Gulf Intracoastal Waterway
Coastal Resilience Study, Texas

Environmental Appendix D

DRAFT

Texas Gulf Coast

Matagorda County, Texas

January 2022

US Army Corps of Engineers ®
Galveston District

Texas Department of Transportation

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Appendix D-1.1

Biological Assessment

for

Gulf Intracoastal Waterway Coastal Resilience Study
Matagorda County, Texas

January 2022

Gulf Intracoastal Waterway Coastal Resilience Study Matagorda County, Texas

Draft Biological Assessment for consultation with the U.S. Fish and Wildlife Service on Federally-Listed Threatened and Endangered Species

January 2022

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This Biological Assessment (BA) has been prepared in accordance with requirements outlined in Section 7 of the Endangered Species Act (ESA). Section (7)(a)(2) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that are proposed or listed as endangered or threatened, as well as their designated critical habitat (CH), if applicable.

This BA documents USACE's determinations regarding the effects of the recommended plan in the Gulf Intracoastal Waterway Coastal Resilience Study (GIWW CRS) in Matagorda County, Texas. It also demonstrates the proposed action is in compliance with the requirements set forth in Section 7, which assures that, through consultation with the US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), Federal actions do not jeopardize the continued existence of any threatened, endangered or proposed species, or result in the destruction or adverse modification of CH. This document specifically pertains to the trust resources of the USFWS. A separate consultation document has been prepared to document the trust resources of the NMFS that receive protection under the ESA.

An official species list was obtained from USFWS via the Information for Planning and Consultation online tool (Consultation Code: 02ETTX00-2022-SLI-0662, Attachment 1). The following ESA-listed, Proposed, or Candidate species were identified as being known to occur in Matagorda County, Texas: West Indian Manatee (*Trichechus manatus*), Eastern Black Rail (*Laterallus jamaicensis jamaicensis*), Northern Aplomado Falcon (*Falco femoralis septentrionalis*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), Whooping Crane (*Grus americana*), 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*), Texas Fawnsfoot (*Truncilla macrodon*), Texas Pimpleback (*Cyclonaias petrina*), and the Monarch Butterfly (*Danaus plexippus*). The only CH reported in or near any of the action areas is for the piping plover.

1.0 Study Background

The U.S. Army Corps of Engineers, Galveston District (USACE), in partnership with the Texas Department of Transportation, have undertaken the Gulf Intracoastal Waterway Coastal Resilience Study (the Study), which is evaluating potential improvements to provide resilience from hurricanes and storms in the Gulf Intracoastal Waterway (GIWW) in Matagorda and Brazoria Counties, Texas. After studying this reach of the GIWW, all of the measures in the recommended plan fall entirely within Matagorda County, Texas (Figure 1). Resilience is defined by USACE as the ability to *prepare, absorb, recover*, and *adapt* from disruptive events. In the context of this study, *prepare* is how proactively the proposed measures are planned, *absorb* is the how effectively the proposed measures can withstand harm, *recover* is how quickly the proposed measures allow for normal operations to resume, and *adapt* is how easily the proposed measures can be modified for changing conditions. The proposed Federal action (also referred to as the recommended plan) consists of shoreline stabilization, restoration of barrier features, the establishment of beneficial use of dredge material placement areas to create marsh habitat, and channel widening (only in zone 12). Project plans are included as Attachment 2.

Figure 1 GIWW CRS Authorized Project Area

Currently, the Study has completed the Tentatively Selected Plan (TSP) milestone meeting phase of the USACE Specific, Measurable, Attainable, Risk Informed, Timely (SMART) Civil Works planning process, where a plan has been tentatively selected by the USACE vertical chain of command. At this stage of the planning, the major components of the plan have been identified and evaluated at a higher level of analysis. Consistent with USACE policy in Planning Bulletin PB 2017-01, there is a certain level of uncertainty expected in the size and make-up of the recommended plan, and other plans identified from the suite of alternatives analyzed in this initial phase, including the National Economic Development (NED) Plan, or a variant preferred by the non-Federal sponsor. As such, the final size of the measures (e.g. width, length, etc.), and location presented in this BA may change in the next planning phase. These changes can affect the habitat impacted. Because of the conservative nature of economic and engineering assumptions used during the initial planning of the recommended plan, it is anticipated that the design of proposed structures will result in equal or lesser environmental impacts.

The measures included in the Recommended Plan are intended to compliment the project features approved in the Coastal Texas Protection and Restoration Study (Coastal Texas Study). None of the measures included in this study overlap with any of those put forth in the Coastal Texas Study.

1.1 Consultation History

Coordination with USFWS, NMFS, and Texas Parks and Wildlife Department (TPWD), has occurred since the start of the study. Coordination has included: problem and opportunity development; contributing to identifying restoration measures and priority restoration locations; describing the existing, future without- and future with-project condition; and discussion of benefit and impact analyses. The following documents coordination with USFWS regarding ESA and general resource agency coordination:

- April 29, 2020 – An Initial list of threatened and endangered species was acquired from the IPAC website. (Consultation Code: 02ETTX00-2020-SLI-1960).
- May 12, 2020 – Letter sent to USFWS's Clear Lake Ecological Services Office extending an invitation to be a Cooperating Agency for the Study.
- June 29, 2020 – Resource Agency Meeting to kick off the study and discuss potential compliance requirements including Endangered Species Act Compliance.
- December 11, 2020 – Resource Agency Meeting with engineers to discuss designs o the measures. Attendees included USFWS representatives from the Clear Lake Ecological Services Office and Big Boggy NWR. Our agency representatives included NMFS and TPWD. USFWS expressed concerns with the designs for Zone 12 (Mitchell's Cut). The recommendations in meeting led to a complete redesign of the proposed work in Zone 12 to incorporate agency recommendations.
- March 24, 2021 - Meeting between USFWS's Clear Lake Ecological Services Office and USACE to discuss changes to Zone 12 (Mitchell's Cut/Caney Creek) to reduce impacts to Piping Plover and future without projects for the action area over the 50 year analysis period.
- December 9, 2022 – An updated IPAC list of threatened and endangered species was acquired (Consultation Code: 02ETTX00-2022-SLI-0662, Attachment 1) to ensure up to date statuses in this document.

1.2 Recommended Plan (Description of proposed action)

The authorized project area encompasses 85 miles of the Texas portion of the GIWW in Brazoria and Matagorda counties which was divided into 20 zones for detailed analysis according to geography and ecology. As the evaluation progressed during the study, the study area focused on Zones 12, 13, 14, 16 and 18 as shown in Figure 1. The Recommended Plan prevents the loss of existing barrier islands while also restoring 435 acres of barrier features by 2080.

Work in Zone 12 includes a combination of shoreline stabilization using breakwaters and channel widening of the existing GIWW by 150-foot on either side of the channel at the confluence of Caney Creek and the GIWW. Approximately 951 linear feet of breakwater would protect 16 acres of existing barrier and 36 acres of existing marsh and mudflats predicted to be lost to erosion without the proposed work. These actions will help address a grounding hotspot which has posed safety risks to navigation. The new work widening dredge material will be placed into PA 102-C unless in PED the new work material is considered sufficient to construct the earthen berms included in nearby Zones. The frequency of emergency dredging is expected to stay the same through 2080 if channel widening is not performed. In Zone 12, with channel widening it was possible to change the dredging cycle for the entire zone to every 2 years, eliminating the existing need for out of cycle dredging as vessels should be able to navigate channel better even in high shoaling conditions. The breakwater configurations will be refined in PED using survey data, they are planned to be placed in shallow water and not on land. Due to the erosive state of the shorelines, the breakwater footprints are shown where predictive modeling indicates future shorelines to be.

Work in Zone 13 includes construction of an earthen berm with a crest elevation of 8 feet NAVD88 to attenuate the crosswinds that vessels in the GIWW would be exposed to. Breakwaters are proposed to be constructed with crests at 3 feet NAVD88 on the channel bayside and bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure. The berm would span approximately 19,000 linear feet in length with a surface area of 110 acres. The berm would be constructed using material borrowed from a 200-foot-wide by 3-foot-deep area that runs parallel to and on the bayside of the restored barrier feature. Finally, a 328-acre area between the bayside breakwater and the berm would be used as an adaptable beneficial use site. The borrow area is within the BU site and would be restored using O&M material. For the feasibility analysis, the creation of marsh cells using training berms to hit ideal elevations for *Spartina alterniflora* propagation to incrementally develop the BU area over the period of analysis was used. In PED and for future construction cycles, USACE will coordinate with Federal and State resource agencies to incorporate recommendations for continued work and optimization within the BU site. Costs for incrementally seeding the BU site with locally gathered *S. alterniflora* seed was also included in the estimate. Also, thin layer placement is included in the Engineering Appendix as a strategy to combat the effects of Relative Sea Level Rise in the BU areas. Final designs for the BU strategy will occur in PED and will utilize inputs from the resource agencies to identify reference sites and goals.

Work in Zone 14 would restore barrier features along the interface of the GIWW and Live Oak Bay and includes a pass to match historic conditions for hydrologic purposes. A combination of shoreline stabilization using breakwaters and sediment placement will restore 29 acres of barrier feature and would protect 85 acres of barrier island predicted to remain at the start of construction. This work would protect 4,329 linear feet of the GIWW. The earthen berm is proposed to be constructed with a

crest elevation of 8 feet NAVD88 and is designed to attenuate the crosswinds that vessels in the channel would be exposed to. Breakwaters are proposed to be constructed with crests at 3 feet NAVD88 on the channel bayside and bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure. Work in Zone 14 also includes 85 acres of BU area. All the BU discussions for Zone 13 also apply to Zone 14. Live Oak Bay contains many oyster reefs and rookery areas. USACE will conduct habitat surveys and will coordinate with Federal and State resource agencies in PED to ensure final designs avoid and minimize impacts to these important ecological habitats. This is specifically relevant for the BU area and bayside breakwaters which will be reconfigured in PED to avoid those habitats.

Work in Zone 16 includes construction of 94 acres of berm to a crest elevation of 8 feet NAVD88 and installation of channel bayside and bayside breakwaters with a 3 feet NAVD88 crest elevation to protect 7,704 linear feet of GIWW channel. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Work in Zone 16 also includes 282 acres of BU area. All the BU discussions for Zone 13 also apply to Zone 16.

Work in Zone 18 includes construction of 291 acres of berm to a crest elevation of 8 feet NAVD88 and installation of channel bayside and bayside breakwaters with a 3 feet NAVD88 crest elevation to protect 33,115 linear feet of GIWW channel. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Work in Zone 16 also includes 870 acres of BU area. All the BU discussions for Zone 13 also apply to Zone 18.

Hydrologic breaks are planned for the breakwaters included in all of the zones to ensure tidal exchange occurs across the structures and to ensure transitory access for marine species. There are numerous potential approaches that may be applied, such as reef balls, oyster castles, complete breaks in the breakwater, or lower crest elevation sections. The designs will be incorporated during the preconstruction, engineering, and design phase of project development.

Mitigation Plan summary for the recommended plan: For this feasibility analysis, existing ecological resources within and near the project footprints were calculated using geospatial data from USFWS, TPWD, NMFS, and the TXGLO. The results of this analysis are as follows, project footprints would directly impact 39 acres of seagrasses and 1 acre of oyster reef. In addition to the direct impacts, 138.8 acres of sea grass and 41.4 acres of oyster reef occur within 1000 feet of the project footprints. To provide an estimate of the high end of the range of possible adverse effects, USACE assumed a complete loss of the habitats within the footprints, a percentage of indirect impacts within the buffer zone and developed a mitigation plan using ecological modeling (Habitat Evaluation Procedures). To offset the high-end range of adverse effects, USACE will have to restore 3 acres of oyster reef and 87 acres of seagrass meadows in East Matagorda Bay and 4.5 acres of oyster reef in Matagorda Bay. USACE will conduct habitat surveys and will coordinate with Federal and State resource agencies in PED to ensure final designs avoid and minimize impacts to these important ecological habitats. Engineering has confirmed that the BU areas and bayside breakwaters will be reconfigured in PED to avoid those habitats. Ecological modeling will be re-run in PED to include survey data and reconfigured alignments.

2.0 ACTION AREA

The action area is defined (50 CFR 402.02) as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The USACE proposes that the action area includes each of the project footprints by zone to include a 1000-foot buffer to capture any temporary construction areas and noise or turbidity disturbances. Additionally, the action area includes the entirety of East Matagorda Bay, the western portion of Matagorda Bay, Mitchell’s Cut, and the beaches west of Mitchell’s cut which might experience hydrologic alterations from project measures. See Figure 1.

3.0 LISTED SPECIES AND CRITICAL HABITAT IN THE ACTION AREA

Fourteen ESA-listed, candidate, or proposed for listing species have been identified in the USFWS Official Species List dated December 9, 2022.

Table 1. ESA-listed Species Identified by USFWS as Potentially Occurring in the Action Area

Species	Scientific Name	Status	CH*
Mammal			
West Indian Manatee	*Trichechus manatus*	Threatened	Yes
Birds			
Eastern black rail	*Laterallus jamaicensis jamaicensis*	Threatened	No
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Endangered	No
Piping Plover	*Charadrius melodus*	Threatened	Yes
Rufa Red Knot	*Calidris canutus rufa*	Threatened	Proposed
Whooping Crane	*Grus americana*	Endangered	Yes
Reptiles			
Green sea turtle	*Chelonia mydas*	Threatened	Yes
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	Yes
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered	Proposed
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Yes
Loggerhead sea turtle	*Caretta caretta*	Threatened	Yes
Clams			
Texas Fawnsfoot	*Truncilla macrodon*	Proposed Endangered	Proposed
Texas Pimpleback	*Cyclonaias petrina*	Proposed Endangered	Proposed
Insects			
Monarch Butterfly	*Danaus plexippus*	Candidate	No

* CH designated for the species; however a 'Yes' does not indicate presence in the action area. See Chapter 4.0 for presence/absence.

To assess the status of species in the action area and potential impacts of the action on ESA-listed species, several sources were consulted including: literature review of scientific data; interview of recognized experts on listed species including local and regional authorities and Federal (USFWS and NMFS) and State (TPWD) wildlife personnel; on-site inspections; and compiled lists of ESA-listed species. Significant literature sources consulted include the USFWS and NMFS species specific webpages, Federal status reports and recovery plans, TPWD species occurrence and monitoring reports, peer-reviewed journals, and other standard references.

During the review, it was found that 3 species have no potential to occur in any of the action areas because no suitable habitat exists (Table 5). Also, the five sea turtle species are also included in Table 5 because the project does not include work in turtle nesting habitat and there were no indirect effects identified that would modify that habitat. A Memorandum of Understanding (MOU)was signed on July 18, 1977 acknowledging joint administration of the ESA by the Service and the National Marine Fisheries Service (NMFS) in regard to marine sea turtles. The MOU outlines jurisdiction for sea turtles under the ESA and states "The Service shall have sole jurisdiction over seaturtles, including parts or products, when on land and NMFS shall have sole jurisdiction over sea turtles, including parts or products when in the marine environment" (NMFS and Service 1977). For this reason the USACE is The USACE is working with NMFS to evaluate the effects of the proposed dredging and other in-water construction activities on sea turtles in the water.

Table 2. Listed Species with No Potential to Occur in Project Vicinity

Species	Range and Habitat
Northern Aplomado Falcon (USFWS 2014)	Historically, the species' range extended from Trans-Pecos Texas, southern New Mexico and southeastern Arizona, to Chiapas and the northern Yucatan along the Gulf of Mexico and along the Pacific slope of Central America north of Nicaragua. By mid-century, the falcon was absent from most of its range in the US with very few sightings reported. Since their listing, there have been reintroduction efforts in west Texas, at the King Ranch in Kleberg County, Matagorda Island and Laguna Atascosa NWR. There are established nesting populations in Brownsville and on Matagorda Island in Texas. Matagorda Island was not historically associated with falcons and the population was established to improve survival success since the island was devoid of great-horned owls. Matagorda Island is 5 miles from Zone 18 which is the closest project area and does not include preferred foraging habitat. In the US, they are found along yucca-covered sand ridges in coastal prairies, riparian woodlands in open grasslands, and in desert grasslands with scattered mesquite and yucca from sea level to about 4,500 feet. Nest platforms of sticks or twigs are often placed in mesquite or tall yuccas, 10-14 feet above ground. Falcons have successfully nested on larger expanses of seasonally inundated salt prairie and vegetated by gulf cordgrass (*Spartina spartinae*), marshhay cordgrass (*S. patens*), gulf dune paspalum (*Paspalum monostachyum*), gulf bluestem (*Schizachyrium maritimum*), sea ox-eye daisy (Borrichia frutescens), and glasswart (*Salicornia sp.*). Woody vegetation on salt prairie is sparse, except where honey mesquite (*Prosopis glandulosa*) and huisache (*Acacia farnesiana*) occur more frequently at slightly higher elevations, and occasional small hills (lomas) unless controlled by periodic fire.
Clams: Texas Fawnsfoot Texas Pimpleback	All work areas contain estuarine salinity profiles not suitable for these species. There are no upstream impacts anticipated from the proposed work. The species prefer large to moderate freshwater riverine environments with soft, sandy sediment and moderate water flow. The species seems to be intolerant of impoundments, as no individuals have been found in lakes, ponds, or reservoirs within its range. Adults appear to occur most often in bank habitat and occasionally in backwater, riffle, and point bar habitats with low to moderate water velocities and fine or coarse sediments.
Reptiles: green sea turtle Hawksbill sea turtle Kemp's Ridley sea turtle, leatherback sea turtle loggerhead sea turtle	This Section only relates to nests, nesting habitat, and nesting activities for the five sea turtle species sea turtles. A separate assessment on other habitat requirements for other portions of the species life cycles is included in the ESA Coordination letter to the NMFS. Separate Effects determinations and justifications are included in that document. While the action area contains suitable nesting habitat along the beaches in Matagorda County, primarily for the Kemp's Ridley sea turtle, the Engineering analysis concluded that the project features would not create a difference in the with and without project scenario for these beach habitats. Sediment delivery to the beaches is expected to be the same for the with and without project scenarios even with the increased width of the GIWW in Zone 12. The Engineering for the widened channel predicts the same amount of O&M dredge material but with fewer out of cycle dredge events required.

3.1 West Indian Manatee

Manatees are large, elongated marine mammals with paired flippers and a large, spoon-shaped tail. They can reach lengths of over 14 feet and weights of over 3,000 pounds. Manatees are herbivores that feed opportunistically on a wide variety of submerged, floating, and emergent vegetation.

Status

USFWS listed the West Indian manatee as endangered on March 11, 1967 (32 FR 4001) and later received protection under ESA in 1973. On May 5, 2017, the species was reclassified from endangered to threatened because the endangered designation no longer reflected the status of the species at the time of reclassification (82 FR 16668). Critical habitat for the Florida manatee subspecies (*Trichechus manatus latirostris*) was designated in 1976 (41 FR 41914).

The major threats faced by manatees today are numerous. Collisions with watercraft account for an average of 24-30% of the known manatee deaths in Florida annually. Deaths attributed to water control structures and navigational locks represent four percent of known deaths. There are also threats to their habitat as a result of intensive coastal development throughout much of the manatee's range. As well, the availability of warm-water refuges for manatee is uncertain if minimum flows and levels are not established for the natural springs on which many manatees depend and as deregulation of the power industry in Florida occurs. There are also threats from natural events such as red tide and cold events. (USFWS 2001b).

Range and Habitat

The West Indian manatee was historically found in shallow coastal waters, bays, lagoons, estuaries, rivers, and inland lakes throughout much of the tropical and sub-tropical regions of the New World Atlantic, including many of the Caribbean islands. However, at the present time, manatees are now rare or extinct in most parts of their former range. Today, manatees occur primarily in Florida and southeastern Georgia, but individuals can range as far north as Rhode Island on the Atlantic coast (Reid 1996) and as far west as Texas on the Gulf coast.

Manatees live in marine, brackish, and freshwater systems in coastal and riverine areas throughout their range. Preferred habitats include areas near the shore featuring underwater vegetation like seagrass and eelgrass. They feed along grass bed margins with access to deep water channels, where they flee when threatened. Manatees often use secluded canals, creeks, embayments, and lagoons, particularly near the mouths of coastal rivers and sloughs, for feeding, resting, cavorting, mating, and calving (Marine Mammal Commission 1986). In estuarine and brackish areas, natural and artificial fresh water sources are sought by manatees.

When ambient water temperatures drop below 68 degrees Fahrenheit in autumn and winter, manatees aggregate within the confines of natural and artificial warm-water refuges or move to the southern tip of Florida (Snow 1991). Most artificial refuges are created by warm-water outfalls from power plants or paper mills. The largest winter aggregations are at refuges in Central and Southern Florida. The northernmost natural warm-water refuge used regularly on the west coast is at Crystal River and at Blue Springs in the St. Johns River on the east coast. Most manatees return to the same warm-water refuges each year; however, some use different refuges in different years and others use two or more refuges in the same winter (Reid and Rathbun 1986, Reid et al. 1995). Many lesser known, minor aggregation sites

are used as temporary thermal refuges. Most of these refuges are canals or boat basins where warmer water temperatures persist as temperatures in adjacent bays and rivers decline.

As water temperatures rise manatees disperse from winter aggregation areas. While some remain near their winter refuges, others undertake extensive travels along the coast and far up rivers and canals. On the east coast, summer sightings drop off rapidly north of Georgia (Lefebvre et al. 2001) and are rare north of Cape Hatteras (Schwartz 1995); the northernmost sighting is from Rhode Island (Reid 1996). On the west coast, sightings drop off sharply west of the Suwannee River in Florida (Marine Mammal Commission 1986). Rare sightings also have been made in the Dry Tortugas (Reynolds and Ferguson 1984) and the Bahamas (Lefebvre et al. 2001).

During the summer, manatees may be commonly found almost anywhere in Florida where water depths and access channels are greater than one to two meters (O'Shea 1988). Manatees can be found in very shallow water. In warm seasons, they usually occur alone or in pairs, although interacting groups of five to ten animals are not unusual.

Occurrence in the Action Area

The West Indian manatee historically inhabited the Laguna Madre, the Gulf, and tidally influenced portions of rivers. It is currently, however, extremely rare in Texas waters and the most recent sightings are likely individuals migrating or wandering from Mexican waters. Historical records from Texas waters include Cow Bayou, Sabine Lake, Galveston Bay, Copano bay, the Bolivar Peninsula, and the mouth of the Rio Grande (Schmidly 2004, Würsig 2017). In May 2005, a live manatee appeared in the Laguna Madre near Port Mansfield (Blankinship 2005) several hundred miles south of the action area. Due to the species' extreme rarity in the action area, its presence is highly unlikely; however, with historic records it cannot be ruled out with certainty that the species could not occur in the action area.

3.2 Eastern Black Rail

The eastern black rail is the most secretive of the secretive marsh birds and one of the least understood species in North America. The sparrow-sized bird with slate gray plumage and red eyes lives in remote wetlands of the Midwest and along the coasts of the Atlantic and Pacific oceans and the Gulf of Mexico. Because it only comes out at night, prefers to walk hidden in tall grasses instead of fly and rarely makes a call, very little is known about its behavior and habitat needs.

Not much is known about the subspecies diet, but they are probably opportunistic foragers. Their bill shape suggests generalized feeding methods such as gleaning or pecking at individual items, thus a reliance on sight for finding food. Examination of specimens collected indicates a diet of small aquatic and terrestrial invertebrates, as well as small seeds. Foraging most likely occurs on or near the edges of stand of emerging vegetation -- both above and below the high-water line.

Status

The eastern black rail was listed as threatened on October 8, 2020, with a Section 4(d) Rule (FR 63764). No CH has been designated for the species. The Section 4(d) Rule allows the Service to establish prohibitions or exceptions to prohibitions for threatened species while providing for the conservation of a threatened species by allowing flexibility under ESA. None of the 4(d) Rule prohibitions or exceptions to prohibitions apply to this project.

The primary threats to eastern black rail are: (1) Habitat fragmentation and conversion, resulting in the loss of wetland habitats across the range; (2) sea level rise and tidal flooding; (3) land management practices (*i.e.,* incompatible fire management practices, grazing, and haying/mowing/other mechanical treatment activities); and (4) stochastic events (*e.g.,* extreme flooding, hurricanes). Human disturbance, such as birders using excessive playback calls of black rail vocalizations, is also a concern for the species. Additional stressors to the species (including oil and chemical spills and environmental contaminants; disease, specifically West Nile virus; and predation and altered food webs resulting from invasive species (fire ants, feral pigs, nutria, mongoose, and exotic reptiles) introductions.

Range and Habitat

All of the information found in this section were summarized from Watts (2016), unless otherwise indicated.

The eastern black rail is a widely distributed, secretive marsh bird with little known about its population structure and dynamics. The subspecies is broadly distributed, living in salt and freshwater marshes in portions of the United States, Central America, and South America. The species is partially migratory wintering in the southern part of its breeding range.

The eastern black rail has a broad but poorly known breeding range that includes the Atlantic and Gulf Coasts of North America, parts of Colorado, Oklahoma and the mid-west, the West Indies including Cuba, Jamaica and historically Puerto Rico and parts of Central America from Mexico through Panama (Eddleman et al. 1994). A total of 1,937 occurrence records were found within this area between 1836 and 2016. Credible evidence of occurrence was found for 21 of the 23 states including 174 counties, parishes and independent cities and 308 named properties. Based on breeding evidence and seasonality of occurrence 34 (19%) counties were classified as confirmed, 97 (56%) as probable breeding and 43 (25%) as possible breeding. Many of the named properties are well-known conservation lands including 46 (15%) national wildlife refuges, 44 (14%) state wildlife management areas, 26 (8%) state and municipal parks and many named lands managed by non-governmental conservation organizations.

Since 2010, 247 black rail occurrences have been recorded within 11 of the 23 states in the study area. Records were found for 53 counties, parishes and independent cities (Figure 7). Based on breeding evidence and seasonality of occurrence 2 (4%) counties were classified as confirmed, 35 (66%) as probable breeding and 16 (30%) as possible breeding. Records were found for 92 named properties including 2 (3%) properties classified as confirmed, 73 (79%) as probable breeding and 17 (18%) properties classified as possible breeding.

The eastern black rail is a wetland dependent bird requiring dense overhead cover and soils that are moist to saturated (occasionally dry) and interspersed with or adjacent to very shallow water (typically ≤3 cm) to support its resource needs. Eastern black rails occur across an elevational gradient that lies between lower and wetter portions of the marsh and their contiguous uplands. Their location across this gradient may vary depending on the hydrologic conditions. These habitat gradients have gentle slopes so that wetlands are capable of having large areas of shallow inundation (sheet water). These wetlands are able to shrink and expand based on hydrologic conditions and thus provide dependable foraging habitat across the wetted areas and wetland-upland transition zone for the subspecies. Eastern black rails also require adjacent higher elevation areas (i.e., the wetland-upland transition zone) with dense

cover to survive high water events due to the propensity of juvenile and adult black rails to walk and run rather than fly and chicks' inability to fly. (USFWS 2019)

The subspecies requires dense vegetation that allows movement underneath the canopy, and because are found in a variety of salt, brackish, and freshwater wetland habitats that can be tidally or non-tidally influenced, plant structure is considered more important than plant species composition in predicting habitat suitability. In terms of nest success, nests must be well hidden in a dense clump of vegetation over moist soil or shallow water to provide shelter from the elements and protection from predators. Flooding is a frequent cause of nest failure; therefore, water levels must be lower than nests during egg-laying and incubation in order for nets to be successful. In addition, shallow pools that are 1-3 cm deep may be the most optimal for foraging and for chick-rearing. (USFWS 2019)

Occurrence in the Action Area

All information in this section was summarized from Watt (2016) unless otherwise noted. Texas is a black rail crossroad making it difficult to differentiate breeders from winter residents from migrants. Black rail in Texas use tidal salt marshes along the barrier islands and the mainland fringe, as well as, drier coastal prairie. The upper Texas coast (Jefferson, Chambers, Galveston, Harris, and Brazoria counties) has a long history of black rail records that are concentrated within national wildlife refuges and state wildlife management areas. Much of the black rail activity along the upper and middle Texas coast has been concentrated on the Bolivar Peninsula and Brazoria, Anahuac and San Bernard National Wildlife Refuges. Presence of black rail in Matagorda County (action area) is uncertain but is presumed to be likely.

Within the action area, dredged material would be placed into open water areas and severely degraded and fragmented marsh habitat with current platform elevations of less than +0.5 feet. No project work (initial construction or future BU) is proposed in Eastern Black Rail Habitat but existing tidal marsh and future restored marsh would be considered habitat that is near the construction areas for the project.

3.3 Piping Plover

Piping plover is in the family Charadriidae, which is the second-largest family of shorebirds. Piping plovers are small, stocky shorebirds, typically about seven and a quarter inches long, with a wing span of 14 to 15.5 inches.

Wintering piping plover feed on a variety of invertebrates such as polychaete marine worms, various crustaceans, amphipods, terrestrial and benthic insects, and occasionally bivalve mollusks (Elphick at al 2001, Zonick and Ryan 1996), but diet varies by ecosystem and habitat. Polychaete worms and surface-dwelling arthropods such as amphipods and insects are particularly important food sources. (USFWS 2008) Feeding activities occur during all hours of the day and night (Zonick 1997) and at all stages in the tidal cycle (USFWS 2009). Plovers forage on moist substrate features such as intertidal portions of ocean beaches, washover areas, mudflats, sand flats, algal flats, shoals, wrack lines, sparse vegetation, and shorelines of coastal ponds, lagoons, ephemeral pools adjacent to salt marshes (USFWS 2009, Zonick 1997).

Status

USFWS listed the piping plover (*Charadrius melodus*) on 11 December 1985 (50 FR 50726) as endangered in its breeding range and threatened throughout the remaining range. In the action area, piping plovers are listed as threatened.

Major threats to wintering piping plover that were identified at the time of listing included destruction or modification of beach and littoral habitat and human disturbance. Human-caused disturbance factors that may affect the survival of piping plover or utilization of wintering habitat include recreational activities, inlet and shoreline stabilization projects, dredging of inlets that can affect spit formation, beach maintenance and renourishment, and pollution. In some areas, natural erosion of barrier islands may also result in habitat loss. The construction of houses and commercial buildings on and adjacent to barrier beaches results in increased human disturbance and habitat loss.

Range and Habitat

Piping plovers breed in three areas in North America: the Great Plains, the Great Lakes, and the Atlantic Coast. They typically inhabit shorelines of oceans, rivers, and inland lakes. Nest sites include sandy beaches, especially where scattered tufts of grass are present; sandbars; causeways; bare areas on dredge-created and natural alluvial islands in rivers; gravel pits along rivers; silty flats; and salt-encrusted bare areas of sand, gravel, or pebbly mud on interior alkali lakes and ponds (Haig and Elliot-Smith 2004).

Migration to winter areas begins in late summer and continues through the fall. Piping plovers begin arriving on their wintering ground in late July, although most wintering birds arrive at the Texas coast in August and September. They begin leaving the wintering grounds in late February and by mid-May, almost all wintering birds have left the Texas coastal area for their nesting grounds. Because birds may cross over from the Gulf or Atlantic coasts, birds on Texas wintering grounds may be from any of the three breeding areas. (USFWS 2008)

Wintering habitat along the Texas coast can be broadly characterized as emergent tidal or washover areas that are unvegetated to sparsely vegetated with wet to saturated soils in close proximity to water (Zonick 2000). Wintering plover use coastal areas on the mainland and habitats on barrier islands, both on the bay side (i.e. bayshore habitats) and on the ocean side (i.e. ocean beaches). Bayshore tidal sand and algal flats are primary areas used by plovers, but oceanside beaches, washover passes, and mainland tidal mud flats provide essential secondary habitat when bayshore tidal flats are submerged. Important components of the beach/dune ecosystem include surf-cast algae for feeding of prey; sparsely vegetated backbeach (beach area above mean high tide seaward of the dune line, or in cases where no dune exists, seaward of a delineating feature such as a vegetation line, structure, or road) for roosting and refuge during storms; and spits (a small point of land, especially sand running into water), salterns (bare sand flats in the center of mangrove ecosystems that are found above mean high water and are only irregularly flushed with sea water), and washover areas for feeding and roosting (USFWS 2003).

On the lower Texas coast, individual plovers are known to use areas about 3,000 acres in size, moving two miles or more between forgaging sites as tidal movements shift the availability of productive tidal flats (TPWD 2000). Recent studies show significantly more stringent site fidelity with individual birds returning to more precise locations (+/-400 feet in lateral distance on the beach) each year (USACE 2009)

Occurrence in the Action Area

The Texas coast is a major wintering area for piping plovers, and may provide habitat for about 55 percent of birds found during winter censuses (Haig and Plissner 1993, Drake 1999, Elliott-Smith et. al. 2009). Since piping plovers spend 55 to 80 percent of their annual cycle associated with wintering areas, factors that affect their wellbeing on the wintering grounds could substantially affect their survival and recovery (Service 1996). A consistent finding of all analyses of the demographic factors affecting the persistence and/or extinction of piping plover populations is that vulnerability to extinction is greatly increased by even small declines in

Within or near the action areas, piping plover are expected in small numbers during the winter feeding on invertebrates along exposed mud, sand, or algal flats or on wide Gulf beaches. In general, most actionable measure locations do not currently support high quality habitat due to highly erosive and narrow shorelines and presence of emergent vegetation or open water.

Critical Habitat

CH for wintering piping plover was designated on July 10, 2001 (66 FR 36038) along several locations of the Texas coast. Designated wintering piping plover CH originally included 142 areas encompassing approximately 1,793 miles of mapped shoreline and 165,211 acres of mapped areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

The primary constituent elements (PCEs) for piping plover wintering habitat essential for the conservation of the species are those habitat components that support foraging, roosting, and sheltering, and the physical features necessary for maintaining the natural processes that support these habitat components. The essential physical and biological elements of the habitat include:

1) Intertidal sand beaches including sand flats or mudflats between annual low tide and annual high tide with no or very sparse emergent vegetation for feeding
2) Unvegetated or sparsely vegetated sand, mud, or algal flats above annual high tide for roosting. Such sites may have debris or detritus and micro-topographic relief offering refuge from high winds and cold weather.
3) Surf-case algae for feeding.
4) Sparsely vegetated back beach which is the beach area above mean high tide seaward of the dune line, or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road. Back beach is used by plovers for roosting and refuge during storms.
5) Spits, especially sand, running into water for foraging and roosting.
6) Unvegetated washover areas with little or no topographic relief for feeding and roosting. Washover areas are formed and maintained by the action of hurricanes, storm surges, or the extreme wave actions.
7) Natural conditions of sparse vegetation and little or no topographic relief mimicked in artificial habitat types (e.g. dredge spoil sites)

The units designated as CH are those areas that have consistent use by piping plovers and that best meet the biological needs of the species. The amount of wintering habitat included in the designation

appears sufficient to support future recovered populations, and the existence of this habitat is essential to the conservation of the species.

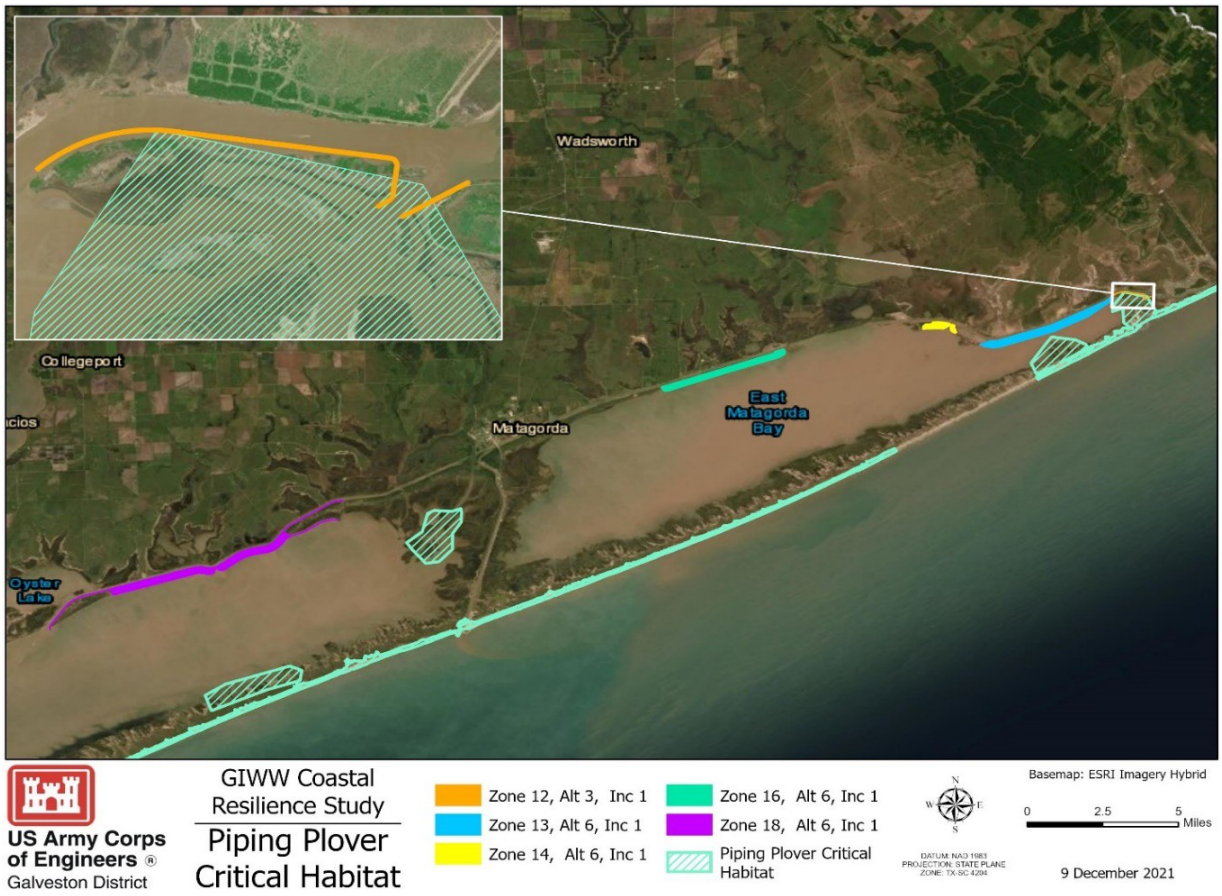

Figure 2. Piping Plover Critical Habitat within the Action Area

As shown in Figure 2, the project involves some work within piping plover CH. Specifically, in Zone 12, 1,120 linear feet of rock breakwater would be installed within a total of 1.13 acre of Piping Plover critical habitat. Initial plans considered barrier restoration and breakwaters on the bay side of Zone 12 to address projected barrier loss; however, as a result of agency coordination, the design was iteratively designed to avoid impacts to critical habitat. Also, by reducing the erosion caused by ship wakes in the GIWW, and reducing the frequency of future O&M dredging, the project will reduce predicted disturbances on piping plover CH. All work within CH would occur in open water areas along eroding shorelines.

3.4 Red Knot

The rufa red knot (red knot) is a medium-size shorebird about 9 to 11 inches in length. The red knot is a specialized molluscivore, eating hard-shelled mollusks, sometimes supplemented with easily accessed and/or shallow-buried softer invertebrate prey, such as shrimp- and crab-like organisms, marine worms, and horseshoe crab (*Limulus polyphemus*) eggs (Piersma and van Gils 2011). Mollusk prey are swallowed whole and crushed in the gizzard (Piersma and van Gils 2011). Foraging activity is largely dictated by tidal conditions, as the red knot rarely wades more than 0.8 to 1.2 inches and cannot effectively dig

deeper than 0.8 to 1.2 inches. It has been reported that Coquina clams (*Donax variabilis*) serve as a frequent and often important food resource for red knots along Gulf beaches.

Status

There are six recognized subspecies of red knots (*Calidris canutus*), and on December 11, 2014, the USFWS published a final rule in the Federal Register listing the rufa subspecies of red knot (*Calidris canutus rufa*) as a threated species under ESA (79 FR 73705—73748). Each subspecies is believed to occupy separate breeding areas, in addition to having distinctive morphological traits (i.e. body size and plumage characteristics), migration routes, and annual cycles. No CH has been proposed or designated for the red knot.

The rufa red knot subspecies is threatened due to loss of both breeding and nonbreeding habitat; potential for disruption of natural predator cycles on breeding grounds; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions. Main threats to the rufa red knot in the United States include: reduced forage base at the Delaware Bay migration stopover; decreased habitat availability from beach erosion, sea level rise, and shoreline stabilization in Delaware Bay; reduction in or elimination of forage due to shoreline stabilization, hardening, dredging, beach replenishment, and beach nourishment in Massachusetts, North Carolina, and Florida; and beach raking which diminishes red knot habitat suitability. (USFWS 2014)

Range and Habitat

The red knot's range spans 40 states, 24 countries, and their administrative territories or regions extending from their breeding grounds in the Canadian Arctic to migration stopover areas along the Atlantic and Gulf coasts of North America to wintering grounds throughout the Southeastern U.S., the Gulf coast, and South America (reaching as far south as Tierra del Fuego at the southern tip of South America). In Delaware Bay and Tierra del Fuego, the era of modern surveys for the red knot and other shorebird species began in the early 1980s. Systematic red knot surveys of other areas began later, and for many portions of the knot's range, available survey data are patchy. Prior to the 1980s, numerous natural history accounts are available, but provide mainly qualitative or localized population estimates. Nonetheless, a consistent narrative emerges across many historical accounts that red knots were extremely abundant in the early 1800s, decreased sharply starting in the mid-1800s, and may have begun to recover by the mid-1900s. Most writers agree the cause of that historical decline was intensive sport and market hunting. It is unclear whether the red knot population fully recovered its historical numbers following the period of unregulated hunting (Harrington 2001).

Habitats used by red knots in migration and wintering areas are generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In many wintering and stopover areas, quality high-tide roosting habitat (i.e., close to feeding areas, protected from predators, with sufficient space during the highest tides, free from excessive human disturbance) is limited (Kalasz pers. Comm. 2012). The supra-tidal (above the high tide) sandy habitats of inlets provide important areas for roosting, especially at higher tides when intertidal habitats are inundated (Harrington 2008). In some localized areas, red knots will use artificial habitats that mimic natural conditions, such as nourished beaches, dredged spoil sites, elevated road causeways, or impoundments; however, there is limited information regarding the frequency, regularity, timing, or significance of red knots' use of such artificial habitats.

Little information is available about nonbreeding red knots. Unknown numbers of nonbreeding red knots remain south of the breeding grounds during the breeding season, and many, but not all, of these knots are 1-year-old (i.e., immature) birds (Niles et al. 2008). Nonbreeding knots, usually individuals or small groups, have been reported during June along the U.S. Atlantic and Gulf coasts, with smaller numbers around the Great Lakes and Northern Plains in both the United States and Canada (eBird 2020). There is also little information on where juvenile red knots spend their winter months and there may be at least partial segregation of juvenile and adult red knots on the wintering grounds. All juveniles of the Tierra del Fuego wintering region are thought to remain in the Southern Hemisphere during their first year of life, possibly moving to northern South America, but their distribution is largely unknown (Niles et al. 2008). Because there is a lack of specific information on juvenile red knots, the Service uses the best available data from adult red knots to draw conclusions about juvenile foraging and habitat use.

Occurrence in the Action Area

Suitable habitat exists, in and near the action areas, so there is potential for the species to occur. Any occurrence would be expected to be in very small numbers. Piping plovers and red knots exhibit similar foraging and roosting behaviors and utilize similar coastal habitats.

Critical Habitat

Critical habitat was proposed on July 15, 2021, for red knots (86 FR 37410). Currently the proposed critical habitat includes 120 units in Massachusetts, New York, New Jersey, Delaware, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. A total of approximately 649,066-ac (262,667-ha) were proposed to be designated critical habitat. There were 11 proposed critical habitat units [approximately 186,241-ac (75,369-ha)] proposed to be designated in Texas. These areas were believed to contain the essential physical and biological elements for the conservation of red knots, and the physical features necessary for maintaining the natural processes that provides appropriate foraging, roosting, and sheltering habitat components.

3.5 Whooping Crane

The whooping crane (*Grus americana*) is the tallest North American bird with males approaching 1.5 meters in height, is snowy white with black primary feathers on the wings, and a bare red face and crown. Whooping cranes form monogamous pairs for life and all whooping cranes return to the same breeding territory in Wood Buffalo National Park, in Canada to nest in late April or May. Whooping cranes return to wintering grounds of Aransas NWR by late October to mid-November where they migrate singly, in pairs, in family groups or in small flocks and remain until March or April.

Whooping cranes are omnivorous and forage by probing and gleaning foods from soil, water, and vegetation. Summer goods include dragonflies, damselflies, other aquatic insects, crayfish, clams, snails, grasshoppers, cricket, frogs, mice, voles, small birds, minnows, reptiles, and berries. During the winter in Texas, they eat a wide variety of plan and animal foods, with blue crabs, clams, and berries of Carolina wolfberry (*Lycium carolinianum*) being predominant in the diet. Foods taken at upland sites include acorns, snails, crayfish, and insects. Waste grains, such as barley and wheat, form an important part of the diet during the spring and fall migrations (Lewis 1995, Campbell 2003, Canadian Wildlife Service [CWS] and USFWS 2007).

Status

The whooping crane was federally listed as endangered on March 11, 1967 (32 FR 4001). CH has been designated in Aransas, Calhoun, and Refugio counties in Texas, and includes the Aransas National Wildlife Refuge. There is no CH in or near the vicinity of the project area.

The main factors for the decline of the whooping crane were loss of habitat to agriculture (hay, pastureland, and grain production), human disturbance of nesting areas, uncontrolled hunting, specimen and egg collection, collisions with power lines, fences, and other structures, loss and degradation of migration stopover habitat, disease such as avian cholera, predation, lead poisoning, and loss of genetic diversity. Biological factors, such as delayed sexual maturity and small clutch size, prevent rapid population recovery. Drought during the breeding season presents serious hazards to the species. Exposure to disease is a special problem when large numbers of birds are concentrated in limited areas, as often happens during times of drought (Lewis 1995, Campbell 2003, CWS and USFWS 2007).

Range and Habitat

Whooping cranes were originally found throughout most of North America. In the nineteenth century, the main breeding area was from the Northwest Territories to the prairie provinces in Canada, and the northern prairie states to Illinois. Only four populations of whooping cranes exist in the wild, the largest of which is the Aransas-Wood Buffalo population, which breeds in isolated marshy areas of Wood Buffalo National Park in Canada's Northwest Territories. Each fall, the entire population of whooping cranes from this national park migrates some 2,600 miles (4,183 kilometers) primarily to the Aransas NWR and adjacent areas of the central Texas coast in Aransas, Calhoun, and Refugio counties, where it overwinters in oak savannahs, salt marshes, and bays (USFWS 1995). During migration they use various stopover areas in western Canada and the American Midwest. The three other wild populations have been introduced: an eastern population that migrates between Wisconsin and Florida and two non-migratory populations, one in central Florida, the other in Louisiana.

The natural wild population of whooping cranes spends its winters at Aransas NWR, Matagorda Island, Isla San Jose, portions of Lamar Peninsula, and Welder Point on the east side of San Antonio Bay (CWS and USFWS 2007). The main stopover points in Texas for migrating birds are in the central and eastern Panhandle (USFWS 1995).

USFWS reintroduced a non-essential experimental population (NEP) to Vermillion Parish in southwestern Louisiana in 2011. The reintroduced population was designated as NEP under section 10(j) of the Endangered Species Act of 1973 (ESA), as amended. A NEP population is a reintroduced population believed not be essential for the survival of the species, but important for its fully recovery and eventual removal from the endangered and threatened list. Since 2011, 10-16 hatched juveniles have been released annually at White Lake Wetlands Conservation Area, and in 2016 a new release area was added 19 miles to the south at Rockefeller Wildlife Refuge. The NEP is approximately 175 miles from the action area.

Nesting habitat in northern Canada is in poorly drained region of freshwater marshes and wet prairies interspersed with numerous potholes and narrow-wooded ridges. Whooping cranes use a variety of habitats during migration, including freshwater marshes, wet prairies, inland lakes, small farm ponds, upland grain fields, and riverine systems. Shallow flooded palustrine wetlands are used for roosting,

while croplands and emergent wetlands are used for feeding. Riverine habitats, such as submerged sandbars, are often used for roosting. The principal winter habitat in Texas is brackish bays, marshes, and salt flats, although whooping cranes sometimes feed in upland sites characterized by oak mottes, grassland swales, and ponds on gently rolling sandy soils (Lewis 1995, Campbell 2003, CWS and USFWS 2007).

Occurrence in the Action Area

All marsh areas have the potential to support foraging or resting birds.

3.6 Monarch Butterfly

The monarch butterfly is one of the most recognizable species in North America with its iconic orange and black markings. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily Asclepias spp.) and larvae emerge after two to five days. Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic cardenolides as a defense again predators. The larva pupate into chrysalis before eclosing six to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live six to nine months.

Status

On December 15, 2020, the USFWS announced that listing the monarch as endangered or threatened under ESA is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants (85 FR 81813). The monarch is now a candidate species under ESA; its status will be reviewed each year until a listing decision is made. Threats to the monarch include loss of milkweed and nectar resources (i.e. breeding and migratory habitat) from conversion and development of grasslands and widespread use of herbicides), exposure to insecticides, availability and quality of overwintering habitat, and climate change.

Range and Habitat

The life cycle varies by geographic locations and in many regions breed year-round. While in more temperate climates, the species can migrate long distances (over 1850 miles) lasting for over two months to reach their overwintering sites.

Texas is situated between the principal breeding grounds in the north and the overwintering areas in Mexico. Monarchs funnel through Texas both in the fall and spring. During the fall, monarchs use two principal flyways. One traverses Texas in a 300-mile wide path stretch from Wichita Falls to Eagle Pass. Monarchs enter the Texas portion of this flyway during the last days of September and by early November most have passed through to Mexico. The second flyway is situated along the Texas coast and lasts roughly from the third week of October to the middle of November. Early each March overwintering monarchs begin arriving from their overwintering grounds in Mexico seeking emerging milkweeds where they lay their eggs before dying. Most of their offspring continue heading north to repopulate the eastern half of the US and southern Canada.

Adult monarch butterflies during breeding and migration require a sufficient quality and quantity of nectar from nectar blooming resources, which they feed on throughout their migration routes and at their breed grounding (spring through fall). Monarchs also need healthy and abundant milkweed (for both oviposition and larval feeding) embedded within this diverse nectaring habitat. Many monarchs use a variety of roosting trees along the fall migration route. The size and spatial arrangement of habitat patches are generally thought to be important aspects but is not well understood.

Occurrence in the Action Area

Within a couple of miles of the action area, there are grasslands, fields, and marshes that could support milkweed and nectar flowering species in the fall and spring that monarchs could use along their migration paths. Specifically in the action area, suitable habitat is absent in the open water areas and is generally very limited in the existing marsh areas with only a few nectar flowering plants sporadically growing. Common nectar plants include sea ox-eye, seaside golden rod (Solidago sempevirens) and salt marsh aster (Aster tenufolius). Milkweed, specifically swamp milkweed (Asclepias incarnata) is uncommon in the area.

4.0 EFFECTS OF PROJECT

Three of species that were identified on at least one of the three sources sought during the literature review were determined to not be present in the study area because their known range does not overlap the action area or suitable habitat does not exist in the action area (Table 5). Therefore, the proposed action would have ***no effect*** on the northern aplomado falcon, Texas Fawnsfoot, or the Texas Pimpleback. Further the proposed actions would have ***no effect*** on the nesting habitat or life cycle requirements for the five sea turtle species. The USACE is working with NMFS to evaluate the effects of the proposed dredging and other in-water construction activities on sea turtles in the water. These species will not be discussed in further detail in this document. Since the Monarch Butterfly is a Candidate species an effect determination is not required, however this BA documents the lack of habitat within the immediate footprints of the action.

4.1 West Indian Manatee

Due to the rarity of the manatee in the action areas and the conservation measures that would be implemented, implementation of the project ***may affect but is not likely to adversely affect*** the West Indian manatee.

Beneficial Effects: The project will reduce the frequency of maintenance dredging activities which would reduce potential strike and noise harassment probabilities over the 50-year project life. Additionally, ship wake attenuation is expected to reduce turbidities in and around the GIWW which will improve water quality. Additionally, the project includes a total of 1,601 acres of beneficial use placement areas across all of the project zones, which are designed to support habitats like tidal marsh which would also improve water quality.

Direct Effects: In the rare instance that a manatee is found in or near any of the action areas, in-water work during placement of pipelines, operation of watercraft to move material or equipment, etc. could impact manatees. Impacts could include temporary habitat avoidance, exposure to underwater sound, and visual disturbances, which would all cease after construction is complete. The most extreme impact could include entrapment and/or collision with pipes, silt barriers, pumps, placement equipment, support watercraft or other in-water construction equipment. Although this is unlikely due to the extremely rare occurrence of West Indian manatee in any of the action areas, conservation measures are being incorporated into the plan to avoid harassment and take of manatee, see Section 5.0.

4.2 Eastern Black Rail

The USACE has determined implementation of any of the actionable measures ***may affect but is not likely to adversely affect*** the Eastern black rail because the temporary adverse impacts are anticipated to be insignificant and discountable, especially since conservation measures have been incorporated into the plan, the overall beneficial impacts would far outweigh any negative impacts, and the likelihood of the species occurring in the action areas is extremely low. No work is proposed within any marsh habitat although work will unavoidable have to occur near wetland areas including those created through beneficial use of dredge material proposed in this project.

4.3 Piping Plover and Rufa Red Knot

Because both of the species share very similar foraging and roosting behaviors and share similar coastal habitats within the action area, the effects of the action on the two species is expected to be very similar and will, therefore, be discussed together.

Implementation of the Recommended Plan ***may affect but is not likely to adversely affect*** wintering piping plovers and rufa red knots. The primary effects to piping plover and red knot are temporary and would come from construction actions that occur in or near foraging and roosting habitat. Birds may temporarily be displaced from foraging, loafing, and roosting locations to other areas within or adjacent to the action area. It is anticipated that once the disturbance stops, piping plovers and red knots will return. Temporary adverse impacts are anticipated to be insignificant and discountable, especially since conservation measures (Section 5.0) have been incorporated into the plan.

Adverse consequences from work lights may disturb roosting piping plovers and red knots. This disturbance may result in displacing birds to other locations within or adjacent to the action area. The timing and duration of this disturbance will be temporary and occur infrequently as lights will only be used when proposed activities must occur at night.

4.4 Piping Plover Critical Habitat and Proposed Red Knot Critical Habitat Analysis

The Recommended Plan, specifically, the work in Zone 12 is ***not likely to cause destruction or adverse modification of critical habitat for the piping plover***. The proposed actions will likely result in a long-term protection of suitable habitat by attenuating ship wakes from the GIWW ad reducing the frequency of O&M dredge cycles.

As shown in Figure 2, the project involves some work within piping plover CH. Specifically, in Zone 12, 1,120 linear feet of rock breakwater would be installed within a total of 1.13 acre of Piping Plover critical habitat. Initial plans considered barrier restoration and breakwaters on the bay side of Zone 12 to address projected barrier loss; however, as a result of agency coordination, the design was iteratively designed to avoid impacts to critical habitat. Also, by reducing the erosion caused by ship wakes in the GIWW, and reducing the frequency of future O&M dredging, the project will reduce predicted disturbances on piping plover CH. All work within CH would occur in open water areas along eroding shorelines.

4.5 Whooping Crane

The USACE has determined implementation of any of the actionable measures ***may affect but is not likely to adversely affect*** the whooping crane because the temporary adverse impacts are anticipated to be insignificant and discountable, especially since conservation measures have been incorporated into the plan, and the overall beneficial impacts would far outweigh any negative impacts.

4.6 Cumulative Effects of the Actionable Measures

Cumulative effects are those “effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area” considered in this Opinion (50 CFR 402.02).

The project would reduce the frequency of O&M dredge cycles for the GIWW within the Action Area and would increase opportunities for beneficial use to restore habitats within Zones 13, 14, 16, and 18. These measures align with the trend of increasing projects seeking to improve and restore habitats within East Matagorda and Matagorda Bays. Other future projects either conducted by USACE or requiring a permit from USACE, are likely to require consultation under Section 7 with the Service and would therefore be designed to avoid and minimize impacts to these resources.

5.0 AVOIDANCE AND MINIMIZATION MEASURES

Pertaining to all species -

1. Prior to any construction activities, all workers shall be educated on identification, and the importance and protections allocated to the West Indian Manatee, the Eastern Black Rail, the Piping plover, the Red Knot and the Whooping crane. The USACE shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing species protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

2. Notify TCESFO in writing two weeks prior to initiation of construction activities and within two weeks following the completion of project construction. Upon completion of the project, a report describing any deviations from the description of the proposed action (see description of proposed action section above), conservation measures implemented during project activities, the success of such measures, any incidents that may have occurred, and any recommendations on improvements to those measures shall be submitted to TCESFO. Reports should be sent to U.S. Fish and Wildlife Service, ATTN: Field Supervisor, 17629 El Camino Real Suite 211, Houston, Texas 77058.

West Indian Manatee –

3. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

4. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment.

5. Any construction barriers must not impede manatee movement.

6. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes' elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

7. Any collision with or injury to a manatee shall be reported immediately to the Texas Marine Mammal Stranding Network (TMMSN) Hotline at 1-888-9-MAMMAL. Collision and/or injury should also be reported to the Texas Coastal Ecological Service Field Office (TCESFO) at (281) 286-8282, extension 26504.

8. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed upon completion of the project. Temporary signs that

have already been approved for this use by the Service must be used. One sign which reads Caution: Boaters must be posted. A second sign measuring at least 8 ½" by 11" explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

Eastern black rail –

9. Efforts will be made to mitigate noise and vibration within and adjacent to BLRA habitat to include planning and performing work outside of peak breeding call times (i.e., one hour before and after dawn and one hour before and after dusk) for BLRA.

10. The contractor will minimize traffic to temporary access routes, or staging areas that occur within potential BLRA habitat; thereby minimizing the construction footprint, by limiting the number of ingress and egress routes to the maximum extent possible.

11. A biological monitor will be present during construction activities and will have authority to stop work immediately if BLRA chicks or eggs are observed within the project area and the TCESFO should be contacted immediately at (281)286-8282. (The need for a biological monitor will depend on the results of the surveys and time of year that work is completed in BLRA habitat and must be coordinated with the Service.)

12. Upon discovery of any injured BLRA, the Service's TCESFO will be notified at 281-286-8282, and the individual will be kept comfortable and safe until Service biologist can arrive and transport the bird to a veterinary facility for appropriate care.

Piping Plover and Red Knot -

13. For any work in Zones 12 and 13, occurring during the wintering season (July 15, extending through May 15) wildlife monitor(s) will inspect the active work areas prior to the start of work daily and continuously throughout the day.

14. Construction workers will immediately notify the wildlife monitor(s) if listed species occur in the immediate vicinity of the active work area. If a piping plover and/or red knot are found in the active work area, all work will be stopped within an area a 75-ft avoidance buffer until the bird(s) leaves the construction site. Equipment will remain powered off and all personnel will be vacated from the work area until the bird(s) has/have left.

Whooping Crane -

15. A biological monitor will be present when any work is being done in suitable wetland habitat if the work is performed during the wintering season (October 1 through April 15).

16. Prior to the start of work each day, the project area will be surveyed for the presence of whooping cranes within 1,000 feet (805 m) of the project area. If whooping cranes are observed, no work will be performed until the birds have moved away from the project area. If birds move into the project area during project construction implementation, all mechanized equipment actions will cease until the birds vacate the project area.

17. Any equipment used in construction equal to or higher than 15 feet (~4.6 meters) will possess attached visual flags as bird avoidance measures when the equipment is in use; and contractors are to ensure that the equipment is placed horizontally on the ground when not in use to the maximum extent practicable, during fog or inclement weather, and at dusk and overnight to avoid whooping crane strikes during low visibility conditions.

18. All whooping crane sightings will be immediately reported to the TCESFO at (281) 286-8282, extension 26504; the Service Species Lead Wade Harrell at Wade_Harrell@fws.gov; and Eva Szyszkoski with the Louisiana Wildlife and Fisheries Department at ESzyszkoski@wlf.la.gov or by phone at (337) 536-9596.

6.0 CONCULSION

Based upon the findings of this BA, USACE has made the following effect determination for species that were identified as occurring or potentially occurring in the action area:

Species	Scientific Name	Jurisdiction	Conclusion
Birds			
Piping Plover	*Charadrius melodus*	USFWS	NLAA
Rufa Red Knot	*Calidris canutus rufa*	USFWS	NLAA
Whooping Crane	*Grus americana*	USFWS	NLAA
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	USFWS	No effect
Eastern black rail	*Laterallus jamaicensis jamaicensis*	USFWS	NLAA
Clams			
Texas Fawnsfoot	*Truncilla macrodon*	USFWS	No effect
Texas Pimpleback	*Cyclonaias petrina*	USFWS	No effect
Mammals			
West Indian Manatee	*Trichechus manatus*	USFWS/ NMFS	NLAA
Insects			
Monarch Butterfly	*Danaus plexippus*	USFWS	Candidate
Reptiles			
Loggerhead sea turtle	*Caretta caretta*	USFWS/	**On land:** No effect **In water:** NLAA
Green sea turtle	*Chelonia mydas*	USFWS/ NMFS	**On land:** No effect **In water:** NLAA
Leatherback sea turtle	*Dermochelys coriacea*	USFWS/ NMFS	**On land:** No effect **In water:** No effect
Hawksbill sea turtle	*Eretmochelys imbricata*	USFWS/ NMFS	**On land:** No effect **In water:** NLAA
Kemp's Ridley sea turtle	*Lepidochelys kempii*	USFWS/ NMFS	**On land:** No effect **In water:** NLAA

NLAA= Not likely to adversely affect **LAA***= Likely to adversely affect, covered by GRBO

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Attachment 1: IPAC Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
4444 Corona Drive, Suite 215Corpus Christi, TX 78411
Phone: (281) 286-8282 Fax: (281) 488-5882
http://www.fws.gov/southwest/es/TexasCoastal/
http://www.fws.gov/southwest/es/ES_Lists_Main2.html

In Reply Refer To:
Consultation Code: 02ETTX00-2022-SLI-0662
Event Code: 02ETTX00-2022-E-01999

December 09, 2021

Project Name: Gulf Intracoastal Waterway (GIWW) Coastal Resiliency Study (CRS)

Subject: Updated list of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The U.S. Fish and Wildlife Service (Service) field offices in Clear Lake, Tx, and Corpus Christi, Tx, have combined administratively to form the Texas Coastal Ecological Services Field Office. A map of the Texas Coastal Ecological Services Field Office area of responsibility can be found at: http://www.fws.gov/southwest/es/TexasCoastal/Map.html. All project related correspondence should be sent to the field office responsible for the area in which your project occurs. For projects located in southeast Texas please write to: Field Supervisor; U.S. Fish and Wildlife Service; 17629 El Camino Real Ste. 211; Houston, Texas 77058. For projects located in southern Texas please write to: Field Supervisor; U.S. Fish and Wildlife Service; P.O. Box 81468; Corpus Christi, Texas 78468-1468. For projects located in six counties in southern Texas(Cameron, Hidalgo, Starr, Webb, Willacy, and Zapata) please write: Santa Ana NWR, ATTN: Ecological Services Sub Office, 3325 Green Jay Road, Alamo, Texas 78516.

The enclosed species list identifies federally threatened, endangered, and proposed to be listed species; designated critical habitat; and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project.

New information from updated surveys, changes in the abundance and distribution of species, changes in habitat conditions, or other factors could change the list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS-IPaC website http://ecos.fws.gov/ipac/ at regular intervals during project planning and implementation for updates to species list and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Candidate species have no protection under the Act but are included for consideration because they could be listed prior to the completion of your project. The other species information should help you determine if suitable habitat for these listed species exists in any of the proposed project areas or if project activities may affect species on-site, off-site, and/or result in "take" of a federally listed species.

"Take" is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. In addition to the direct take of an individual animal, habitat destruction or modification can be considered take, regardless of whether it has been formally designated as critical habitat, if the activity results in the death or injury of wildlife by removing essential habitat components or significantly alters essential behavior patterns, including breeding, feeding, or sheltering.

8.0 Section 7

Section 7 of the Act requires that all Federal agencies consult with the Service to ensure that actions authorized, funded or carried out by such agencies do not jeopardize the continued existence of any listed threatened or endangered species or adversely modify or destroy critical habitat of such species. It is the responsibility of the Federal action agency to determine if the proposed project may affect threatened or endangered species. If a "may affect" determinationis made, the Federal agency shall initiate the section 7 consultation process by writing to the office that has responsibility for the area in which your project occurs.

Is 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. Certain avoidance and minimization measures may need to be implemented in order to reach this level of effects. The Federal agency or the designated non-Federal representative should seek written concurrence from the Service that adverse effects have been eliminated. Be sure to include all of the information and documentation used to reach your decision with your request for concurrence. The Service must have this documentation before issuing a concurrence.

Is likely to adversely affect - adverse effects to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial. If the overall effect of the proposed action is beneficial to the listed species but also is likely to cause some adverse effects to individuals of that species, then the proposed action "is likely to adversely affect" the listed species. An "is likely to adversely affect" determination requires the Federal action agency to initiate formal section 7 consultation with this office.

No effect - the proposed action will not affect federally listed species or critical habitat (i.e., suitable habitat for the species occurring in the project county is not present in or adjacent to the action area). No further coordination or contact with the Service is necessary. However, if the project changes or additional information on the distribution of listed or proposed species becomes available, the project should be reanalyzed for effects not previously considered.

Regardless of your determination, the Service recommends that you maintain a complete recordof the evaluation, including steps leading to the determination of affect, the qualified personnel conducting the evaluation, habitat conditions, site photographs, and any other related articles.

Please be advised that while a Federal agency may designate a non-Federal representative to conduct informal consultations with the Service, assess project effects, or prepare a biological assessment, the Federal agency must notify the Service in writing of such a designation. The Federal agency shall also independently review and evaluate the scope and contents of a biological assessment prepared by their designated non-Federal representative before that document is submitted to the Service.

The Service's Consultation Handbook is available online to assist you with further information on definitions, process, and fulfilling Act requirements for your projects at: http://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf

9.0 Section 10

If there is no federal involvement and the proposed project is being funded or carried out by private interests and/or non-federal government agencies, and the project as proposed may affect listed species, a section 10(a)(1)(B) permit is recommended. The Habitat Conservation Planning Handbook is available at: http://www.fws.gov/endangered/esa-library/pdf/HCP_Handbook.pdf

10.0 Service Response

Please note that the Service strives to respond to requests for project review within 30 days of receipt, however, this time period is not mandated by regulation. Responses may be delayed due to workload and lack of staff. Failure to meet the 30-day timeframe does not constitute a concurrence from the Service that the proposed project will not have impacts to threatened and endangered species.

11.0 Proposed Species and/or Proposed Critical Habitat

While consultations are required when the proposed action may affect listed species, section 7(a)(4) was added to the ESA to provide a mechanism for identifying and resolving potential conflicts between a proposed action and proposed species or proposed critical habitat at an early planning stage. The action agency should seek conference from the Service to assist the action agency in determining effects and to advise the agency on ways to avoid or minimize adverse effect to proposed species or proposed critical habitat.

12.0 Candidate Species

Candidate species are species that are being considered for possible addition to the threatened and endangered species list. They currently have no legal protection under the ESA. If you findyou have potential project impacts to these species the Service would like to provide technical assistance to help avoid or minimize adverse effects. Addressing potential impacts to these species at this stage could better provide for overall ecosystem healh in the local area and ay avert potential future listing.

Several species of freshwater mussels occur in Texas and four are candidates for listing under the ESA. The Service is also reviewing the status of six other species for potential listing under the ESA. One of the main contributors to mussel die offs is sedimentation, which smothers and suffocates mussels. To reduce sedimentation within rivers, streams, and tributaries crossed by a

project, the Service recommends that that you implement the best management practices foundat: http://www.fws.gov/southwest/es/TexasCoastal/FreshwaterMussels.html.

Candidate Conservation Agreements (CCAs) or Candidate Conservation Agreements with Assurances (CCAAs) are voluntary agreements between the Service and public or private entitiesto implement conservation measures to address threats to candidate species. Implementing conservation efforts before species are listed increases the likelihood that simpler, flexible, and more cost-effective conservation options are available. A CCAA can provide participants with assurances that if they engage in conservation actions, they will not be required to implement additional conservation measures beyond those in the agreement. For additional information on CCAs/CCAAs please visit the Service's website at http://www.fws.gov/endangered/what-we-do/cca.html.

13.0 Migratory Birds

The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful. Many may nest in trees, brush areas or other suitable habitat. The Service recommends activities requiring vegetation removal or disturbance avoid the peak nesting periodof March through August to avoid destruction of individuals or eggs. If project activities must be conducted during this time, we recommend surveying for active nests prior to commencing work. A list of migratory birds may be viewed at http://www.fws.gov/migratorybirds/regulationspolicies/mbta/mbtandx.html.

The bald eagle (*Haliaeetus leucocephalus*) was delisted under the Act on August 9, 2007. Both the bald eagle and the goden eagle (*Aquila chrysaetos*) are still protected under the MBTA and BGEPA. The BGEPA affords both eagles protection in addition to that provided by the MBTA, in particular, by making it unlawful to "disturb" eagles. Under the BGEPA, the Service may issue limited permits to incidentally "take" eagles (e.g., injury, interfering with normal breeding, feeding, or sheltering behavior nest abandonment). For more information on bald and golden eagle management guidlines, we recommend you review information provided at http://www.fws.gov/midwest/eagle/pdf/NationalBaldEagleManagementGuidelines.pdf.

The construction of overhead power lines creates threats of avian collision and electrocution. The Service recommends the installation of underground rather than overhead power lines whenever possible. For new overhead lines or retrofitting of old lines, we recommend that project developers implement, to the maximum extent practicable, the Avian Power Line Interaction Committee guidelines found at http://www.aplic.org/.

Meteorological and communication towers are estimated to kill millions of birds per year. We recommend following the guidance set forth in the Service Interim Guidelines for Recommendations on Communications Tower Siting, Constructions, Operation and Decommissioning, found online at: http://www.fws.gov/habitatconservation/communicationtowers.html, to minimize the threat of avian mortality at these towers. Monitoring at these towers would provide insight into the effectiveness of the minimization measures. We request the results of any wildlife mortality monitoring at towers associated with this project.

We request that you provide us with the final location and specifications of your proposed towers, as well as the recommendations implemented. A Tower Site Evaluation Form is also available via the above website; we recommend you complete this form and keep it in your files. If meteorological towers are to be constructed, please forward this completed form to our office.

More information concerning sections 7 and 10 of the Act, migratory birds, candidate species,and landowner tools can be found on our website at: http://www.fws.gov/southwest/es/TexasCoastal/ProjectReviews.html.

14.0 Wetlands and Wildlife Habitat

Wetlands and riparian zones provide valuable fish and wildlife habitat as well as contribute to flood control, water quality enhancement, and groundwater recharge. Wetland and riparian vegetation provides food and cover for wildlife, stabilizes banks and decreases soil erosion. These areas are inherently dynamic and very sensitive to changes caused by such activities as overgrazing, logging, major construction, or earth disturbance. Executive Order 11990 asserts that each agency shall provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial value of wetlands in carrying out the agency's responsibilities. Construction activities near riparian zonesshould be carefully designed to minimize impacts. If vegetation clearing is needed in these riparian areas, they should be re-vegetated with native wetland and riparian vegetation to preventerosion or loss of habitat. We recommend minimizing the area of soil scarification and initiatingincremental re-establishment of herbaceous vegetation at the proposed work sites. Denuded and/or disturbed areas should be re-vegetated with a mixture of native legumes and grasses.
Species commonly used for soil stabilization are listed in the Texas Department of Agriculture's (TDA) Native Tree and Plant Directory, available from TDA at P.O. Box 12847, Austin, Texas 78711. The Service also urges taking precautions to ensure sediment loading does not occur to any receiving streams in the proposed project area. To prevent and/or minimize soil erosion and compaction associated with construction activities, avoid any unnecessary clearing of vegetation, and follow established rights-of-way whenever possible. All machinery and petroleum products should be stored outside the floodplain and/or wetland area during construction to prevent possible contamination of water and soils.

Wetlands and riparian areas are high priority fish and wildlife habitat, serving as important sources of food, cover, and shelter for numerous species of resident and migratory wildlife. Waterfowl and other migratory birds use wetlands and riparian corridors as stopover, feeding, and nesting areas. We strongly recommend that the selected project site not impact wetlands and riparian areas, and be located as far as practical from these areas. Migratory birds tend to concentrate in or near wetlands and riparian areas and use these areas as migratory flyways or corridors. After every effort has been made to avoid impacting wetlands, you anticipate unavoidable wetland impacts will occur; you should contact the appropriate U.S. Army Corps of Engineers office to determine if a permit is necessary prior to commencement of construction activities.

If your project will involve filling, dredging, or trenching of a wetland or riparian area it may require a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (COE).

For permitting requirements please contact the U.S. Corps of Engineers, District Engineer, P.O. Box 1229, Galveston, Texas 77553-1229, (409) 766-3002.

15.0 Beneficial Landscaping

In accordance with Executive Order 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping (42 C.F.R. 26961), where possible, any landscaping associated with project plans should be limited to seeding and replanting with native species. A mixture of grasses and forbs appropriate to address potential erosion problems and long-term cover should be planted when seed is reasonably available. Although Bermuda grass is listed in seed mixtures, this species and other introduced species should be avoided as much as possible. The Service also recommends the use of native trees, shrubs, and herbaceous species that are adaptable, drought tolerant and conserve water.

16.0 State Listed Species

The State of Texas protects certain species. Please contact the Texas Parks and Wildlife Department (Endangered Resources Branch), 4200 Smith School Road, Austin, Texas 78744 (telephone 512/389-8021) for information concerning fish, wildlife, and plants of State concernor visit their website at: http://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/texas_rare_species/listed_species/.

If we can be of further assistance, or if you have any questions about these comments, please contact 281/286-8282 if your project is in southeast Texas, or 361/994-9005, ext. 246, if your project is in southern Texas. Please refer to the Service consultation number listed above in any future correspondence regarding this project.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whetherany species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

17.0 Texas Coastal Ecological Services Field Office
4444 Corona Drive, Suite 215
Corpus Christi, TX 78411
(281) 286-8282

18.0 Project Summary

Consultation Code: 02ETTX00-2022-SLI-0662
Event Code: Some(02ETTX00-2022-E-01999)
Project Name: Gulf Intracoastal Waterway (GIWW) Coastal Resiliency Study (CRS)
Project Type: SHORELINE / BEACH PROTECTION / RENOURISHMENT
Project Description: This project aims to armor sections of the Gulf Intracoastal Waterway, aswell as restore eroded barrier islands in Matagorda County.
Project Location:
Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@28.640367750000003,-96.00364678271482,14z

Counties: Matagorda County, Texas

19.0 Endangered Species Act Species

There is a total of 14 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS officeif you have questions.

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1. 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.

20.0 Mammals

NAME	STATUS
West Indian Manatee *Trichechus manatus*	Threatened

There is **final** critical habitat for this species. The location of the critical habitat is not available. ***This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.***

Species profile: https://ecos.fws.gov/ecp/species/4469

21.0 Birds

NAME	STATUS
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10477	Threatened
Northern Aplomado Falcon *Falco femoralis septentrionalis* Population: Wherever found, except where listed as an experimental populationNo critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1923	Endangered
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, exceptthose areas where listed as endangered. There is **final** critical habitat for this species. Your location overlaps the critical habitat.Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. The location of the critical habitat is notavailable. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

22.0 Reptiles

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

23.0 Clams

NAME	STATUS
Texas Fawnsfoot *Truncilla macrodon* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8965	Proposed Threatened
Texas Pimpleback *Cyclonaias petrina* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8966	Proposed Endangered

24.0 Insects

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

25.0 Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

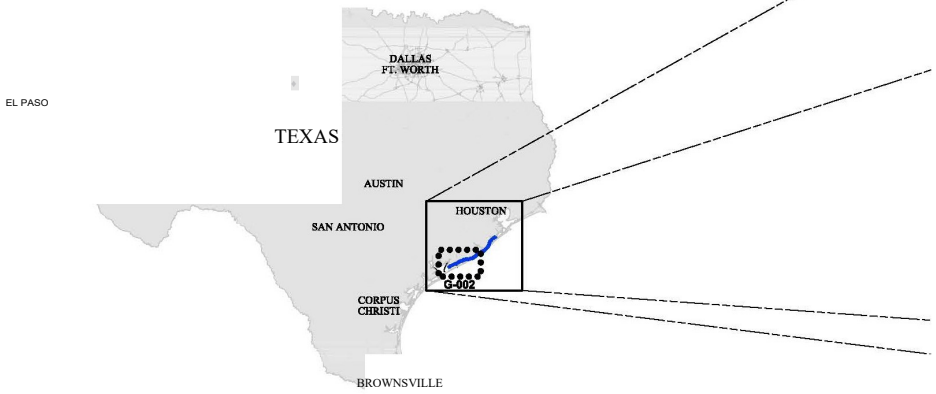
NAME	STATUS

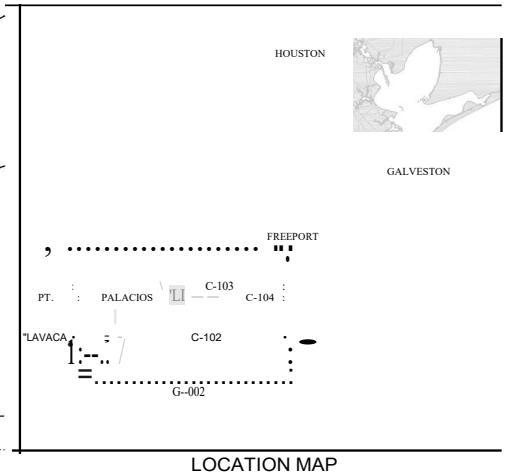
Piping Plover *Charadrius melodus*
https://ecos.fws.gov/ecp/species/6039#crithab

Attachment 2: Project Plans

GIWW COASTAL RESILIENCE STUDY, TX

VICINITY MAP
(NOT TO SCALE)





LOCATION MAP
(NOT TO SCALE)

COVERSHEET
AND INDEX OF DRAWINGS

RESILIENCY PLAN
GIWW COASTAL RESILIENCE S1\IDY, TX

U.S. AR.MY ENGINEER DISTRICT, GALVESTON, TEXAS

ENGINEERING APPENDIX
DATED: DECEMBER 2021

NAME:

SWG FILE NO.
IWW 1199-0088

G-001

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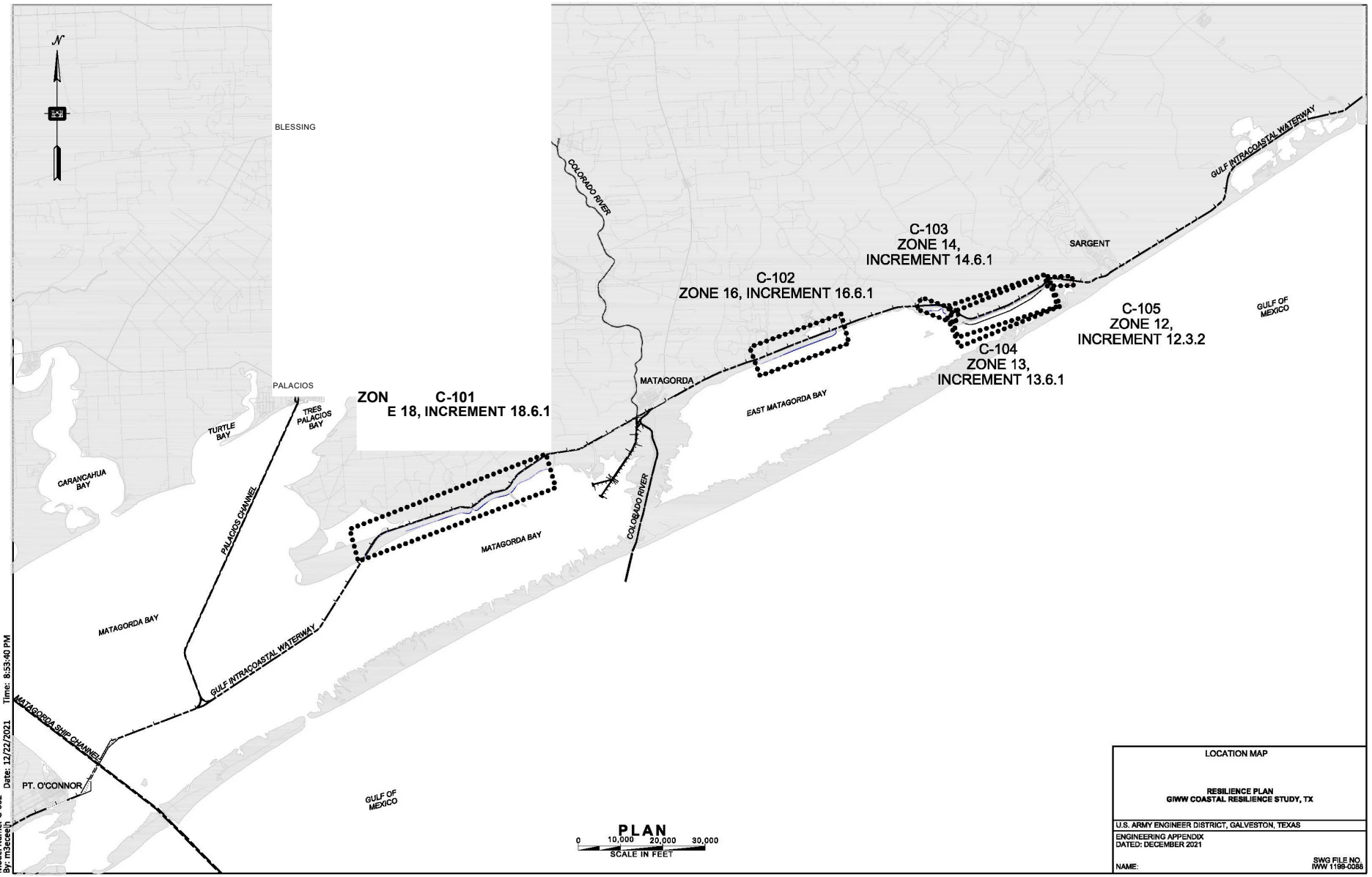

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LOCATION MAP

RESILIENCE PLAN
GIWW COASTAL RESILIENCE STUDY, TX

U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS

ENGINEERING APPENDIX
DATED: DECEMBER 2021

NAME:

SWG FILE NO.
IWW 1199-0088

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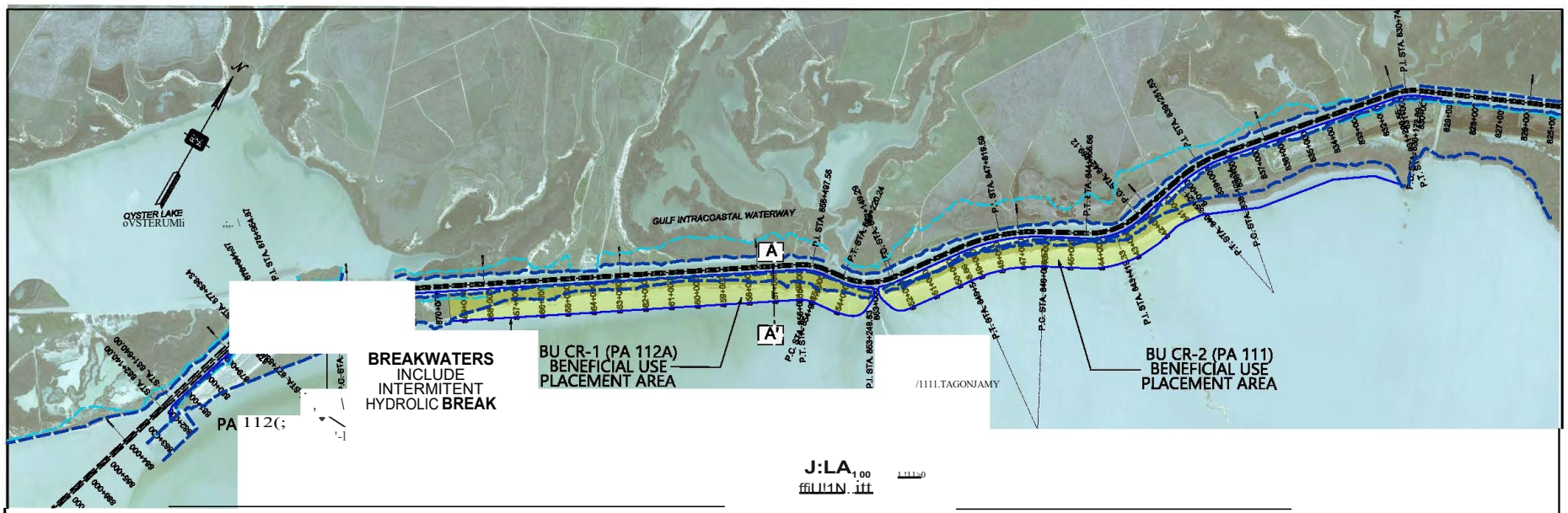
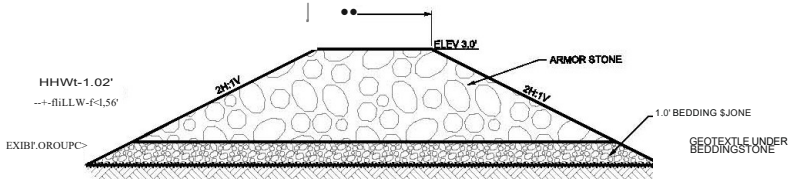
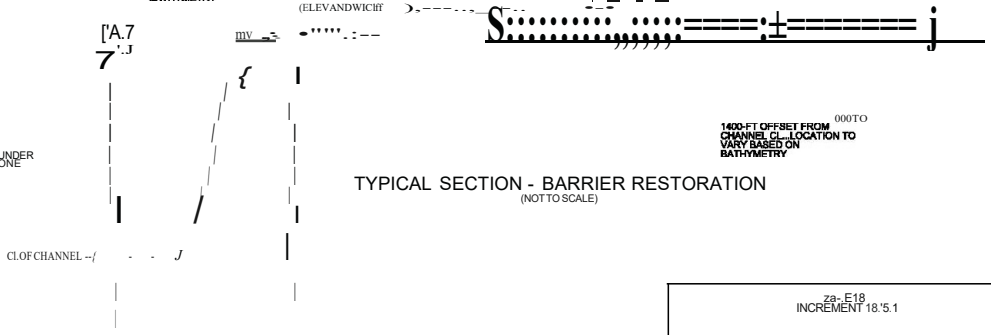


NOTES
1) HORIZONTAL DATUMS ARE FOR NOAA GAGE, MATAGORDA CITY, TX. IN FEET RELATIVE TO NAVD88
2) SIZE AND SPACING OF HYDROLOGIC BREAKS TO BE OPTIMIZED DURING PED



TYPICAL SECTION - 3.0' BREAKWATER



TYPICAL SECTION - BARRIER RESTORATION
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LEGEND:
5.0 FT BREAKWATER
3.0 FT BREAKWATER
EARTHEN BERM
BENEFICIAL USE AREA

INCREMENT 18.'5.1

REFERENCE
GIWW COASTAL INFLUENCE INFLUDY, TX

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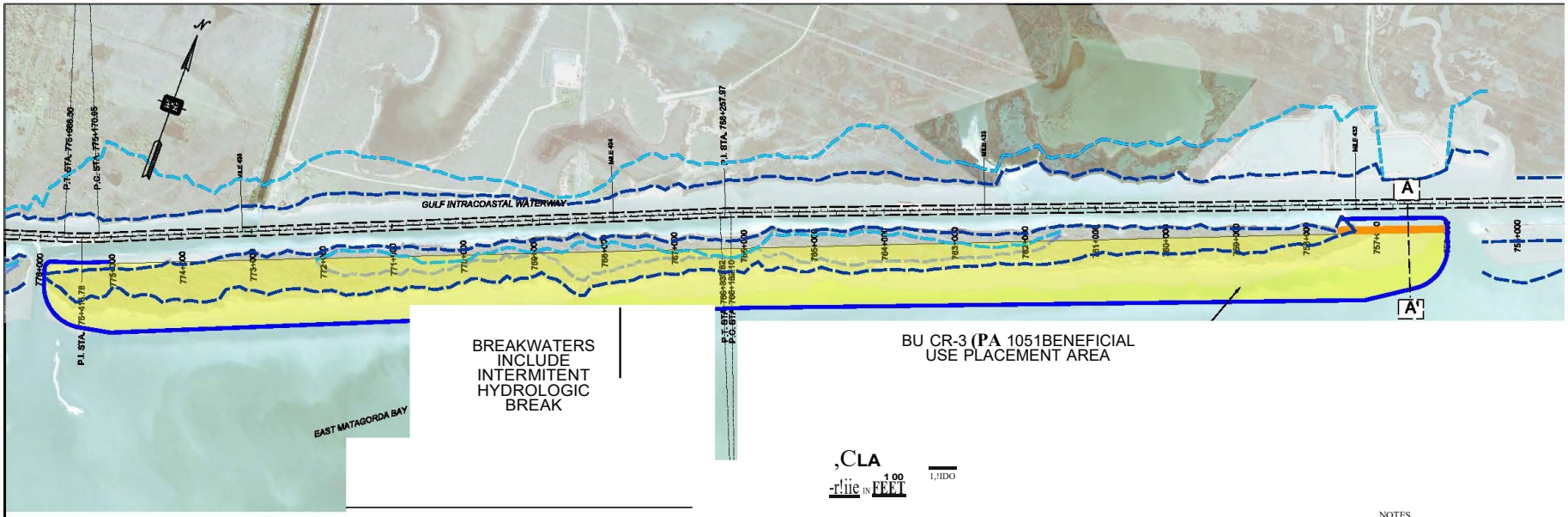

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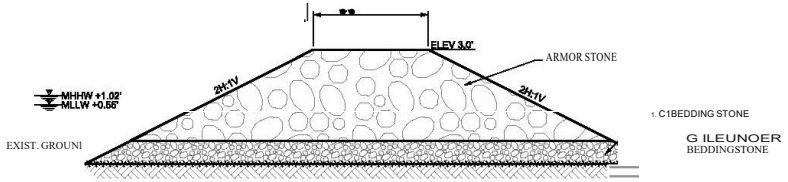

TYPICAL SECTION - 3.0' BREAKWATER
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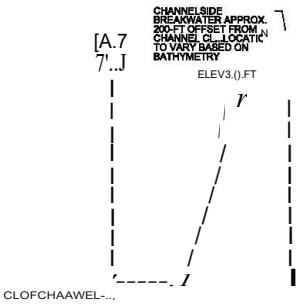

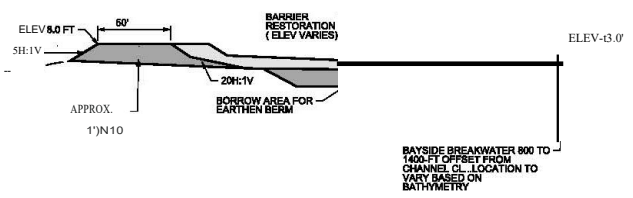

TYPICAL SECTION - BARRIER RESTORATION
(J'IOTTOSCAL.E)

LEGEND:

- 5.0 FT BREAKWATER
- 3.0 FT BREAKWATER
- EARTHEN BERM
- BENEFICIAL USE AREA
- FWOP SHORELINE 2030
- FWOP SHORELINE 2080
- CHANNEL WIDENING

ZONE15
INCREMENT 16.6.1

REIIILENCE"-AN
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U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS
ENGINEERING APPENDIX
DATED: DECEMBER 2021
NAME:
SWG FILE NO.
IWW 1199-0088

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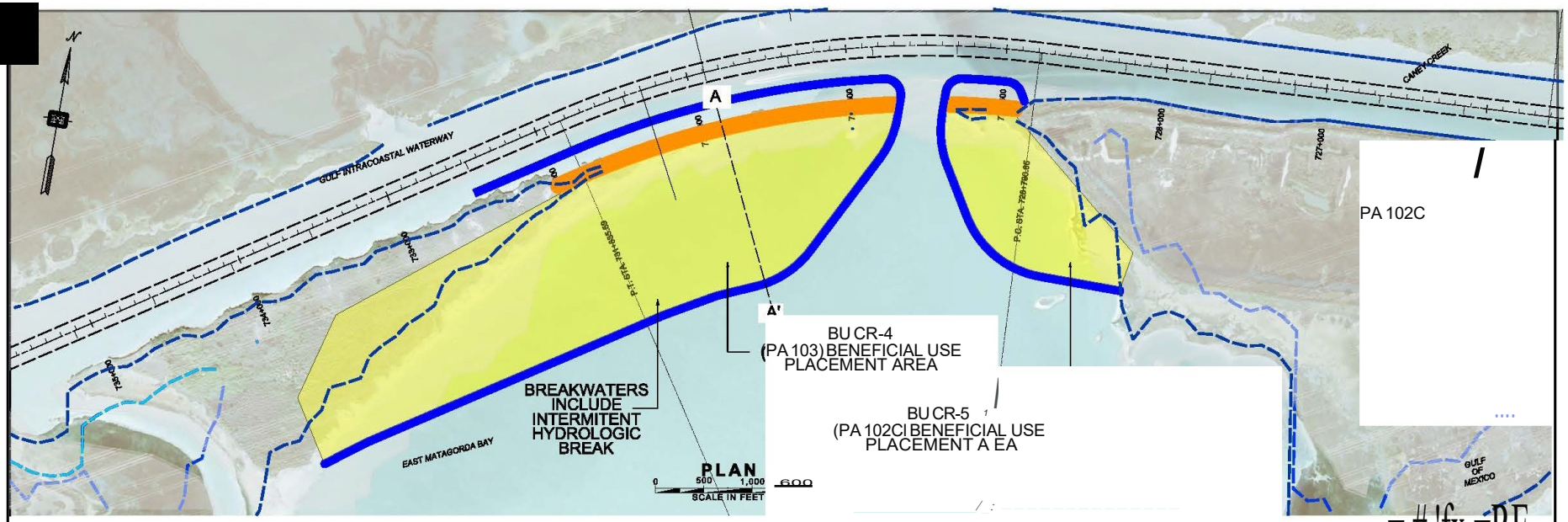

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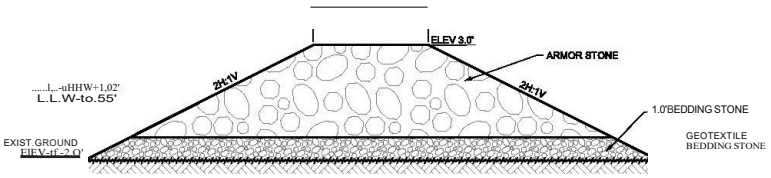

TYPICAL SECTION - 3.0' BREAKWATER

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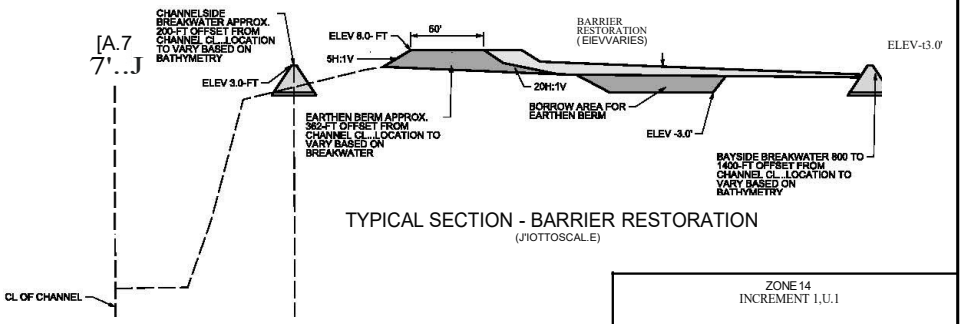

TYPICAL SECTION - BARRIER RESTORATION

(J'IOTTOSCAL.E)

LEGEND:

5.0FTBREAKWATER

BENEFICIAL USEAREA

I'W0PSHORfl.INE 2030
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ZONE 14
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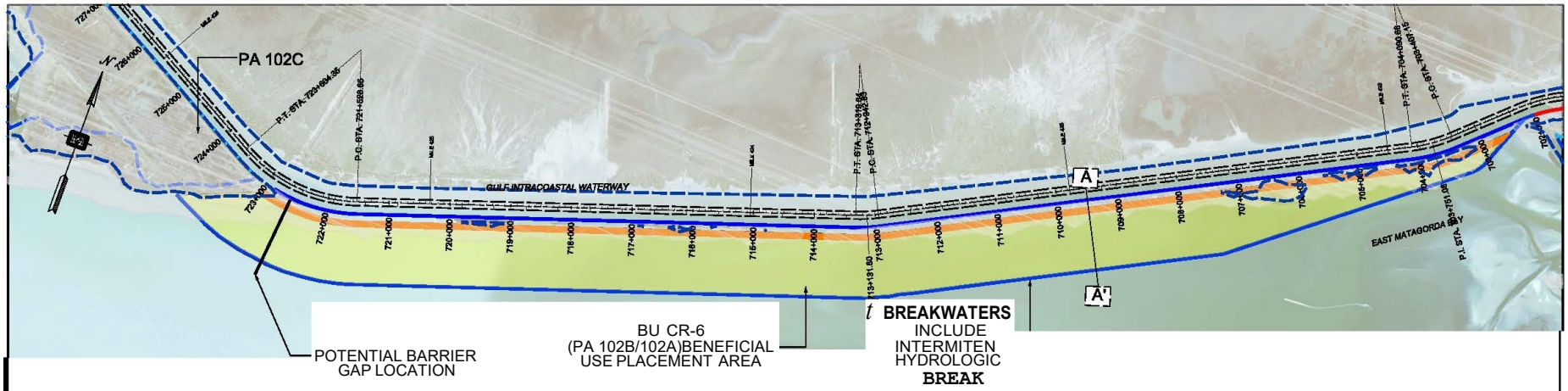

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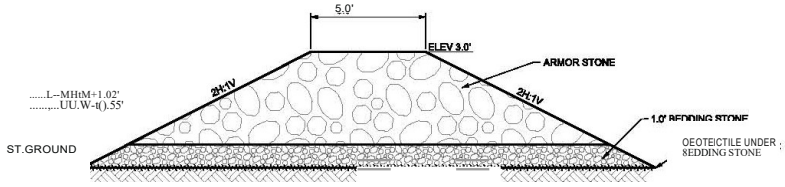

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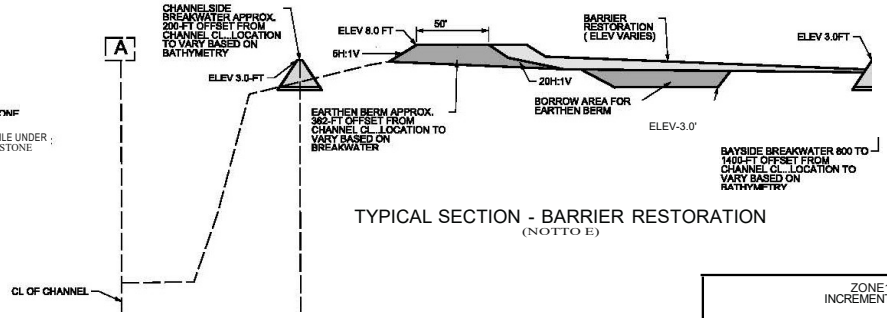

TYPICAL SECTION - BARRIER RESTORATION
(NOTTO E)

LEGEND:

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- 3.0FTBR.EAKWATER
- EARTI--EIBERM
- BENEFICIAL USE AREA
- I'W0PSHORfl..INE 2030
- FWOP8HORB.INE20IIO
- CHANNEL WIDENING

ZONE13
INCREMENT 18.8.1

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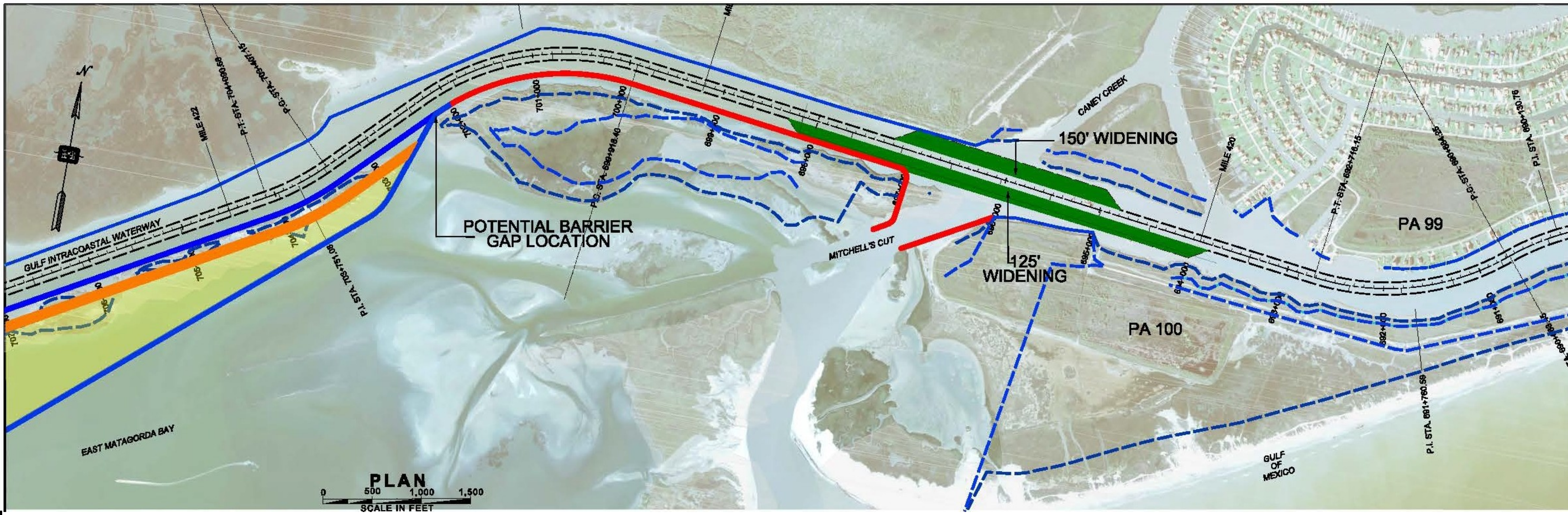
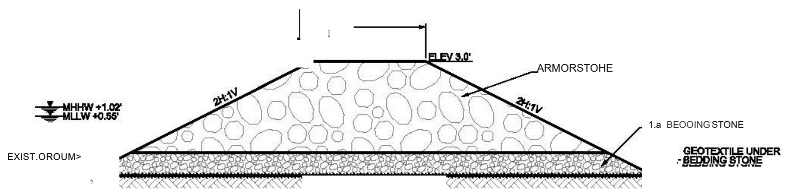
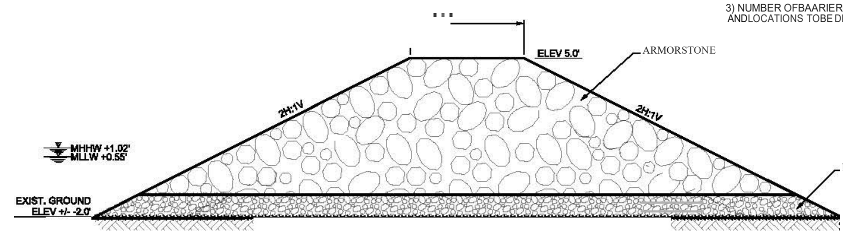


NOTES:
1) TIDAL DATUM BASED ON ... MATAGORDA CITY, TX. IN FEET RELATIVE TO NAVD88
2) SIZE AND SPACING OF HYDROLOGIC BREAKS TO BE OPTIMIZED DURING PED
3) NUMBER OF BARRIER GAPS, DIMENSIONS AND LOCATIONS TO BE DETERMINED IN PED



TYPICAL SECTION- 3.0' BREAKWATER

SCALE: 1"=5.0'



TYPICAL SECTION - 5.0' BREAKWATER

SCALE: 1"=5.0'

GEOTEXTILE UNDER BEDDING STONE

LEGEND:

5.0 FT BREAKWATER
3.0 FT BREAKWATER
EARTHEN BERM
BENEFICIAL USE AREA
FWOP SHORELINE
FWOP SHORELINE 2090
CHANNEL WIDENING

ZONE 12
INCREMENT 12.3.1

RESILIENCE PLAN
GIWW COASTAL RESILIENCE STUDY, TX

U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS
ENGINEERING APPENDIX
DATED: DECEMBER 2021

US Army Corps of Engineers ®
Galveston District

Appendix D-1.2

Draft Request to NOAA Fisheries Southeast Regional Office for Initiation of Expedited Informal Consultation

for

Gulf Intracoastal Waterway Coastal Resilience Study
Matagorda County, Texas

January 2022

Draft Request to NOAA Fisheries Southeast Regional Office
for Initiation of Expedited Informal Consultation
January 24, 2022

Mr. David Bernhart
Assistant Regional Administrator for Protected Resources
National Marine Fisheries Service
Southeast Regional Office
St. Petersburg, Florida

Re: Request for Initiation of Expedited Informal Consultation under section 7(a)(2) of the Endangered Species Act for Gulf Intracoastal WaterWay (GIWW) Coastal Resilience Study (CRS)

Dear Mr. Bernhart:

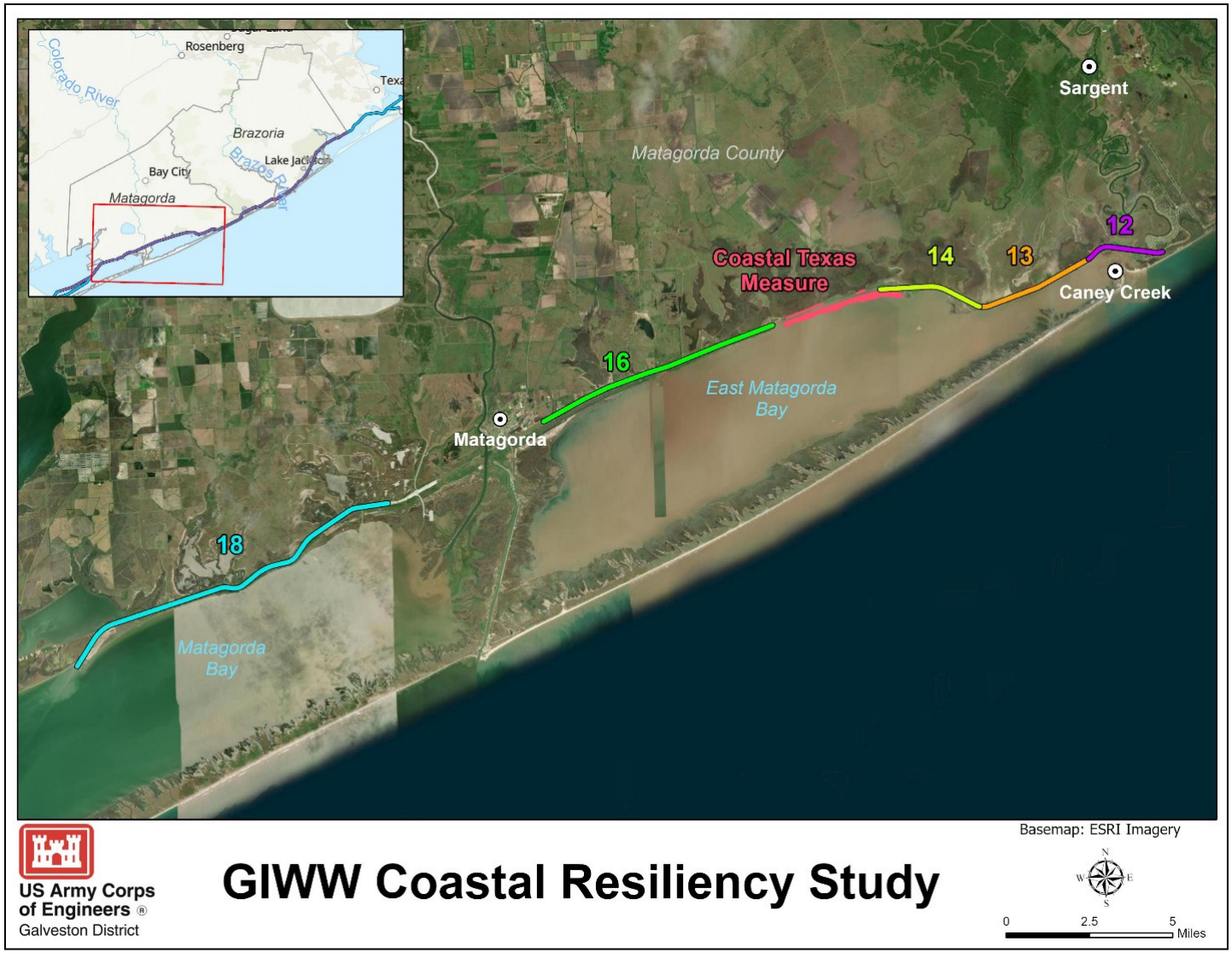
The United States Army Corps of Engineers (USACE) proposes to carry out the proposed project as described below. We request initiation of informal consultation under section 7(a)(2) of the Endangered Species Act (ESA) for the GIWW CRS. We have determined that the proposed activity may affect, but is not likely to adversely affect, the ESA-listed species and critical habitat included in the table(s) below. Our supporting analysis is provided below. We request your written concurrence with our determinations.

Pursuant to our request for expedited informal consultation, we are providing, enclosing, or otherwise identifying the following information:

- A description of the action to be considered;
- A description of the action area;
- A description of any listed species or critical habitat that may be affected by the action; and
- An analysis of the potential routes of effect on any listed species or critical habitat.

Proposed Action

This proposed project is intended to increase the resilience of the portion of the Gulf Intracoastal Waterway (GIWW) located in Matagorda and Brazoria Counties, Texas, to the effects of hurricanes and storms. The proposed Federal Action (recommended plan) includes the installation of breakwaters, construction of berms, the creation of multiple beneficial use of dredge material sites, and dredging to widen the channel near Caney Creek. and sediment placement in Zones 12, 13, 14, 16, and 18 (Figure 1).


Rosenberg
Colorado River
Brazoria
Bay City
Lake Jackson
Brazos River
Matagorda
Sargent
Matagorda County
12
Coastal Texas
Measure
14
13
Caney Creek
16
East Matagorda
Bay
Matagorda
18
Matagorda
Bay
US Army Corps
of Engineers ®
Galveston District
GIWW Coastal Resiliency Study
Basemap: ESRI Imagery
N
W
E
S
0
2.5
5
Miles

The authorized project area encompasses 85 miles of the Texas portion of the GIWW in Brazoria and Matagorda counties which was divided into 20 zones for detailed analysis according to geography and ecology. As the evaluation progressed during the study, the study area focused on Zones 12, 13, 14, 16 and 18 as shown in Figure 1. The Recommended Plan prevents the loss of existing barrier islands while also restoring 435 acres of barrier features. The proposed Federal action (also referred to as the recommended plan) consists of shoreline stabilization using breakwaters, restoration of barrier features, creation of beneficial use dredge material placement areas designed to provide tidal marsh habitat and channel widening in project zones 12, 13, 14, 16, and 18 (Figure 1). Attachment 1 contains detailed project plans for the Recommended Plan.

Work in Zone 12 includes a combination of shoreline stabilization using breakwaters and channel widening of the existing GIWW by 150-foot on either side of the channel at the confluence of Caney Creek and the GIWW. Approximately 951 linear feet of breakwater would protect 16 acres of existing barrier and 36 acres of existing marsh and mudflats predicted to be lost to erosion without the proposed work. These actions will help address a grounding hotspot which has posed safety risks to navigation. The new work widening dredge material will be placed into PA 102-C unless in PED the new work material is considered sufficient to construct the earthen berms included in nearby Zones. The frequency of emergency dredging is expected to stay the same through 2080 if channel widening is not performed. In Zone 12, with channel widening it was possible to change the dredging cycle for the entire zone to every 2 years, eliminating the existing need for out of cycle dredging as vessels should be able to navigate channel better even in high shoaling conditions. The breakwater configurations will be refined in PED using survey data, they are planned to be placed in shallow water and not on land. Due to the erosive state of the shorelines, the breakwater footprints are shown where predictive modeling indicates future shorelines to be.

Work in Zone 13 includes construction of an earthen berm with a crest elevation of 8 feet NAVD88 to attenuate the crosswinds that vessels in the GIWW would be exposed to. Breakwaters are proposed to be constructed with crests at 5 feet NAVD88 on the channel side and 3 feet NAVD88 on the bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure. The berm would span approximately 19,000 linear feet in length with a surface area of 110 acres. The berm would be constructed using material borrowed from a 200-foot-wide by 3-foot-deep area that runs parallel to and on the bayside of the restored barrier feature. Finally, a 328-acre area between the bayside breakwater and the berm would be used as an adaptable beneficial use site. The borrow area is within the BU site and would be restored using O&M material.

Work in Zone 14 would restore barrier features along the interface of the GIWW and Live Oak Bay and includes a pass to match historic conditions for hydrologic purposes. A combination of shoreline stabilization using breakwaters and sediment placement will restore 29 acres of barrier feature and would protect 85 acres of barrier island predicted to remain at the start of construction. This work would protect 4,329 linear feet of the GIWW. The earthen berm is proposed to be constructed with a crest elevation of 8 feet NAVD88 and is designed to attenuate the crosswinds that vessels in the channel would be exposed to. Breakwaters are proposed to be constructed with crests at 5 feet NAVD88 on the channel side and 3 feet NAVD88 on the bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure. Work in Zone 14 also includes 85 acres of BU area. All the BU discussions for Zone 13 also apply to Zone 14. Live Oak Bay contains many oyster reefs and rookery areas. USACE will conduct habitat surveys and will coordinate with Federal and

State resource agencies in PED to ensure final designs avoid and minimize impacts to these important ecological habitats. This is specifically relevant for the BU area and bayside breakwaters which will be reconfigured in PED to avoid those habitats.

Work in Zone 16 includes construction of 94 acres of berm to a crest elevation of 8 feet NAVD88 and installation of channel side and bayside breakwaters with a 3 feet NAVD88 crest elevation to protect 7,704 linear feet of GIWW channel. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Work in Zone 16 also includes 282 acres of BU area.

Work in Zone 18 includes construction of 291 acres of berm to a crest elevation of 8 feet NAVD88 and installation of channel side breakwaters to 5 feet NAVD88 and bayside breakwaters to 3 feet NAVD88 crest elevation to protect 33,115 linear feet of GIWW channel. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Work in Zone 16 also includes 870 acres of BU area.

The start date for construction is uncertain, the project is currently in the feasibility phase of the Civil Works planning process which is set to finish later this year. At this stage of the planning, the major components of the plan have been identified and evaluated at a higher level of analysis. The Feasibility Phase will be complete when a Chief's report and Finding on no significant impact is signed. Then the project will await Congressional Approval and funding and will then move into the Preconstruction Engineering and Design PED) phase. The PED phase will include additional surveys, modeling and design work to generate plans and specs that can be used to move the project into construction. The typical time for PED is approximately two years but that time can vary. During PED the environmental staff at the Corps work to ensure any changes to project design features are coordinated and compliance is maintained.

Conservation Measures and BMPs: The following voluntary measures will be added to the requirements section of the plans and specification for the project.

- Prior to any construction activities, all workers shall be educated on identification, and the importance and protections allocated to the West Indian Manatee and the five sea turtle species. The USACE shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing species protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.
- Biological monitors with stop work authority will be present during all work activities.
- All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

- Siltation or turbidity barriers shall be made of material in which manatees and sea turtles cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment.
- All on-site project personnel are responsible for observing water-related activities for the presence of sea turtles and manatee(s). All in-water operations, including vessels, must be shut down if a sea turtle(s) or manatee(s) comes within 50 feet of the operation. Activities will not resume until the sea turtle(s) or manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes' elapses if the sea turtle(s) or manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.
- Any collision with or injury to a manatee shall be reported immediately to the USACE environmental staff to ensure rapid response and reporting to the Services.

Description of the Action Area

The *action area* is all areas to be affected by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). *Effects of the action* are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. The action area is distinct from and can be larger than the project footprint because some elements of the project may affect listed species or critical habitat some distance from the project footprint. The action area, therefore, extends out to a point where no effects from the project are expected to occur.

For this project, the action area would be defined roughly as sections of Matagorda Bay and East Matagorda Bay in Matagorda County, Texas. The project Zones and Alternatives are placed along the existing shoreline and barrier islands that are on the Bay-side of the GIWW in each of these Bays (Figure 2). This area is currently used primarily for GIWW shipping and recreational vessel activities, with a high amount of existing commercial ship traffic due to the GIWW.

Potentially Affected NMFS ESA-Listed Species and Critical Habitat

Please see NMFS Threatened and Endangered Species and Critical Habitats for more information (https://www.fisheries.noaa.gov/southeast/consultations/threatened-and-endangered-species-and-critical-habitats).

We have assessed the listed species that may be present in the action area and our determination of the project's potential effects to them as shown in Table **2** below.

Please note abbreviations used in *Table 2*: E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; NE = no effect; N/A = not applicable

Table 1. ESA-listed Species in the Action Area and Effect Determination(s)

Species	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan/Outline Date	Effect Determination (Species)
Sea Turtles				
Green (North Atlantic [NA] distinct population segment [DPS])	T	81 FR 20057/ April 6, 2016	October 1991	NLAA
Green (South Atlantic [SA] DPS)	T	81 FR 20057/ April 6, 2016	October 1991	NLAA
Kemp's ridley	E	35 FR 18319/ December 2, 1970	September 2011	NLAA
Leatherback	E	35 FR 8491/ June 2, 1970	April 1992	NE
Loggerhead (Northwest Atlantic [NWA] DPS)	T	76 FR 58868/ September 22, 2011	December 2008	NLAA
Hawksbill	E	35 FR 8491/ June 2, 1970	December 1993	NLAA
Fish				
Smalltooth sawfish (U.S. DPS)	E	68 FR 15674/ April 1, 2003	January 2009	NE

The project is not located in critical habitat, and there are no potential routes of effect to any critical habitat.

Effects of the Action

For all of the protected turtle species listed in Table 2 designated as NLAA, possible effects to support this determination would likely include short term, temporary disturbances to any feeding activity on seagrasses in the vicinity to project actions. These disturbances would result from an increase in noise and turbidity during construction activities. These short-term disturbances would be offset by any long-term benefits to the creation of marsh/shoreline habitats near the breakwaters that may support seagrass colonization.

Habitat requirements for the Leatherback sea turtle do not exist in the upper reaches of the Matagorda Bay systems and therefore a No Effect determination was made for the species.

For the Smalltooth Sawfish, the USACE is not expecting any effect due to this species being primarily limited to the Florida Coast. The Smalltooth Sawfish, if present, would be able to move away from any areas of temporary disturbance due to project activities.

ROUTE(S) OF EFFECT TO ESA-LISTED SPECIES:

For the listed sea turtle species in Table 2, it is likely only to be adult turtles that may be foraging in the area in any seagrasses that would be affected by construction activities. Adult sea turtles would be more likely to occur in the summer during warmer temperatures and increased productivity for seagrass. The most likely species to occur in the project area would be the Kemp's Ridley since it is known to nest and occur on the Western Gulf of Mexico shores. All other species of sea turtles have the potential to occur in the project area in the capacity of migrating/visiting the area and foraging while doing so but are otherwise expected to inhabit offshore areas. Any noise impacts to these species would be temporary and likely result from construction vessels and equipment involved with construction of breakwaters and marsh restoration. Construction would also cause an increase in turbidity around the project area which would likely deter any sea turtle species from feeding on seagrass in the area.

The Smalltooth Sawfish is relatively unlikely to occur in the project area, with the last confirmed sighting dating back to 1984. It is possible that one could occur in the project area since they do prefer shallow waters along the coast and it could be an adult or juvenile. In the event of a Smalltooth Sawfish occurring in the project area during construction activities, they would also be potentially deterred from feeding in the area due to noise, presence of construction vessels, and increases in turbidity associated with the project.

The effects described for all species are expected to be temporary and minor to any of the listed species in Table 2 since these species can easily move to another location to feed or roam if they are disturbed or deterred from the construction area. A large portion of construction is limited to the terrestrial portions of the existing barrier islands and would have minor effects on the aquatic environment. Any temporary negative impacts to any of the listed species in Table 2 would be offset by long term benefits due to reduced erosion and an increase in shoreline and marsh habitat.

Conclusion

The **USACE** has reviewed the proposed project for its effects to ESA-listed species and their critical habitat. Based on the analysis above, we have determined that GIWW CRS is not likely to adversely affect any listed species or critical habitat under NMFS's jurisdiction. We have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

Sincerely,

Robert Morrow
Chief, Environmental Compliance Branch
Regional Planning and Environmental Center

US Army Corps of Engineers ®
Galveston District

Appendix D-2

Ecological Modeling and Mitigation Plan

for

Gulf Intracoastal Waterway Coastal Resilience Study
Matagorda County, Texas

January 2022

Gulf Intracoastal Waterway Coastal Resilience Study Matagorda County, Texas

Ecological Modeling and Mitigation Plan

January 2022

Prepared by:

United States Army Corps of Engineers
Regional Planning and Environmental Center

US Army Corps of Engineers ®
Galveston District

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1.0 INTRODUCTION

The Revised Implementation Guidance for Section 1162 of the Water Resources Development Act of 2016 and Section 1040 of the Water Resources Reform and Development Act of 2014, Fish and Wildlife Mitigation (Section 906 of the Water Resources Development Act of 1986, as Amended (33 U.S.C. 2283) (WRDA 2016) states, "It is the policy of the Corps Civil Works program to demonstrate that impacts to all ecological resources, both terrestrial and aquatic, have been avoided and minimized to the extent practicable, and that any remaining non-negligible unavoidable impacts have been compensated for to the extent practicable, as discussed in Appendix C. The Corps will continue to utilize the mitigation planning process described in ER 1105-2- 100 to determine compensation for non-negligible impacts to aquatic, terrestrial and human resources to the extent practicable and to ensure that the recommended project will not have more than negligible impacts on ecological resources."

USACE planning regulations requires that impacts to significant resources resulting from project activities be forecasted and compared and contrasted with the condition of these resources without the project over the project period of analysis. The period of analysis is the time required for the implementation of the project plus 50 years.

1.1 Existing Conditions

USACE hosted several resource agency meetings to review the project and the specific ecological resources that were identified for evaluation included oyster reefs, sea grass meadows, and wetlands. A geospatial analysis was conducted to quantify the existing resources within the project area. The resource agencies were consulted to identify best available information for the habitat geospatial analysis. The Texas General Land Office's 2011 oyster survey geospatial data was used to evaluate potential affects to oyster reef, combined geospatial data from the Texas Parks and Wildlife Department and National Marine Fisheries Service was used to evaluate sea grasses, and the U.S. Fish and Wildlife Services National Wetlands Inventory NWI Map data was used to evaluate wetlands.

For each of the ecological resources, the geospatial data was placed over the project footprints and the intersections were identified as direct impacts. For oysters and sea grasses, a 1000-foot buffer around the project features was used to review any resources which may be indirectly affected by the project. The results of the geospatial analysis are provided in Table 1. and Table 2. Maps showing the results of the analysis are included as attachments.

Table 1. Existing acreage of resources within project footprints determined using provided geospatial data

Direct Impacts (Acres)	Zone 12	Zone 13	Zone 14	Zone 16	Zone 18	Total (Acres)
Seagrass	1.8	6.1	30.4	0.0	0.0	38.3
Oyster	0.0	0.0	0.0	0.0	0.8	0.8

Table 2. Existing acreage of resources within 1000-foot buffer of project boundaries

Resources in 1000-foot buffer (Acres)*	Zone 12	Zone 13	Zone 14	Zone 16	Zone 18	Total (Acres)
Seagrass	46.5	57.6	30.3	4.4	0.0	138.8
Oyster	0.0	0.0	0.0	6.4	35	41.4
• Does not include resource acreage within project footprint						

The results of the geospatial analysis using the NWI data, were as follows: the project footprints contain approximately 0.11-acre of freshwater emergent wetlands, 320.7 acres of estuarine wetlands, 1,230 acres of estuarine open water, and 5.4 acres of freshwater pond habitat. The project will not adversely impact any wetland habitats. In PED field surveys will be conducted to identify wetlands and refine project plans to ensure any impacts to these wetlands are refined. Some of the project features appear to impact wetlands however the alignments were designed using the future shorelines projected in the engineering analysis included in the Engineering Appendix.

1.2 Recommended Plan

The Recommended Plan includes increments 12.3.2, 13.6.1, 14.6.1, 16.6.1, and 18.6.1 which provide the maximum resilience benefits at a project first cost of $251.8 million and a Benefit-Cost Ratio (BCR) of 0.98. The Recommended Plan is the costliest plan but also the most effective plan because it provides the most acres of barrier island protected or restored by 2080. Barrier islands are the most effective measure of providing resilience to the navigation channel. For an additional $66.6 million above the National Economic Development Plan, the Recommended Plan addresses the grounding safety risk at Zone 12 and includes restoration of the barrier islands at Zone 13 which also provides much-needed additional placement area in case shoaling volumes increase. The Plan prevents the loss of existing barrier islands while also creating 435 acres of new barrier islands by 2080. Description of proposed measures and footprint maps per zone can be found below and in Attachment 2.

Increment 12.3.2 is a combination of shoreline stabilization using breakwaters and channel widening in zone 12 protecting 16 acres of barrier island and 951 linear feet of channel for $17.7 million. This increment also addresses a grounding hotspot which has posed safety risks to navigation. Increment 12.3.2 proposes to add channel widening as an optimization measure to the breakwaters in 12.3.1. The channel widening is intended to provide vessels with more room to navigate in the portion of the channel which is identified as a shoaling hotspot. This location also poses a safety risk for vessels where 12 groundings were reported in the 2020 calendar year.

Increment 13.6.1 is a combination of shoreline stabilization using breakwaters and sediment placement in zone 13 protecting/restoring 438 acres of barrier island and protecting 19,000 linear feet of channel for $60.9 million. Increment 13.6.1 proposes a combination of sediment placement, an earthen berm,

marsh plantings, and breakwaters. The sediment placement is intended to restore the barrier islands which would nearly be completely lost by the end of the period of analysis in year 2080. Marsh plantings are intended to prevent rapid erosion from wind and wave exposure by stabilizing the sediment with vegetation. The earthen berm is proposed to be constructed with a crest elevation of 8 feet NAVD88 and is designed to attenuate the crosswinds that vessels in the channel would be exposed to. Breakwaters are proposed to be constructed with crests at 3 feet NAVD88 on the channel bayside and bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure.

Increment 14.6.1 is a combination of shoreline stabilization using breakwaters and sediment placement in zone 14 protecting/restoring 114 acres of barrier island and protecting 4,329 linear feet of channel for $15.8 million. Increment 14.6.1 proposes a combination of sediment placement, earthen berms, marsh plantings, and breakwaters. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Marsh plantings are intended to prevent rapid erosion from wind and wave exposure by stabilizing the sediment with vegetation. The earthen berm is proposed to be constructed with a crest elevation of 8 feet NAVD88 and is designed to attenuate the crosswinds that vessels in the channel would be exposed to. Breakwaters are proposed to be constructed with crests at 3 feet NAVD88 on the channel bayside and bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure.

Increment 16.6.1 is a combination of shoreline stabilization using breakwaters and sediment placement in zone 16 protecting/restoring 376 acres of barrier island and protecting 7,704 linear feet of channel for $32.4 million. Increment 16.6.1 proposes a combination of sediment placement, earthen berms, marsh plantings, and breakwaters. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Marsh plantings are intended to prevent rapid erosion from wind and wave exposure by stabilizing the sediment with vegetation. The earthen berm is proposed to be constructed with a crest elevation of 8 feet NAVD88 and is designed to attenuate the crosswinds that vessels in the channel would be exposed to. Breakwaters are proposed to be constructed with crests at 3 feet NAVD88 on the channel bayside and bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure.

Increment 18.6.1 which is a combination of shoreline stabilization using breakwaters and sediment placement in zone 18 protecting/restoring 1161 acres of barrier island and protecting 33,115 linear feet of channel for $125.1 million. This increment entails sediment placement, marsh plantings, and breakwaters. The breakwaters on the channel landside are designed to protect the coastal lands from vessel wake which cause erosion.

2.0 ECOLOGICAL MODELING

USACE Civil Works policy in the CECW-CP policy memorandum Policy Guidance on Certification on Ecosystem Output Models, dated August 13, 2008, requires that only standard habitat models already certified by the USACE Ecosystem Planning Center of Excellence (PCX) be used to determine mitigation, or that models proposed for use undergo the model certification process outlined by the USACE.

2.1 Ecological Model Selection

The Coastal Texas Protection and Restoration Study (Coastal Texas), Chief's Report signed October 2021, and the Matagorda Ship Channel Improvement Project (MSC), Chief's Report signed November 2019, were two USACE feasibility studies that required ecological modeling for resources and had study areas that included Matagorda Bay and the surrounding areas.

Both Coastal Texas and the MSC projects used Habitat Evaluation Procedures (HEP) to quantify habitat values for the existing conditions and for the future with and without project scenarios. HEP was developed by the US Fish and Wildlife Service (USFWS) in order to quantify the impacts of habitat changes resulting from land or water development projects (USFWS 1980). HEP is based on suitability models that provide a quantitative description of the habitat requirements for a species or group of species. HEP models use measurements of appropriate variables to rate the habitat on a scale from 0.0 (unsuitable) to 1.0 (optimal).

Habitat quality is estimated using species models developed specifically for each habitat type(s). Each model consists of a 1) list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality and different variable values, and 3) a mathematical formula that combines the Suitability Index for each variable into a single value for habitat quality. The single value is referred to as the Habitat Suitability Index (HSI).

The Suitability Index graph is a graphic representation of how fish and wildlife habitat quality or "suitability" of a given habitat type is predicted to change as values of the given variable change. It also allows the model user to numerically describe, though the Suitability Index, the habitat quality of an area for any variable value. The Suitability Index ranges from 0.1 to 1.0, with 1.0 representing optimal condition for the variable in question.

After a Suitability Index has been developed, a mathematical formula that combines all Suitability Indices into a single HSI value is constructed. Because the Suitability Indices range from 0.1 to 1.0 the HSI also ranges from 0.1 to 1.0 and is a numerical representation of the overall or "composite" habitat quality of the particular habitat being evaluated. The HSI formula defines the aggregation of Suitability Indices in a manner that is unique to each species depending on how the formula is constructed.

2.2 Habitat Suitability Index Models

The Coastal Texas Study used the Spotted Seatrout Model (Kostecki, 1984) to assess seagrass habitat resources and the American Oyster Model (Swannack et al., 2014) to assess oyster habitat resources. Similarly, the MSC Study used the American Oyster Model (Swannack et al., 2014) for impact analysis and to develop the approved mitigation strategy.

For both Coastal Texas and MSC, a series of workshops were held with the resource agencies to characterize baseline conditions and forecast future conditions of cover type and variable data for the HEP analysis. A large percentage of the variables were determined using Geographic Information System (GIS), including calculating cover type acreages and measuring distances from locations along the coast. However, not all future projections were substantiated in this way, and some projections were based on best professional judgment and collective knowledge from the interagency team. scientific data and the professional expertise of the resource agencies was used to forecast the changes in the natural ecosystems and evaluate the effectiveness of the proposed alternative scenarios, rate project performance, and determine many other important aspects of the future with and without project scenarios.

A variety of resources were utilized in the desktop analysis to obtain baseline data, including TPWD water quality data for salinities and water temperatures; land cover datasets for marshes, oyster reefs, and seagrass; Light Detection and Ranging (LiDAR) elevation data; and NOAA sea level rise (SLR) scenarios. Per USACE guidance, field sampling was not conducted for the Coastal Texas Study on the justification that all data necessary for the HEP analyses would be acquired through readily available data or applications in GIS. The NOAA C-CAP 2010 and Marsh Migration land cover datasets were used to evaluate FWOP, and FWP condition for areas within the project footprint and areas indirectly affected beyond the footprint (NOAA, 2017b; pers. com. N. Herold [NOAA], 2017).The MHHW at NOAA station 8773146 on the GIWW is 0.47-ft and it's mid-epoch is 1992, so with 2.35-ft of SLR, the 2080 MHHW would be 2.82-ft NAVD88. Rounding up, the post-settlement design crest elevation of 3-ft was chosen.

2.2.1 Spotted Seatrout Habitat Suitability Index

The spotted seatrout model considers habitat suitability for the egg, larval, and juvenile life stages. These three life stages are considered the most sensitive to environmental variations and are the most responsive to restoration of SAV. The model assumes two primary factors, or life history requisites, for determining habitat quality of a project site: water quality (including temperature and salinity) and food/cover (Kostecki, 1984).

2.2.1.1 Variable 1 - Lowest Monthly Average Winter-Spring Water Salinity

Lowest monthly average winter-spring salinity represents the minimum value of the 4 monthly mean salinities determined for each year of data between the months of December and March (Kostecki, 1984). This variable was determined using TPWD water quality data from 2007 to 2016 (pers. com. M. Fisher [TPWD], 2017).

- Existing Conditions. Existing conditions were determined by calculating the average monthly salinity for the months of December, January, February, and March, and taking the minimum of those values.
- FWOP Conditions. Data to forecast and evaluate changes in salinity with no project action were not readily available; as a result, the interagency team determined that a 10 percent increase to baseline salinities should be applied to baseline salinities in TY51 for the FWOP conditions to capture the potential change in salinities over the period of analysis.
- FWP Conditions. As described above, a 10 and 20 percent increase was applied to baseline salinities for the FWP conditions in TY51, equates to only the footprint of the structure, is

generally considered minimal when compared to the extent of inland open water habitat available. As well, the structures would be designed in such a way as to not hinder movement of aquatic species. These impacts would have an overall minimal impact to fisheries and aquatic populations in the area and would in the long-term protect adjacent habitat that aquatic species depend on for survival that would be lost in the future if the measures were not implemented. The overall benefits of implementing the measure far outweigh any temporary or permanent loss realized during construction.

2.2.1.2 Variable 2 - Highest Monthly Average Summer Water Salinity

Highest monthly average summer salinity represents the maximum value of the 3 monthly mean salinities determined for each year of data between the months of June and September (Kostecki, 1984). This variable was determined using TPWD water quality data from 2007 to 2016 (pers. com. M. Fisher [TPWD], 2017).

- *Existing Conditions.* Existing conditions were determined by calculating the average monthly salinity for the months of June, July, and August, and taking the maximum of those values.
- *FWOP Conditions.* Data to forecast and evaluate changes in salinity with no project action were not readily available; as a result, the interagency team determined that a 20 percent increase to baseline salinities should be applied for the FWOP conditions to capture the potential change in salinities over the period of analysis.
- *FWP Conditions.* As described above, a 20 percent increase was applied to baseline salinities the FWP conditions to capture the potential change in salinities over the period of analysis.

2.2.1.3 Variable 3 - Lowest Monthly Average Winter Water Temperature

Lowest monthly average winter water temperature represents the minimum value of the 4 monthly mean temperatures determined for each year of data between the months of December and March (Kostecki, 1984). This variable was determined using TPWD water quality data from 2007 to 2016 (pers. com. M. Fisher [TPWD], 2017).

- *Existing Conditions.* Existing conditions were determined by calculating the average monthly water temperature for the months of December, January, February, and March, and taking the minimum of those values.
- *FWOP Conditions.* This variable was held constant through the 50-year project life.
- *FWP Conditions.* This variable was held constant through the 50-year project life.

2.2.1.4 Variable 4 - Highest Monthly Average Summer Water Temperature

Highest monthly average summer water temperature represents the maximum value of the 3 monthly mean salinities determined for each year of data between the months of June and September (Kostecki, 1984). This variable was determined using TPWD water quality data from 2007 to 2016 (pers. com. M. Fisher [TPWD], 2017).

- *Existing Conditions.* Existing conditions were determined by calculating the average monthly water temperature for the months of June, July and August, and taking a maximum of those values.

- *FWOP Conditions.* This variable was held constant through the 50-year project life.
- *FWP Conditions.* This variable was held constant through the 50-year project life.

2.2.1.5 Variable 5 - Percentage of Study Area that is Optimal Cover

The preferred habitat of juvenile spotted seatrout is the shallow, vegetated area of estuarine environments, and most ideally near the edges of grass flats, which provide shelter, protection, and an abundance of food resources. Cover, including submerged and/or emergent vegetation, submerged islands, oyster beds, or shell reef, over more than 50 percent of the total area indicates an optimal HSI of 1.0. Cover below this mark decreases in a linear fashion, where no cover indicates suboptimal HSI of 0 (Kostecki, 1984).

- *Existing Conditions.* For baseline conditions, this variable was determined by evaluating historical maps and aerial photographs using Google Earth aerial imagery (2016) and gaining consensus from the interagency team.
- *FWOP Conditions.* For FWOP conditions, it was assumed that existing seagrass beds within a project area were depleted due to increased energies and increased water depth as a result of SLR.
- *FWP Conditions.* For FWP conditions, it was assumed that existing seagrass beds within a project area remain due to protective actions (i.e., the installation of breakwaters, creation of oyster reef, or restoration of marshes) and optimal conditions occur at the end of construction (2035) and remain through the period of analysis.

2.2.2 American Oyster Habitat Suitability Index

Oyster reef acreages were based on a classification conducted using the TPWD oyster locations data to evaluate benefits/impacts to oyster from the proposed measures. Changes in oyster reef habitat associated with each NOAA SLR scenario were determined by consensus from the interagency team. Changes in salinities and substrate composition were also considered for the period of analysis and are described below and are the same as the assumptions generated during the impact analysis for the Matagorda Ship Channel Section 216 project (MSCIP) completed in 2020.

2.2.2.1 Variable 1 Percent Cultch

Percent cultch represents the percent of bottom covered with hard substrate. It is assumed that hard substrate (cultch), such as existing oyster reef, or other hard surfaces (limestone, concrete, granite, etc.) are optimal for oyster larvae to settle on and utilize as habitat (Swannack et al., 2014).

- *Existing Conditions.* Existing conditions were determined by calculating the amount of oyster reef for each Zone footprint, using the TPWD oyster locations data. It was assumed that if no oyster reef existed within the project footprint, then the percent cultch was suboptimal (SI = 0.0). Alternatively, any amount of oyster reef existing within the project footprint was assumed to provide 90 percent bottom substrate (SI = 0.9).

- *FWOP Conditions.* Data to forecast and evaluate future changes in oyster reef habitat were not readily available. As a result, it was assumed that all existing oyster reef habitat, and therefore cultch, was consistent throughout the period of analysis for the with no project action.

- *FWP /Mitigation Conditions.* Oyster habitat restoration or creation actions were assumed to be completed within one year of the start of construction in each zone. For existing oyster reef in the footprints of the project area, a complete loss of cultch was assumed because hard substrate would be buried. For mitigation, the baseline condition was assumed to have 10 percent cultch material which would be increased to 100 percent with the placement of cultch.

2.2.2.2 Variable 2 – Mean Water Salinity during May–September

Mean water salinity during the spawning season for oysters represents the mean monthly salinity from May to September and reflects the optimal salinities required for spawning and larval stages (Swannack et al., 2014).

- *Existing Conditions.* Existing conditions were calculated by averaging monthly values of salinity from May 1 through September 30 within the project footprint using TPWD water quality data from 2007 to 2016 (pers. com. M. Fisher [TPWD], 2017).
- *FWOP Conditions.* Data to forecast and evaluate changes in salinity with no project action were not readily available; as a result, the interagency team for the MSCIP determined that 2 part per thousand increase to baseline salinities should be applied for the TY 51 FWOP conditions to capture the potential change in salinities over the period of analysis.
- *FWP ER/Mitigation Conditions.* As described above, a 20 percent increase was applied to baseline salinities for the FWP conditions to capture the potential change in salinities over the period of analysis.
- *FWP CSRM Conditions.* Areas directly impacted by the presence (within the footprint) of a CSRM measure would no longer be marine habitat so by default the variable is considered 0.

2.2.2.3 Variable 3 Minimum Annual Water Salinity

Minimum annual salinity represents the minimum value of the 12 monthly mean salinities determined for each year of data. This variable reflects freshwater impacts (e.g., high rainfall years or freshwater diversions) on oysters and is an indication of the frequency of freshwater floods that are fatal to oysters (Swannack et al., 2014).

- *Existing Conditions.* Existing or baseline conditions were calculated by averaging monthly values of salinities to determine the minimum annual salinity from 2007 to 2016 using TPWD water quality data (pers. com. M. Fisher [TPWD], 2017).
- *FWOP Conditions.* Data to forecast and evaluate changes in salinity with no project action were not readily available; as a result, the interagency team working on the MSCIP determined that a 2 part per thousand increase to baseline salinities should be applied for the FWOP conditions to capture the potential change in salinities from RSLC over the period of analysis.
- *FWP /Mitigation Conditions.* As described above, a 2 part per thousand increase was applied to baseline salinities for the FWP conditions to capture the potential change in salinities over the period of analysis.

2.2.2.4 Variable 4- Annual Mean Salinity

Annual mean salinity represents the range of suitable salinities that adult oysters can tolerate and are viable. Salinities within the range of 10 to 15 ppt are assumed to be optimal for oysters (Swannack et al., 2014).

- *Existing Conditions.* Existing, or baseline, conditions were calculated by averaging monthly salinity values to determine the annual mean salinity from 2007 to 2016 using TPWD water quality data (pers. com. M. Fisher [TPWD], 2017).
- *FWOP Conditions.* Data to forecast and evaluate changes in salinity with no project action were not readily available; as a result, the interagency team determined that a 25 percent increase to baseline salinities should be applied for the FWOP conditions to capture the potential change in salinities over the period of analysis.
- *FWP /Mitigation Conditions.* As described above, a 7.5 percent increase was applied to baseline salinities for the FWP conditions to capture the potential change in salinities over the period of analysis. This was identified using the hydrologic modeling performed for the Matagorda Ship Channel project.

2.3 Procedure for using HEP to generate Average Annual Habitat Units

Individual species HSI scores were generated for each measure location using the species-specific spreadsheet calculators. The HSI scores were then multiplied by the acreages to calculate the Habitat Units (HUs). HUs represent a numerical combination of quality (i.e. Habitat Suitability Index) and quantity (acres) existing at any given point in time.

HUs represent a single point in time; however, the impacts of any of the proposed actions would occur over the entire planning horizon (50 years). To account for the value of change over time, when HSI scores are not available for each year of analysis, the cumulative HUs are calculated using a formula that requires only the target year (TY) and the area estimates (USFWS 1980). The following formula was used:

$$\sum_{0}^{TY} HUs = (T_2 - T_1)\left[\frac{(A_1 \times HSI_1) + (A_2 \times HSI_2)}{3} + \frac{(A_2 \times HSI_1) + (A_1 \times HSI_2)}{6}\right]$$

Where:

$$\sum_{0}^{TY} HUs = \text{sum of habitat units}$$

T1= first target year of time interval

T2 = last target year of time interval

A1 = area of available habitat at beginning of time interval

A2= area of available habitat as the end of time interval

H1 = Habitat Suitability Index at the beginning of time interval

H2 = Habitat Suitability Index at the end of time interval

3 and 6 = constants derived from integration of HSI x Area for the interval between any two target years

This formula was developed to precisely calculate cumulative HUs when either HSI or area or both change over a time interval, which is common when dealing with the unevenness found in nature. HU gains or losses are annualized by summing the cumulative HUs calculated using the above equation across all target years in the period of analysis and dividing the total (cumulative HUs) by the number of years in the planning horizon (i.e. 50 years). This calculation results in the Average Annual Habitat Units (AAHUs) (USFWS 1980).

The impact of a project can be quantified by subtracting the FWP scenarios benefits/impacts from the FWOP benefits/impacts. The difference in AAHUs between the FWOP and the FWP represents the net impact attributable to the project in terms of habitat quantity and quality, where a positive number results in net benefits and a negative result in net loss.

2.4 Ecological modeling results for impact assessment

Impact acreage was determined by assuming the project will have adverse effects to 10% of the habitat identified in the 1000-foot buffer plus all habitat located within the project footprint. These acreages were then entered into spreadsheets that developed for the Spotted Seatrout and Oyster HSI models respectively. The results of the ecological modeling for the impact assessment are provided in Table 3 and the spreadsheets showing the analysis are attached to this document.

2.5 Ecological modeling to determine mitigation acreages

The same spreadsheets were used to back calculate the acreage of mitigation that would be required to offset the modeled impacts. For Zones 12, 13, 14, and 16, a minimum of 3 acres of oyster reef mitigation would be needed in East Matagorda to offset estimated impacts to 1 acre of oyster reef. Additionally, a minimum of 87-acres of seagrass mitigation in East Matagorda Bay would be needed to offset estimated impacts to 54 acres of habitat. Thirdly, for Zone 18, 10 acres of oyster reef mitigation are needed to offset estimated impacts to 4.5 acres of reef.

Table 3. Impact calculation by Zone in AAHU

	Zone 12		Zone 13		Zone 14		Zone 16		Zone 18		Total (AAHUs)	
HSI Species	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Matagorda Bay	East Matagorda Bay
Spotted Sea Trout	7	-5.25	12	-9.7	34	-27	1	-0.4			0	42.5
Oyster	-	-					1	-0.7	4.5	-2.8	-2.8	-0.7

3.0 MITIGATION PLAN

ER 1105-2-100 states: “Mitigation planning objectives are clearly written statements that prescribe specific actions to be taken to avoid and minimize adverse impacts, and identifies specific amounts (units of measurement, e.g., habitat units) of compensation required to replace or substitute for remaining, significant unavoidable losses.”

Compensating for the impact by replacing or providing substitute resources or environments. “Replacing" means the replacement of fish and wildlife resources in-kind. "Substitute" means the replacement of fish and wildlife resources out-of-kind. Substitute resources, on balance, shall be at least equal in value and significance as the resources lost.

3.1 Mitigation Sites

Selection of potential mitigation sites and updates to the modeling of benefits will be conducted in PED and will be coordinated with the resource agencies. Field surveys will be conducted in PED to refine the impact acreage. Impact acreages for this mitigation plan were estimated using geospatial data provided by TPWD and the NMFS. While the exact locations of the mitigation sites have not been selected at this point for oyster reef and sea grass mitigation construction, discussions with TPWD and USFWS have indicated that placing the features near the respective zones is preferable. Further discussions with these agencies and their local biologists will continue during the PED and construction phases to confirm the best location for reef construction.

3.2 Oyster Reef Mitigation

The preferred option for oyster reef restoration identified in the MSCIP IFR-EIS is through artificial cultch placement. This method entails placing a hard substrate on the bay bottom which allows oyster spat to attach and mature into adults and develop into reefs. This is the most common method employed along the Texas Gulf coast. The most common method of providing artificial cultch for reef development is the use of crushed limestone of river pebble placement. Placement of this material in layers of thickness from 6-9” thick has been shown to be the most successful method of oyster reef creation. The use of rock allows for small pore spaces for the oyster spat to attach, but does not allow for larger spaces for predators, such as crabs and oyster drills, to settle. The mass placement of rock allows for effective coverage of the bay bottom to accomplish our goal of 90 percent cultch coverage.

3.3 Seagrass Mitigation

Field surveys will be conducted in PED to identify suitable seagrass mitigation areas. Coordination with the resource agencies will occur in PED to optimize the mitigation site selection and the final mitigation work plan. Seagrass mitigation work may include use of dredge material to match nearby healthy seagrass grades, installation of wave breaks to protect the mitigation sites, planting with seagrass plugs from approved donor sites.

4.0 MONITORING AND ADAPTIVE MANAGEMENT

4.1 Ecological Success Criteria

4.1.1 Oyster Reef Mitigation Ecological Success Criteria

Criteria for restoration success would include one structural and one functional endpoint. The structural endpoint would be the number of hard bottom acres restored. The functional endpoint would be a measure of the live oyster density or recruitment onto the cultch that would be determined in coordination with TPWD. Success criteria includes:

1. Structural Endpoint: Target acres of hard bottom is established 1 year after mitigation construction is complete.

2. Functional Endpoint: At least 80% of the total live density of nearby natural reefs is achieved by the end of the 3rd year post-mitigation construction.

4.1.2 Seagrass Mitigation Ecological Success Criteria

To establish native seagrass coverage of 60 percent of the mitigation area(s). Seagrass surveys will be conducted in PED to inform the final mitigation modeling calculations, identify reference sites, and to identify suitable mitigation sites. Coordination with resource agencies will continue in PED to ensure mitigation sites are appropriate for seagrass meadow establishment and to identify seagrass species and donor sites for planting.

4.2 Monitoring Plan

4.2.1 Oyster Reef Mitigation Monitoring

Monitoring of the mitigation sites would be conducted pre- and post-restoration to assess the success of mitigation. The specific method and techniques would be adapted to the scale of the mitigation site and would follow TPWD sample methods, where applicable and suitable for large acreages of restoration.

Pre-restoration and post-restoration side scan-sonar data would be collected and processed into ArcGIS data layers. This would determine the acres of reef habitat available for colonization. The purpose of pre-restoration side-scan sonar data is to determine the presence/absence of existing exposed reef within the mitigation site footprint, with the aim of confirming that existing reef is zero acres since mitigation construction should avoid placing cultch over existing reef. As a structural endpoint, the restored cultch acreage would be quantified from the post-restoration hard-bottom acreage indicated in the side-scan data. These data would determine the amount of hard bottom habitat restored that would be available for oyster recruitment.

The proposed methodology to monitor oyster success includes using patent tongs or similar grab sample method on a randomly stratified grid over each mitigation site. The functional endpoint monitoring would be conducted starting 2 years after the placement of cultch and continue for 3 years. The functional monitoring would be timed after spat peak periods, when possible, to ensure the selected success criteria are met. Both the amount of spat, live growth (market size ≥3 inches and sub-market size <3 inches) and amount and size of dead shell would be determined using grab sample tongs or

other similar recommended methodology by TPWD. The enumeration of spat, juvenile, and adult live growth would be compared with nearby mapped natural reef comparison sites that would be confirmed to present by side-scan sonar and grab sampling.

Use of specific target live reef density of oysters per square meter (oysters/m2) is not practical because year-to-year recruitment and live reef density is highly variable with climatic variations in salinity and annual storm and other freshwater inflow events. Therefore, sampling of mitigation reef and the comparison to natural reef would be conducted contemporaneously.

When the success criteria are met of the required structural hard-bottom acres constructed and function endpoint result of 80% of total live density of nearby natural reef, the monitoring would cease, and the mitigation project would be determined to be successful.

4.2.2 Oyster Mitigation Adaptive Management

Anytime during the monitoring period, if the success of the mitigation plan appears to not be meeting the success criteria, TPWD and other resource agencies would be notified so that the team can evaluate the problems and pursue ways to address the deficiencies in the mitigation. Discussion on meeting the success criteria would be included in each monitoring report. Corrective action would depend on the assessed or probable cause of the failure. Failure of the oyster mitigation site due to natural or anthropogenic drives from poor water quality, harvesting, or improper site conditions would be minimized to the greatest extent practicable through selection of a site that meets the needs of a healthy reef. The most relevant actions that could be used for adaptive management in the context of oyster reef mitigation are re-placing cultch if substrate has subsided or is otherwise not exposed through seeding with oyster larvae as long as all other factors such as salinity and cultch were not an issue. Based on past local reef restoration projects that account for proper design, the risk of full subsidence is low

4.2.3 Seagrass Mitigation Monitoring

Monitoring of the mitigation sites would be conducted pre- and post-restoration to assess the success of mitigation. Annual seagrass surveys will be conducted in years two and three post construction of the mitigation site. Actual survey protocols will be coordinated with resource agencies in PED. For this feasibility report, survey costs were generated by using recent seagrass surveys which were part of the Corpus Christi Channel Improvement Project. The monitoring surveys for this project divided the mitigation site into quadrats approximately 20 meters apart which were then are sampled for depth, sea grass species, and sea grass density. The data from the quadrats is then extrapolated to determine density, abundance, frequency by species and percent cover for the mitigation site.

When the success criteria is met, (mitigation site has 60% coverage of native seagrass) the monitoring would cease, and the mitigation project would be determined to be successful.

4.2.4 Seagrass Mitigation Adaptive Management

Anytime during the monitoring period, if the success of the mitigation plan appears to not be meeting the success criteria, TPWD and other resource agencies would be notified so that the team can evaluate the problems and pursue ways to address the deficiencies in the mitigation. Discussion on meeting the

success criteria would be included in each monitoring report. Corrective action would depend on the assessed or probable cause of the failure.

Adaptive management should begin by comparing the mitigation site to the reference locations previously identified in the environmental surveys performed in PED. If target depths or substrates are determined to be the issue with the mitigation area, additional dredge material may need to be placed to improve the suitability of the mitigation site. If the mitigation site is suitable, another round of planting may be deemed necessary.

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Attachment: Maps and Ecological Modeling Spreadsheets

N

A

Zone 12 Direct & Indirect Seagrass Impacts

Miles

0 0.25 0.5

Legend

- Zone 13A6
- Zone 12A3
- TPWD 2021 Seagrass Data
- Zone 12 Direct Seagrass Impacts
- Zone 12 Indirect Seagrass Impacts

N

A

Zone 13 Direct & Indirect Seagrass Impacts

Miles

0 0.25 0.5

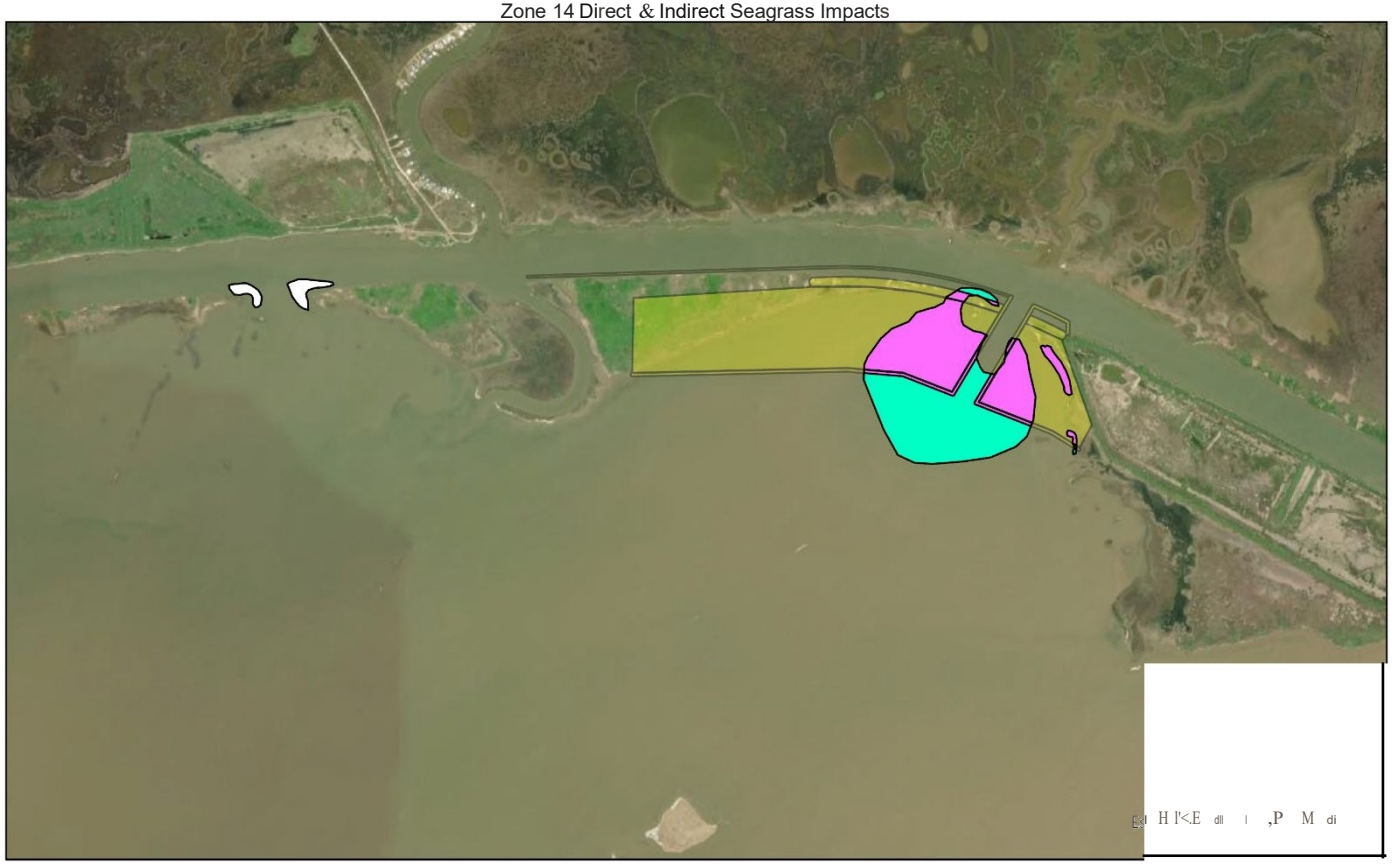
Legend

- Zone 13A6
- Zone 12A3
- TPWD 2021 Seagrass Data
- Zone 13 Direct Seagrass Impacts
- Zone 13 Indirect Seagrass Impacts

N

A

Zone 14 Direct & Indirect Seagrass Impacts



Miles

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Legend

- Zone 14A6
- TPWD 2021 Seagrass Data
- Zone 14 Direct Seagrass Impacts
- Zone 14 Indirect Seagrass Impacts

N

A

Zone 16 Direct & Indirect Oysters Impacts

Miles

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Legend

- Zone 16A6
- Zone 16 Indirect Oyster Impacts
- 2011 Oysters Data

N

A

Zone 16 Indirect Seagrass Impacts

Miles

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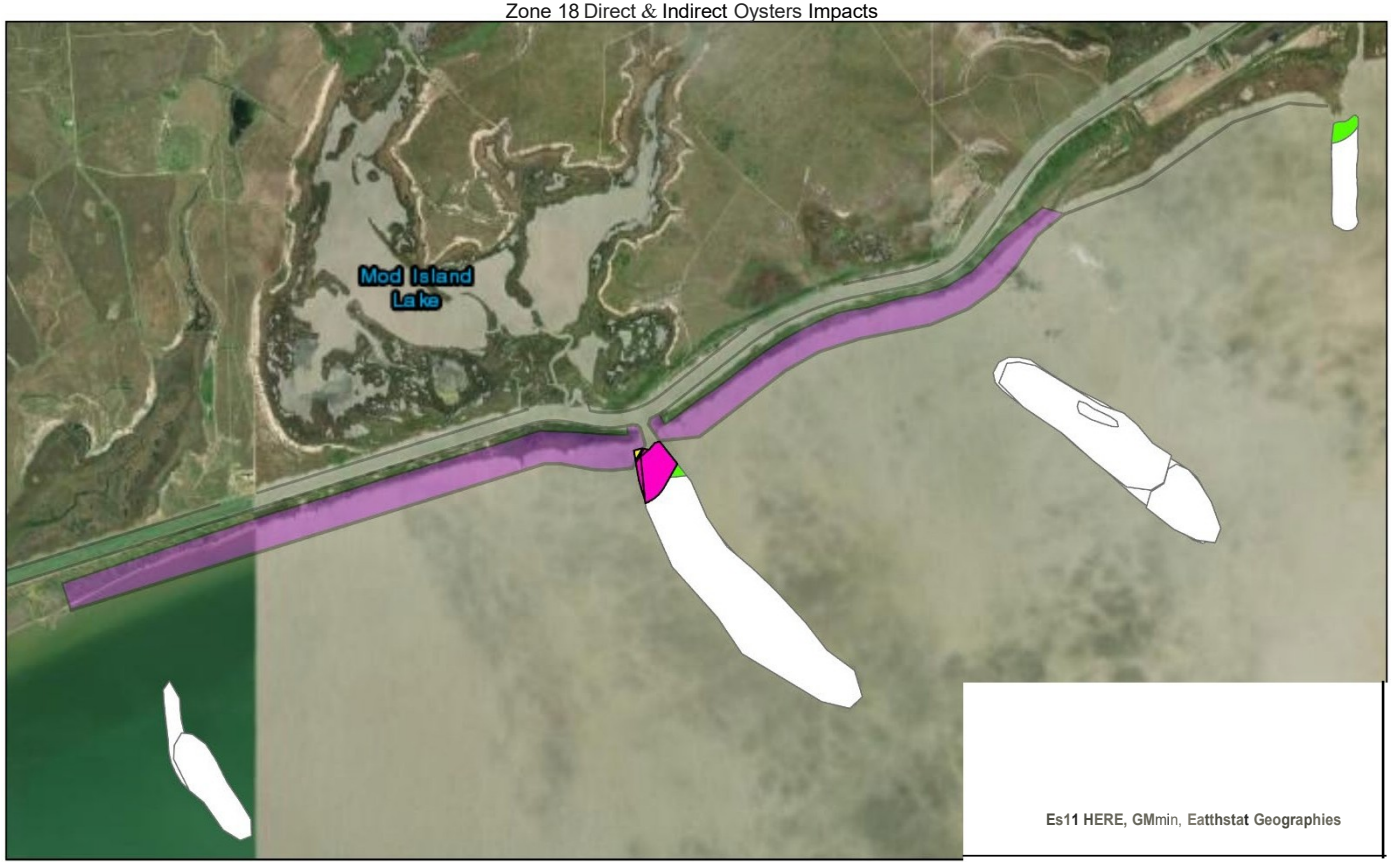
Legend

- Zone 16A6
- TPWD 2021 Seagrass Data
- Zone 16 Indirect Seagrass Impacts

N

A

Zone 18 Direct & Indirect Oysters Impacts



Miles

O 0.250.5

Legend

- Zone 18 A6
- D Zone 18 Direct Oyster Impacts
- D 2011 Oysters Data
- Zone 18 Indirect Oysters Impacts

US Army Corps of Engineers ®
Galveston District

Appendix D-3

Draft Intra-Agency CBRA Consultation

for

Gulf Intracoastal Waterway Coastal Resilience Study
Matagorda County, Texas

January 2022

DRAFT INTERAGENCY CBRA CONSULTATIONS

The Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 *et seq*.) encourages the conservation of hurricane prone and biologically rich coastal barriers. No new expenditures or financial assistance may be made available under authority of any Federal law for any purpose within the System Units of the John H. Chafee Coastal Barrier Resources System (CBRS) including: construction or purchase of roads, structures, facilities, or related infrastructure, and most projects to prevent the erosion of or otherwise stabilize any inlet, shoreline, or inshore area. However, the appropriate Federal officer, after consultation with the U.S. Fish and Wildlife Service (Service), may make Federal expenditures and financial assistance available within System Units for activities that meet one of the CBRA's exceptions (16 U.S.C. 3505). The CBRA imposes no restrictions on actions and projects within the CBRS that are carried out with State, local, or private funding. Any response from the Service to a CBRA consultation request is in the form of an opinion only. The Service has not been granted veto power. **The responsibility for complying with the CBRA and the final decision regarding the expenditure of funds for a particular action or project rests with the Federal funding agency.**

There are two types of units within the CBRS, System Units and Otherwise Protected Areas (OPAs). OPAs are denoted with a "P" at the end of the unit number (e.g., "FL-64P"). Most new Federal expenditures and financial assistance, including Federal flood insurance, are prohibited within System Units. The only Federal spending prohibition within OPAs is on Federal flood insurance; other Federal expenditures are permitted. **Consultation with the Service is not needed if the proposed action or project is located within an OPA.** However, agencies providing disaster assistance that is contingent upon a requirement to purchase flood insurance after the fact are advised to disclose the OPA designation and information on the restrictions on Federal flood insurance to the recipient prior to the commitments of funds.

The Service has developed the attached template to help facilitate the CBRA consultation process. This form, and any additional documentation, may be submitted to the appropriate Ecological Services Field Office to fulfill the CBRA's consultation requirement.

Additional Resources:

CBRS Mapper: *https://www.fws.gov/cbra/maps/mapper.html*

CBRS shapefile and Web Map Service: *https://www.fws.gov/cbra/maps/Boundaries.html*

CBRA consultations: *https://www.fws.gov/cbra* under "Project Consultations"

CBRS in/out property determinations: *https://www.fws.gov/cbra/Determinations.html*

Ecological Services Field Office contact information: *https://www.fws.gov/offices*

DATE

Mr. Charles Ardizzone
U.S. Fish and Wildlife Service
Texas Coastal Ecological Services
17629 El Camino Real
Houston, TX 77058

The U.S. Army Corps of Engineers (USACE) requests a consultation with the U.S. Fish and Wildlife Service (Service) under the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 *et seq*.) for the proposed Gulf Intracoastal Waterway Coastal Resilience Study (GIWW-CRS) which is and investigation of resilience and navigation opportunities for the existing navigation channel in Brazoria and Matagorda Counties, Texas.

Project Location

The project is located in Matagorda County, Texas, partially within Unit(s) TO7 and T07P of the Coastal Barrier Resources System (CBRS).

While the Product Delivery Team (PDT) for the GIWW-CRS investigated resilience and navigation opportunities along the existing Gulf Intracoastal Waterway (GIWW) in both Brazoria and Matagorda Counties, the Tentatively Selected Plan (TSP) only includes recommended actions in Matagorda County, Texas. The study area was broken up into individual zones to allow for targeted analysis. Planned activities in Zones 12, 13, and 14 overlap portions of T07 and T07P (see *Figure 1* and the attached maps).

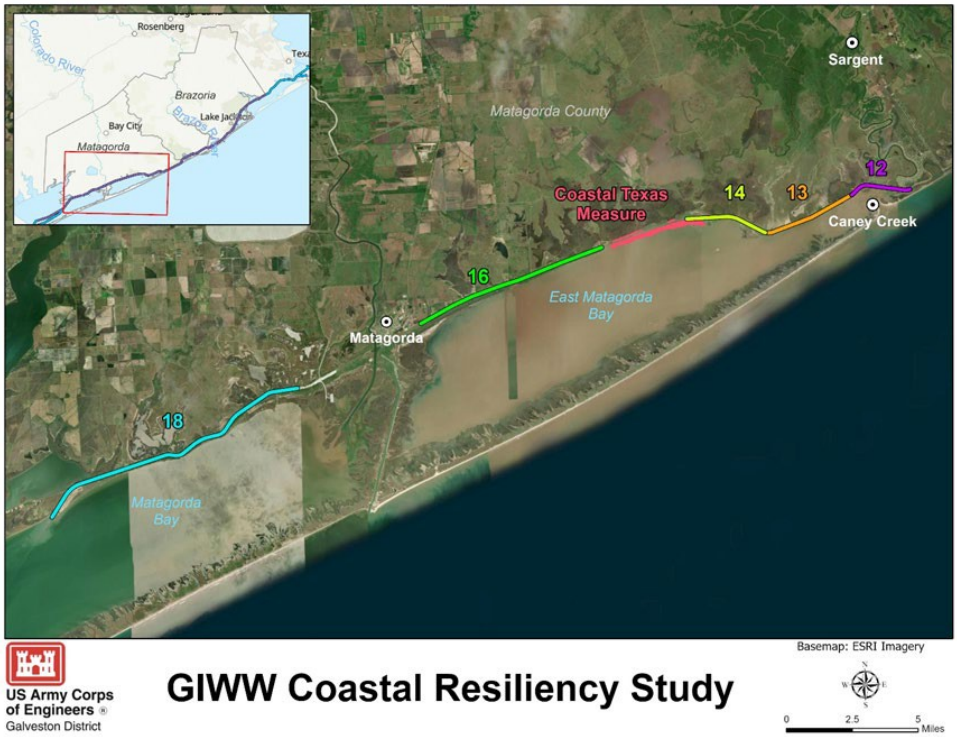


Figure 1. Study area and zones

Description of the Proposed Action or Project

The proposed actions in the CBRS units include construction of three types of project measures: breakwaters, earthen berms, and areas designated for the beneficial use of dredge material (shown in the attached maps as "marsh plantings"). All elevations are provided using the North American Vertical Datum of 1988 (NAVD 88). The feasibility designs for the project assumes the breakwaters would be constructed using commercially sourced R-150 size stone and would have a crest elevation of 3.0-foot, toe elevation of -2.0-foot, a crest width of 5-foot, a bottom width of 25-foot and a 2:1 side slope. The feasibility designs for the project assumes the earthen berms would have a crest elevation of 8-foot, a minimum crest width of 100-foot, and a 5:1 side slope. The material needed to construct the earthen berms would be excavated from an area immediately adjacent to the berm. The borrow sources for the earthen berms would be restored using operations and maintenance (O&M) dredged material from the GIWW. The Beneficial Use (BU) areas are located on the "bay side" of the proposed earthen berms, would be constructed using O&M dredged material from the GIWW, and would be planted with native species to establish marsh habitat. The final target elevations and designs for the BU areas would be identified through collaboration with the Federal and State resource agencies in the future Preconstruction, Engineering, and Design Phase of the project. Table 1 contains the specific amounts of these features that overlap CBRS Units. Additional detail on the proposed actions can be found in the Draft Integrated Feasibility Report and Environmental Assessment for the GIWW-CRS.

Table 1. Amount of project features that overlap with CBRS Units

Study Zone	***Measure***	***Unit***	***Linear Feet***	***Acreage***
12	*Breakwater*	*T07*	*1875*	*2*
12	*Breakwater*	*T07P*	*442*	*0.5*
13	*Breakwater*	*T07*	*13987*	*15.8*
13	*Earthen Berm*	*T07*	*19393*	*43.2*
13	*BU (marsh planting)*	*T07*	*-*	*34.7*
13	*Breakwater*	*T07P*	*22872*	*26*
13	*Earthen Berm*	*T07P*	*1480*	*4.6*
13	*BU (marsh planting)*	*T07P*	*-*	*370.7*
14	*Breakwater*	*T07*	*1906*	*2.2*
14	*Earthen Berm*	*T07*	*954*	*2.2*
14	*BU (marsh planting)*	*T07*	*-*	*6.5*
14	*Breakwater*	*T07P*	*7937*	*9.1*
14	*Earthen Berm*	*T07P*	*1723*	*3.9*
14	*BU (marsh planting)*	*T07P*	*-*	*81.2*

Federal Funding Source:

The study is authorized under the Water Resources Development Act of 2016, Section 1201 (25). The non-Federal Partner for the GIWW-CRS is the Texas Department of Transportation (TXDOT). Upon approval of the final report, Chief's report, and construction by OMB, the project will be reviewed and compete for Inter Waterways User Board (IWUB) funds (IWUF) for a 50% federal/50% non-federal cost share.

Applicable Exception(s) under 16 U.S.C. 3505(a)
Identify the appropriate exception(s) for the action or project under the CBRA (16 U.S.C. 3505(a)).

General Exceptions

☐ 16 U.S.C. 3505(a)(1): Any use or facility necessary for the **exploration, extraction, or transportation of energy resources** which can be carried out only on, in, or adjacent to a coastal water area because the use or facility requires access to the coastal water body.

☒ 16 U.S.C. 3505(a)(2): The **maintenance or construction of improvements of existing Federal navigation channels** (including the Intracoastal Waterway) and related structures (such as jetties), including the disposal of dredge materials related to such maintenance or construction. A Federal navigation channel or a related structure is an existing channel or structure, respectively, if it was authorized before the date on which the relevant System unit or portion of the System Unit was included within the CBRS.

☐ 16 U.S.C. 3505(a)(3): The maintenance, replacement, reconstruction, or repair, but not the expansion, of **publicly owned or publicly operated roads, structures, or facilities that are essential links** in a larger network or system.

☐ 16 U.S.C. 3505(a)(4): **Military activities** essential to national security.

☐ 16 U.S.C. 3505(a)(5): The construction, operation, maintenance, and rehabilitation of **Coast Guard facilities** and access thereto.

Specific Exceptions
These exceptions must also be consistent with all three purposes of the CBRA (see "Justification" section below).

☐ 16 U.S.C. 3505(a)(6)(A): **Projects for the study, management, protection, and enhancement of fish and wildlife resources and habitats**, including acquisition of fish and wildlife habitats, and related lands, stabilization projects for fish and wildlife habitats, and recreational projects.

☐ 16 U.S.C. 3505(a)(6)(B): Establishment, operation, and maintenance of **air and water navigation aids** and devices, and for access thereto.

☐ 16 U.S.C. 3505(a)(6)(C): Projects under the **Land and Water Conservation Fund Act** of 1965 (16 U.S.C. 4601-4 through 11) and the **Coastal Zone Management Act** of 1972 (16 U.S.C. 1451 et seq.).

☐ 16 U.S.C. 3505(a)(6)(D): **Scientific research**, including aeronautical, atmospheric, space, geologic, marine, fish and wildlife, and other research, development, andapplications.

☐ 16 U.S.C. 3505(a)(6)(E): Assistance for **emergency actions essential to the saving of lives and the protection of property and the public health and safety**, if such actions are performed pursuant to sections 5170a, 5170b, and 5192 of title 42 **and are limited to actions that are necessary to alleviate the emergency.**

☐ 16 U.S.C. 3505(a)(6)(F): Maintenance, replacement, reconstruction, or repair, but not the expansion (except with respect to United States route 1 in the Florida Keys), of **publicly owned or publicly operated roads, structures, and facilities.**

☐ 16 U.S.C. 3505(a)(6)(G): **Nonstructural projects for shoreline stabilization** that are designed to mimic, enhance, or restore a natural stabilization system.

Justification for Exception(s)

The project purpose is to investigate opportunities to maintain and improve a section of the Intracoastal Waterway. The federal funding source is navigation funds from the IWUF. CBRS Units T07 and T07P have a System Unit Establishment Date of November 16, 1991. The section of the GIWW reviewed in this project was originally authorized in 1941 to 9-foot-deep and 100-foot-wide. The GIWW in Matagorda County, Texas was authorized to the current dimensions (12-foot-deep and 125-foot-wide) in 1949. Both authorizations dates for the GIWW predate the System Unit Establishment Date in question.

Contact Information

Include contact information and where the response should be sent.

Mr. Jeff Pinsky
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Sincerely,

Robert Morrow DATE
Acting Chief, Environmental Branch
Regional Planning and Environmental Center

U.S. Fish and Wildlife Service Response

Below is the Service's response to U.S. Army Corps of Engineers' request for a consultation under the CBRA for the Gulf Intracoastal Waterway Coastal Resilience Study. This response represents the Service's opinion. **The final decision regarding the expenditure of funds for this action or project rests with the Federal funding agency.** U.S. Army Corps of Engineers has fulfilled its obligation to consult with the Service under the CBRA for this

particular action or project within the CBRS. Please note that any new commitment of Federal funds associated with this action or project, or change in the project design and/or scope, is subject to the CBRA's consultation requirement.

The Service has reviewed the information provided by the U.S. Army Corps of Engineers, and believes the referenced action/project is:

- ☐ Not located within a System Unit of the CBRS and the CBRA does not apply (except with respect to the restrictions on Federal flood insurance)
- ☐ Located within a System Unit of the CBRS and meets the exception(s) to the CBRA selected above
- ☐ Located within a System Unit of the CBRS and meets different exception(s) than the one(s) selected above (see additional information/comments below)
- ☐ Located within a System Unit of the CBRS and does not meet an exception to the CBRA (see additional information/comments below)
- ☐ Due to many competing priorities, the Service is unable to provide an opinion on the applicability of the CBRA's exceptions to this action/project at this time. The U.S. Army Corps of Engineers may elect to proceed with the action/project if it has determined that the action/project is allowable under the CBRA. Please note that any new commitment of Federal funds associated with this action/project or a related future project is subject to the CBRA's consultation requirement.

Additional Information/Comments
Include any additional information/comments.

This response does not constitute consultation for any project pursuant to section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) or comments afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*); nor does it preclude comment on any forthcoming environmental documents pursuant to the National Environmental Policy Act (83 Stat. 852; 42 U.S.C. 4321 *et seq.*).

SERVICE FIELD OFFICE SIGNATORY AND TITLE DATE

US Army Corps of Engineers ®
Galveston District

Appendix D-4

Draft Magnuson-Stevens Fishery Conservation and Management Act Compliance

(Essential Fish Habitat Assessment)

for

Gulf Intracoastal Waterway Coastal Resilience Study
Matagorda County, Texas

January 2022

Gulf Intracoastal Waterway Coastal Resilience Study Matagorda County, Texas

Draft Magnuson-Stevens Fishery Conservation and Management Act Compliance (Essential Fish Habitat Assessment)

January 2022

Prepared by:

United States Army Corps of Engineers
Regional Planning and Environmental Center

US Army Corps of Engineers ®
Galveston District

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Attachments

Attachment 1: Project Plans for the Recommended Plan

Attachment 2: EFH Mapper Report

1.0 INTRODUCTION

Congress enacted amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (PL 94-265) in 1996 that established procedures for identifying essential fish habitat (EFH) and required interagency coordination to further the conservation of federally managed fisheries. Rules published by the National Marine Fisheries Service (NMFS) (50 CFR Sections 600.805–600.930) specify that any Federal agency that authorizes, funds or undertakes, or proposes to authorize, fund, or undertake an activity that could adversely affect EFH is subject to the consultation provisions of the abovementioned act and identifies consultation requirements. EFH is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils.

In accordance with the MSFCMA and NMFS consultation guidelines, this EFH assessment has been prepared to document the effects of the recommended plan on EFH. The level of detail in this EFH assessment is commensurate with the complexity and magnitude of the potential adverse effects of the recommended plan considering the available information at the time of preparation of this assessment.

The online EFH Mapping tool was accessed on January 5, 2022 (https://www.habitat.noaa.gov/) and the list of species identified in the report were considered in this assessment. A copy of the report is included at the end of this document.

1.1 Study Background

The U.S. Army Corps of Engineers, Galveston District (USACE), in partnership with the Texas Department of Transportation, have undertaken the Gulf Intracoastal Waterway Coastal Resilience Study (the Study), which is evaluate potential improvements to provide resilience from hurricanes and storms in the Gulf Intracoastal Waterway (GIWW) in Matagorda County, Texas (Figure 1). Resilience is defined by USACE as the ability to *prepare, absorb, recover*, and *adapt* from disruptive events. In the context of this study, *prepare* is how proactively the proposed measures are planned, *absorb* is the how effectively the proposed measures can withstand harm, *recover* is how quickly the proposed measures allow for normal operations to resume, and *adapt* is how easily the proposed measures can be modified for changing conditions.

Currently, the Study has completed the Tentatively Selected Plan (TSP) milestone meeting phase of the USACE Specific, Measurable, Attainable, Risk Informed, Timely (SMART) Civil Works planning process, where a plan has been tentatively selected by the USACE vertical chain of command. At this stage of the planning, the major components of the plan have been identified and evaluated at a higher level of analysis. Consistent with USACE policy in Planning Bulletin PB 2017-01, there is a certain level of uncertainty expected in the size and make-up of the recommended plan, and other plans identified from the suite of alternatives analyzed in this initial phase, including the National Economic Development (NED) Plan, or a variant preferred by the non-Federal sponsor. As such, the final size of the measures (e.g. width, length, etc.), and location presented in this BA may change in the next planning phase. These changes can affect the habitat impacted. Because of the conservative nature of economic and engineering assumptions used during the initial planning of the recommended plan, it is anticipated that the design of proposed structures will result in equal or lesser environmental impacts.

Figure 1. GIWW CRS Authorized Project Area

1.2 Description of the Proposed Action

The authorized project area encompasses 85 miles of the Texas portion of the GIWW in Brazoria and Matagorda counties which was divided into 20 zones for detailed analysis according to geography and ecology. As the evaluation progressed during the study, the study area focused on Zones 12, 13, 14, 16 and 18 as shown in Figure 1. The Recommended Plan prevents the loss of existing barrier islands while also restoring 435 acres of barrier features. The proposed Federal action (also referred to as the recommended plan) consists of shoreline stabilization using breakwaters, restoration of barrier features, creation of beneficial use dredge material placement areas designed to provide tidal marsh habitat and channel widening in project zones 12, 13, 14, 16, and 18 (Figure 1). Attachment 1 contains detailed project plans for the Recommended Plan.

Work in Zone 12 includes a combination of shoreline stabilization using breakwaters and channel widening of the existing GIWW by 150-foot on either side of the channel at the confluence of Caney Creek and the GIWW. Approximately 951 linear feet of breakwater would protect 16 acres of existing barrier and 36 acres of existing marsh and mudflats predicted to be lost to erosion without the proposed work. These actions will help address a grounding hotspot which has posed safety risks to navigation. The new work widening dredge material will be placed into PA 102-C unless in PED the new work material is considered sufficient to construct the earthen berms included in nearby Zones. The frequency of emergency dredging is expected to stay the same through 2080 if channel widening is not performed. In Zone 12, with channel widening it was possible to change the dredging cycle for the entire zone to every 2 years, eliminating the existing need for out of cycle dredging as vessels should be able to navigate channel better even in high shoaling conditions. The breakwater configurations will be refined in PED using survey data, they are planned to be placed in shallow water and not on land. Due to the erosive state of the shorelines, the breakwater footprints are shown where predictive modeling indicates future shorelines to be.

Work in Zone 13 includes construction of an earthen berm with a crest elevation of 8 feet NAVD88 to attenuate the crosswinds that vessels in the GIWW would be exposed to. Breakwaters are proposed to be constructed with crests at 5 feet NAVD88 on the channel side and 3 feet NAVD88 on the bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure. The berm would span approximately 19,000 linear feet in length with a surface area of 110 acres. The berm would be constructed using material borrowed from a 200-foot-wide by 3-foot-deep area that runs parallel to and on the bayside of the restored barrier feature. Finally, a 328-acre area between the bayside breakwater and the berm would be used as an adaptable beneficial use site. The borrow area is within the BU site and would be restored using O&M material.

Work in Zone 14 would restore barrier features along the interface of the GIWW and Live Oak Bay and includes a pass to match historic conditions for hydrologic purposes. A combination of shoreline stabilization using breakwaters and sediment placement will restore 29 acres of barrier feature and would protect 85 acres of barrier island predicted to remain at the start of construction. This work would protect 4,329 linear feet of the GIWW. The earthen berm is proposed to be constructed with a crest elevation of 8 feet NAVD88 and is designed to attenuate the crosswinds that vessels in the channel would be exposed to. Breakwaters are proposed to be constructed with crests at 5 feet NAVD88 on the channel side and 3 feet NAVD88 on the bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure. Work in Zone 14 also includes 85

acres of BU area. All the BU discussions for Zone 13 also apply to Zone 14. Live Oak Bay contains many oyster reefs and rookery areas. USACE will conduct habitat surveys and will coordinate with Federal and State resource agencies in PED to ensure final designs avoid and minimize impacts to these important ecological habitats. This is specifically relevant for the BU area and bayside breakwaters which will be reconfigured in PED to avoid those habitats.

Work in Zone 16 includes construction of 94 acres of berm to a crest elevation of 8 feet NAVD88 and installation of channel side and bayside breakwaters with a 3 feet NAVD88 crest elevation to protect 7,704 linear feet of GIWW channel. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Work in Zone 16 also includes 282 acres of BU area.

Work in Zone 18 includes construction of 291 acres of berm to a crest elevation of 8 feet NAVD88 and installation of channel side breakwaters to 5 feet NAVD88 and bayside breakwaters to 3 feet NAVD88 crest elevation to protect 33,115 linear feet of GIWW channel. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Work in Zone 16 also includes 870 acres of BU area.

2.0 MANAGED SPECIES AND LIFE HISTORIES

The report generated by the EFH mapping tool listed 53 species for EFH considerations. Table 3 includes a summary of the list. The EFH mapping tool report also indicated that there are no Habitat Areas of Particular Concern (HAPC) or EFH Areas Protected from Fishing (EFHA) identified at the project location. The Royal red shrimp is not common to estuaries on the middle Texas Coast.

Table 1. Species included in the EFH Mapper Report

Common Name	Scientific Name	Habitat Present in Project area
Red Drum	*Sciaenops ocellatus*	✓
Reef Fish	43 *Species*	✗
Brown Shrimp	*Penaeus aztecus*	✓
White Shrimp	*Penaeus setiferus*	✓
Pink Shrimp	Penaeus duorarum	✓
Royal red shrimp	*Pleoticus robustus*	✗
Bull Shark	*Carcharhinus leucas*	✓
Spinner Shark	*Carcharhinus brevipinna*	✓
Lemon Shark	*Negaprion brevirostris*	✓
Scalloped Hammerhead Shark	*Sphyrna lewini*	✓
Blacktip Shark (GOM Stock)	*Carcharhinus limbatus*	✓

2.1 Red Drum

Life History and habitat requirements:

In the GOM, red drum occur in a variety of habitats, ranging from depths of about 40 meters offshore to very shallow estuarine waters. They commonly occur in virtually all the Gulf's estuaries where they are found over a variety of substrates including sand, mud, and oyster reefs. Red drum can tolerate salinities ranging from freshwater to highly saline, but optimum salinities for juveniles and adults are between 20-40 ppt. Types of habitat occupied depend upon the life stage of the fish. Spawning occurs in deeper water near the mouths of bays and inlets, and on the Gulf side of the barrier islands (Pearson, 1929; Simmons and Breuer, 1962; Perret *et al*., 1980). The eggs hatch mainly in the Gulf, and larvae are transported into the estuary where the fish mature before moving back to the Gulf (Perret *et al*. 1980; Pattillo *et al*., 1997). Adult red drum use estuaries but tend to spend more time offshore as they age. Schools of large red drum are common in deep Gulf waters. Estuarine wetlands are especially important to larval, juvenile, and subadult red drum. Yokel (1966) concluded that abundance of red drum varied directly with the estuarine area (habitat). He also reported that, in general, landings within a state varied with the amount of that state's suitable habitat. An abundance of juvenile red drum has been reported around the perimeter of marshes in estuaries (Perret *et al*., 1980). Young fish are found in quiet, shallow, protected waters with grassy or slightly muddy bottoms (Simmons and Breuer, 1962). Shallow bay bottoms or oyster reef substrates are especially preferred by subadult and adult red drum (Miles, 1950).

2.2 Reef Fish

Most of the Fish included in the Reef Fish list complete all if not most of all their lifecycles in the offshore environment which this project would not directly impact. Certainly, the offshore environment is closely linked ecologically to adjacent estuaries, and their fates are closely tied. However, the Gray Snapper (*Lutjanus griseus*) is a reef fish that is known to commonly occur in shallow inshore waters.

Gray Snapper Life History and habitat requirements:

The gray snapper occurs on the shelf waters of the Gulf and is particularly abundant off south and southwest Florida. Gray snapper occur in almost all of the Gulf's estuaries but are most common in Florida. Considered to be one of the more abundant snappers inshore, the gray snapper inhabits waters to depths of about 180 meters. Adults are demersal and mid-water dwellers, occurring in marine, estuarine, and riverine habitats. They occur up to 32 km offshore and inshore as far as coastal plain freshwater creeks and rivers. They are found among mangroves, sandy grassbeds, and coral reefs and over sandy, muddy, and rocky bottoms. Spawning occurs offshore around reefs and shoals from June to August. Eggs are pelagic and are present June through September after the summer spawn, occurring in offshore shelf waters and near coral reefs. Larvae are planktonic, occurring in peak abundance June through August in offshore shelf waters and near coral reefs from Florida through Texas. Postlarvae move into estuarine habitat and are found especially over dense grass beds of Halodule sp. and Syringodium sp. Juveniles also are marine, estuarine, and riverine dwellers, often found in estuaries, channels, bayous, ponds, grassbeds, marshes, mangrove swamps, and freshwater creeks within eco-regions 1 and 2. They appear to prefer *Thalassia* sp. grass flats, marl bottoms, seagrass meadows, and mangrove roots.

2.3 Brown Shrimp

Life History and habitat requirements:

Brown shrimp eggs are demersal and occur offshore. Larval and pre-settlement postlarval brown shrimp are found in estuarine, nearshore, and offshore waters with depths of 0-82 m in the water column, year-round with peak abundances occurring in the spring (GMFMC, 2016).Late postlarvae and juvenile brown shrimp are found during the spring through fall in estuarine waters in depths less than one meter, temperatures of 7-35°C, salinities of 2-40 ppt, and experience mortality at dissolved oxygen (DO) concentrations less than one parts per million (ppm). They occupy nearly all estuarine environments, including submerged aquatic vegetation, emergent marsh, oyster reef, soft bottom, and sand/shell habitats (GMFMC, 2016). Postlarval shrimp migrate through passes on flood tides at night mainly from February - April with a minor peak in the fall. Juveniles and sub-adults of brown shrimp occur from secondary estuarine channels out to the continental shelf but prefer shallow estuarine areas, particularly the soft, muddy areas associated with plant-water interfaces. Sub-adults migrate from estuaries at night on ebb tide on new and full moon. Abundance offshore correlates positively with turbidity and negatively with hypoxia. Adult brown shrimp occur in neritic Gulf waters (i.e., marine waters extending from mean low tide to the edge of the continental shelf) and are associated with silt, muddy sand, and sandy substrates. Spawning occurs at depths of 18-110 m during the fall and spring and year-round at depths greater than 64 m (GMFMC, 2016). Brown shrimp are highly commercially valued nationwide; population estimates in shallow water habitats of Galveston Bay, Texas are approximately 1.3 billion (GMFMC, 2016).

2.4 White Shrimp

Life History and habitat requirements:

White shrimp are offshore and estuarine dwellers and are pelagic or demersal, depending on life stage. White shrimp eggs are found in estuarine, nearshore, and offshore waters from spring through fall, occupying water depths of 9-34m (GMFMC, 2016). The eggs are demersal and larval stages are planktonic; both occur in estuarine and nearshore marine waters of the project area. White shrimp larvae are also found in estuarine, nearshore, and offshore waters spring through fall. Postlarval shrimp migrate through passes mainly from May-November with peaks in June and September. Migration is in the upper two meters of the water column at night and at mid depths during the day. Postlarval white shrimp become benthic upon reaching the nursery areas of estuaries, where they seek shallow water with muddy-sand bottoms high in organic detritus or abundant marsh, and develop into juveniles. Juveniles are common to highly abundant in all Gulf estuaries from Texas to about the Suwannee River in Florida. Postlarvae and juveniles inhabit mostly mud or peat bottoms with large quantities of decaying organic matter or vegetative cover. Densities are usually highest in marsh edge and submerged aquatic vegetation, followed by marsh ponds and channels, inner marsh, and oyster reefs. Juveniles prefer lower salinity waters (less than 10 ppt), and frequently are found in tidal rivers and tributaries throughout their range. As juvenile white shrimp approach adulthood, they move from the estuaries to coastal areas where they mature and spawn. Migration from estuaries occurs in late August and September and appears to be related to size and environmental conditions (e.g. , sharp temperature drops in fall and winter). Adult white shrimp are demersal and inhabit estuarine, nearshore, and offshore Gulf waters to depths less than 30 meters on bottoms of soft mud or silt. Spawning occurs in estuarine, nearshore, and offshore waters from spring through late fall, peaking from June to July at depths of 9-34 m and salinities greater than or equal to 27 ppt (GMFMC, 2016). See Nelson (1992) and Pattillo et al. (1997) for more detailed information on habitat associations of white shrimp.

2.5 Pink Shrimp

Life History and habitat requirements:

Pink shrimp occupy a variety of habitats, depending on their life stage. Eggs are demersal and occur in offshore marine waters, at depths from 9 m to 48 m. Larvae and pre-settlement postlarvae occur in estuarine, nearshore, and offshore waters at depths of 1-50 m. They are water column associated and can be found year-round at temperatures of 15-35°C and salinities of 0-43. They recruit to nearshore environments through passes or open shorelines, primarily on flood tides at night. Postlarvae and juveniles of pink shrimp occur in estuarine and nearshore waters of wide-ranging salinity (0 to >30 ppt) at depths less than 3 m. Juveniles inhabit a wide variety of habitats, such as submerged aquatic vegetation, soft bottom, sand/shell and mangroves. Sub-adults occur offshore, nearshore and in estuarine waters at depths ranging from 1 to 65 m. They too have a wide habitat range, including submerged aquatic vegetation, soft bottom, sand/shell, oyster reefs, and mangroves. They are present in Texas from fall through spring. Adults inhabit nearshore and offshore waters with sand/shell habitats. They are found spring through fall off Texas at depths of 9-48 m. Pink shrimp densities are highest in or near seagrasses, low in mangroves, and near zero or absent in marshes (GMFMC 2019).

2.6 Royal Red Shrimp

Life History and habitat requirements:

Royal red shrimp (*Hymenopeneaus robustus* or *Pleoticus robustus*) is a deep-sea shrimp serves a niche market, representing a very small proportion of the overall shrimp industry in the Southeast U.S. and GOM (Stiles *et al.*, 2007). The estimated biological range for royal red shrimp extends along the continental shelf from 590 to 2,395 feet (180-730m) (Perry and Larson 2004). Peak concentrations are usually found at depths of between 820 and 1,558 feet (250-475m) (GMFMC, 2004).

2.7 Bull Shark

Life History and habitat requirements:

The bull shark is a large, shallow water shark that is cosmopolitan in warm seas and estuaries. This species can be found primarily in shallow coastal waters and is common in lagoons, bays, and river mouths. Bull sharks can also be found in fresh water that connects with salt water and have been caught in the Mississippi River as far upstream as Illinois. The bull shark prefers to live in shallow coastal waters less than 100 ft deep (30 m), but ranges from 3-450 ft deep (1-150 m) (FLMNH 2011a). It commonly enters estuaries, bays, harbors, lagoons, and river mouths and is the only shark species that readily occurs in freshwater (FLMNH 2011a). Juvenile bull sharks enter low salinity estuaries and lagoons as readily as adults do, and use these shallow areas as nursery grounds (FLMNH 2011a). They can also tolerate hypersaline water as high as 53 ppt (FLMNH 2011a). In the United States the nursery areas are in low salinity coastal estuaries of the GOM. In the western north Atlantic off Florida and the Gulf of Mexico, and off South Africa, the young are born in late spring or early summer (MBCS 2011).

2.8 Spinner Shark

Life History and habitat requirements:

The spinner shark is a coastal-pelagic, warm-temperate, and tropical shark of the continental and insular shelves (Castro, 1984). It inhabits inshore waters less than 30 m deep, but ranges offshore to at least 150 m deep (Aubrey and Snelson 2007). The spinner shark often swims in schools, leaping out of the water while spinning. It is a migratory species, but its patterns are poorly known. Off the eastern United States the species ranges from Virginia to Florida and in the Gulf of Mexico. Juveniles tend to stay inshore of the 20m bathymetric line, whereas adults are found inshore and in offshore habitats to the 90m bathymetric line. Adults are generally not found in inland bays or bayous.

EFH for neonate spinner sharks in the Gulf of Mexico includes coastal areas surrounding the Florida Keys and from the Big Bend Region to southern Texas and consists of sandy bottom areas where sea surface temperatures range from 24.5 to 30.5 °C and mean salinity is around 36 ppt. EFH for juvenile and adults includes coastal areas from Apalachicola, Florida to southern Texas. In all locations, juveniles EFH extends from shore to depths to 20m, whereas adult EFH extends from shore to 90m in depth.

2.9 Lemon Shark

Life History and habitat requirements:

Lemon sharks inhabit coastal inshore waters from New Jersey (US) to Southern Brazil, Gulf of Mexico and Caribbean in the northwestern Atlantic Ocean and along Senegal and the Ivory Coast of Africa in the eastern Atlantic (FLMNH, 2022). It is unknown whether the eastern and western Atlantic individuals are the same species. In the North Pacific, the lemon shark ranges from the Gulf of California and Baja California south to Ecuador (Sundström 2015). The lemon shark is commonly found in subtropical shallow water to depths of 300 feet (90 m) around coral reefs, mangroves, enclosed bays, sounds and river mouths. However, this species does not venture far into freshwater systems. Lemon sharks can be found in oceanic water when migrating but tend to stay along the continental and insular shelves. The lemon shark is known to form loose aggregations based on size and sex and have been seen congregating near docks and fishing piers during the night, returning to deep water during the day (Compagno et al. 2005, Sundström 2015).

2.10 Scalloped Hammerhead Shark

Life History and habitat requirements:

The scalloped hammerhead shark, *Sphyrna lewini* (Griffith & Smith, 1834), is a cosmopolitan species, residing in coastal warm temperate and tropical seas (Bigelow and Schroeder 1948). In the western Atlantic Ocean, this shark is found from New Jersey (USA) south to Brazil, including the Gulf of Mexico and Caribbean. The scalloped hammerhead and the silky shark dominate the shark by catch of the winter sword fishery in the western GOM (Branstetter, 1987). Despite their common worldwide occurrence there is little know of the species life histories. Piercy *et al.* (2007) worked to resolve an age and growth curve for the population in the GOM and oldest age estimates obtained were 30.5 years.

2.11 Blacktip Shark

Life History and habitat requirements:

The blacktip shark is circumtropical in shallow coastal waters and offshore surface waters of the continental shelves. In the southeastern United States it ranges from Virginia to Florida and the GOM.

The young are born at 55 to 60 cm total length in late May and early June in Bay systems in the GOM (Carlson, 2002; Parsons, 2002) and the Texas coast (Jones and Grace, 2002). EFH includes all major bay systems along the Gulf coast of Texas from Sabine Lake to Lower Laguna Madre.

3.0 ANALYSIS OF PROJECT EFFECTS ON EFH AND MANAGED SPECIES

3.1 Habitat Impact Discussions

All the work areas for the project, except for the existing upland dredged material placement areas, would be within tidally influenced open water which is classified as EFH. The EFH acreages within the direct footprint of the project features are included by zone in Table 1.

Moreover, the entirety of East Matagorda Bay and Matagorda Bay are considered EFH and contain numerous habitats including mud flats, sand flats, sea grass meadows, oyster reefs, channel, inlets, and cuts. The confluence Caney Creek with the GIWW and East Matagorda Bay (Mitchell's Cut) is a key transitory passage for numerous marine species during various periods in their lifecycles. The ability for larval, juvenile, and adult fish, crustaceans, and mollusks to transit to and from these bay systems was a key consideration of the Product Delivery Team in designing the measures included in the Recommended Plan. Additionally, ensuring the freshwater sources are still able to enter these bay systems was another key requirement to ensure salinities and flushing is maintained for these systems.

Table 2. EFH habitat conversion by zone

Zone	Acreage				
	Open water filled by breakwater	Open water converted to berm/barrier feature	Open water deepened by excavation for borrow source*	Open water converted to marsh (BU) **	Open water dredged for Channel Widening
12	0.7	-	-	-	24.8
13	25	110	87	328	-
14	5.7	29	20	85	-
16	10.1	94	35.4	282	-
18	43.3	291	152	870	-

* Borrow source areas fall within the created BU sites and will be restored to marsh using O&M dredged material
** The construction of the BU sites will occur over the 50-year project life.

Resource agencies were consulted to identify best available information for habitat level geospatial analysis. The Texas General Land Office's 2011 oyster survey geospatial data was used to evaluate potential affects to oyster reef, combined geospatial data from the Texas Parks and Wildlife Department and National Marine Fisheries Service was used to evaluate sea grasses, and the U.S. Fish and Wildlife Service's National Wetlands Inventory NWI Map data was used to evaluate wetlands. Of the wetlands identified within or near the project footprint, there are no aspects of the project planned that would fill or disturb them.

Table 3. Results of the Geospatial Analysis for direct impacts to sea grass and oyster reef.

Direct Impacts (Acres)	Zone 12	Zone 13	Zone 14	Zone 16	Zone 18	Total (Acres)
Seagrass	1.8	6.1	30.4	0.0	0.0	38.3
Oyster	0.0	0.0	0.0	0.0	0.8	0.8

3.2 Breakwaters

The proposed action would install a large about of breakwaters along the shorelines of the GIWW and to protect the restored barrier features and BU sites. These activities are expected to have very short temporary adverse effects on the habitat. Noise and substrate disturbance during construction will likely temporarily displace highly motile species and can injure or kill species that shelter in substrates or are sessile. It is anticipated that the populations of these species will not be suffer any long-term adverse effects and that any disturbed areas will quickly repopulate.

The breakwaters are expected to provide long-term benefits to water quality by reducing erosion which in turn reduces turbidity and by protecting the new beneficial use sites located on the by side of the project features.

Hydrologic breaks are planned for the breakwaters included in all the zones to ensure tidal exchange occurs across the structures and to ensure transitory access for marine species. There are numerous potential approaches that may be applied, such as reef balls, oyster castles, complete breaks in the breakwater, or lower crest elevation sections. The designs will be incorporated during the preconstruction, engineering, and design phase of project development.

3.3 Berms

This portion of the project involves constructing earthen berms with a crest elevation of 8-feet NAVD88 and a crest width of 50-feet. These berms would be constructed in areas that were previously barrier features that protected the GIWW but have eroded over time. The areas where these barriers feature once existed are now open water and EFH. The berms would be constructed from borrow sources immediately south of the berms. The borrow areas would be limited to a maximum depth of 3 feet to prevent water quality problems, and would be restored to marsh using O&M dredge material as part of the BU plan.

The results of the engineering analysis presented in Appendix C of the feasibility report demonstrate that the loss of these features has resulted in increased shoaling rates in the GIWW which has required frequent out-of-cycle dredging to maintain channel depth. It is estimated that by restoring these features then number of dredge days in this section of the GIWW would be reduced by 533 (an approximate 1/3 reduction) over the 50-year period of analysis. Less dredging means fewer temporary disturbances and better water quality.

3.4 Beneficial Use Sites

For the feasibility analysis, the plan is to create of marsh cells using training berms to hit ideal elevations for *Spartina alterniflora* propagation to incrementally develop the BU area over the period of analysis was used. In PED and for future construction cycles, USACE will coordinate with Federal and State resource agencies to incorporate recommendations for continued work and optimization within the BU site. Costs for incrementally seeding the BU site with locally gathered *S. alterniflora* seed was also included in the estimate. Also, thin layer placement is included in the Engineering Appendix as a strategy to combat the effects of Relative Sea Level Rise in the BU areas. Final designs for the BU strategy will occur in PED and will utilize inputs from the resource agencies to identify reference sites and goals.

3.5 Channel Widening

The channel widening is only proposed for the section of the GIWW where Caney Creek flows into Mitchell's Cut. The proposed work would use a hydraulic dredge to widen the channel by approximately 150-feet on either side of the channel. If the new work material is determined to be suitable, it would be used to construct the berm in Zone 13 which would reduce the amount of borrow material required. If the geotechnical surveys preformed in PED reveal that the material is unsuitable for use in the berm, it will be placed into existing DMPA 102B. The engineering analysis does not show a change in sedimentation rates, meaning that the same amount of O&M material is expected with or without the widening, however, the wider channel reduces the frequency of the required dredging. Other than the normal temporary disturbances during construction, this part of the project is not expected to cause impacts to EFH.

4.0 MITIGATION

Mitigation Plan summary for the recommended plan: For this feasibility analysis, existing ecological resources within and near the project footprints were calculated using geospatial data from USFWS, TPWD, NMFS, and the TXGLO. The results of this analysis are as follows, project footprints would directly impact 39 acres of seagrasses and 1 acre of oyster reef. In addition to the direct impacts, an additional 138.8 acres of sea grass and 41.4 acres of oyster reef occur within 1000 feet of the project footprints. To provide an estimate of the high end of the range of possible adverse effects, USACE assumed a complete loss of the habitats within the footprints, a percentage of indirect impacts within the buffer zone and developed a mitigation plan using ecological modeling (Habitat Evaluation Procedures). To offset the high-end range of adverse effects, USACE will have to restore 3 acres of oyster reef and 87 acres of seagrass meadows in East Matagorda Bay and 4.5 acres of oyster reef in Matagorda Bay. USACE will conduct habitat surveys and will coordinate with Federal and State resource agencies in PED to ensure final designs avoid and minimize impacts to these important ecological habitats. Engineering has confirmed that the BU areas and bayside breakwaters will be reconfigured in PED to avoid those habitats. Ecological modeling will be re-run in PED to include survey data and reconfigured alignments.

5.0 CONCLUSION

With the incorporation of the proposed mitigation for impacts to EFH, the Corps has determined that the project would have minimal adverse effects on EFH and Managed Species. It is likely that by restoring the barrier features, installing the breakwaters, and creating the BU placement areas that the ecosystems adjacent to the project zones will have fewer disturbances and will improve over time.

6.0 REFERENCES

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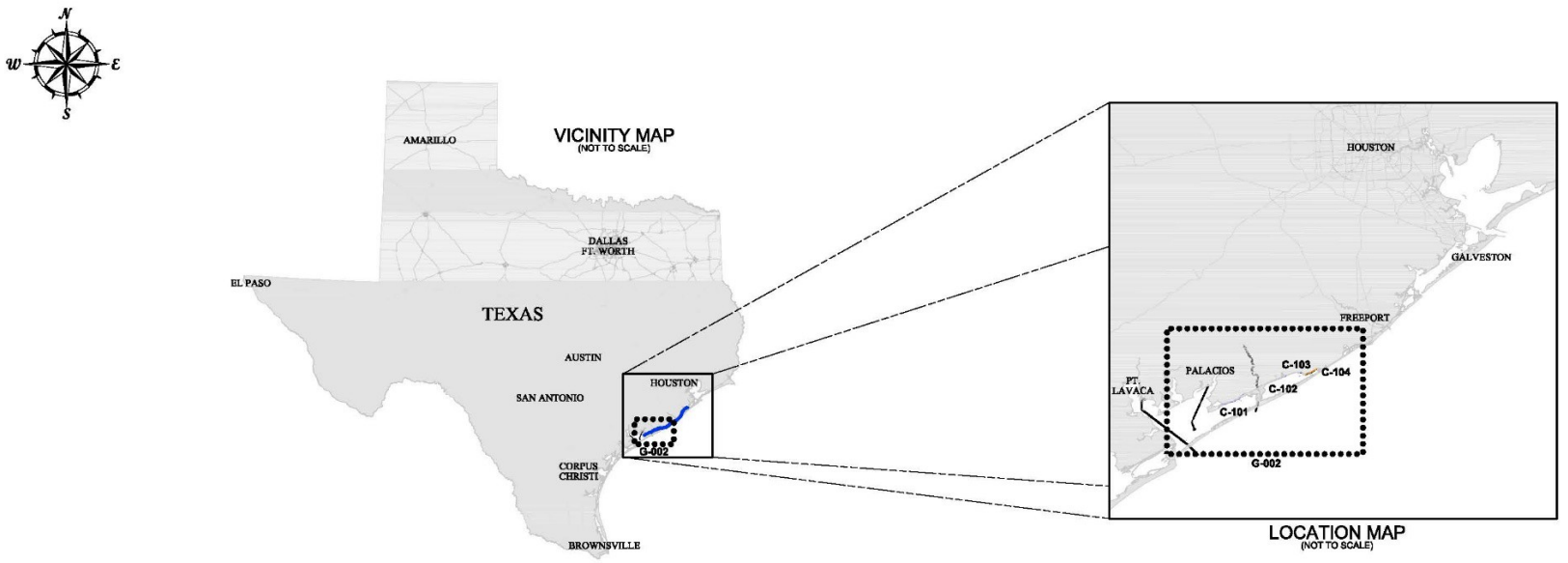
Attachment 1: Project Plans

GIWW COASTAL RESILIENCE STUDY, TX



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COVER SHEET
AND INDEX OF DRAWINGS

RESILIENCY PLAN
GIWW COASTAL RESILIENCE STUDY, TX

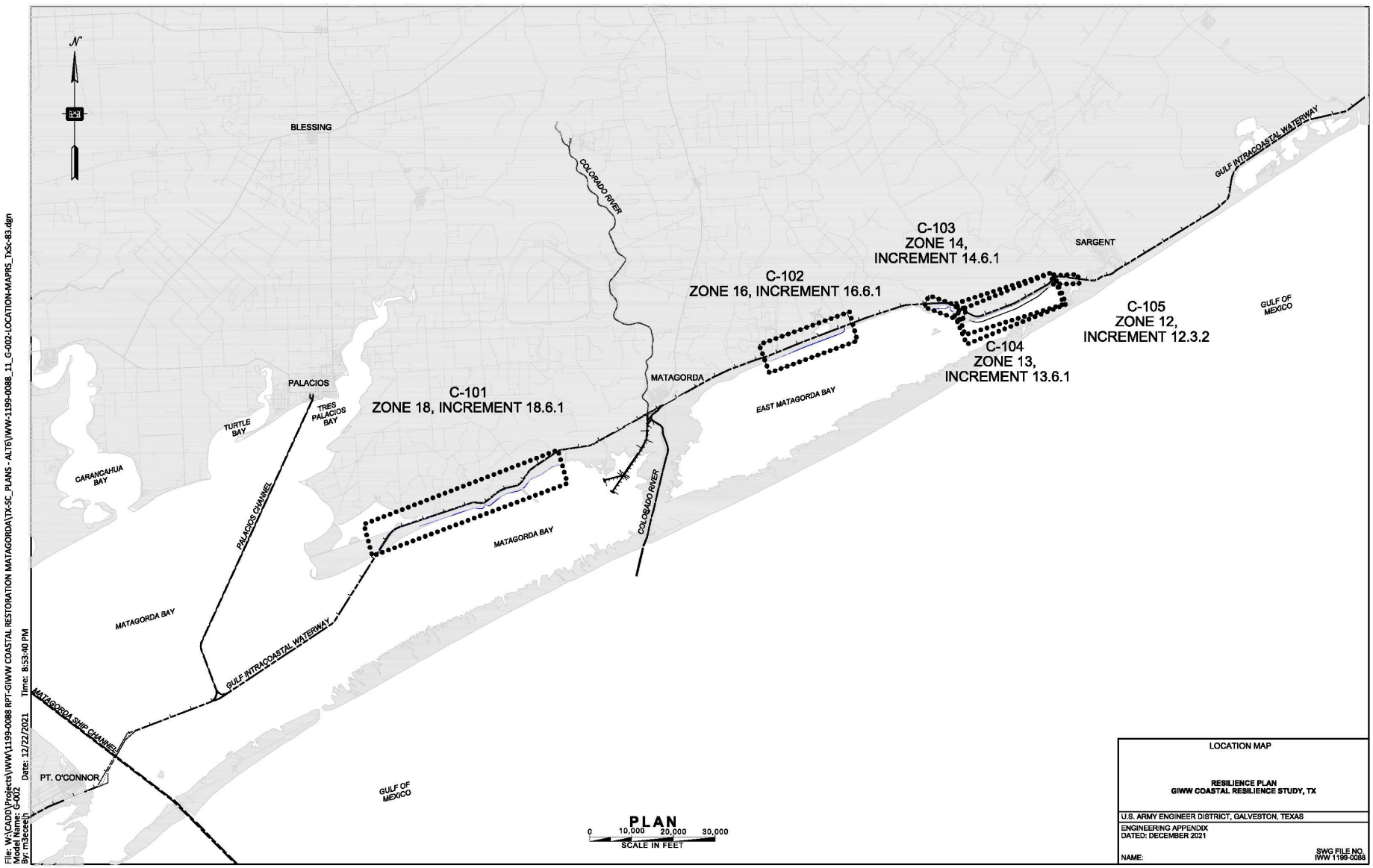
U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS

ENGINEERING APPENDIX
DATED: DECEMBER 2021

NAME:

SWG FILE NO
IWW 1199-0088

G-001


BLESSING
COLORADO RIVER
C-103
ZONE 14,
INCREMENT 14.6.1
SARGENT
GULF INTRACOASTAL WATERWAY
C-102
ZONE 16, INCREMENT 16.6.1
C-105
ZONE 12,
INCREMENT 12.3.2
GULF OF MEXICO
C-104
ZONE 13,
INCREMENT 13.6.1
PALACIOS
C-101
ZONE 18, INCREMENT 18.6.1
MATAGORDA
EAST MATAGORDA BAY
TURTLE BAY
TRES PALACIOS BAY
CARANCAHUA BAY
PALACIOS CHANNEL
COLORADO RIVER
MATAGORDA BAY
MATAGORDA BAY
GULF INTRACOASTAL WATERWAY
MATAGORDA SHIP CHANNEL
PT. O'CONNOR
GULF OF MEXICO
PLAN
0 10,000 20,000 30,000
SCALE IN FEET
LOCATION MAP
RESILIENCE PLAN
GIWW COASTAL RESILIENCE STUDY, TX
U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS
ENGINEERING APPENDIX
DATED: DECEMBER 2021
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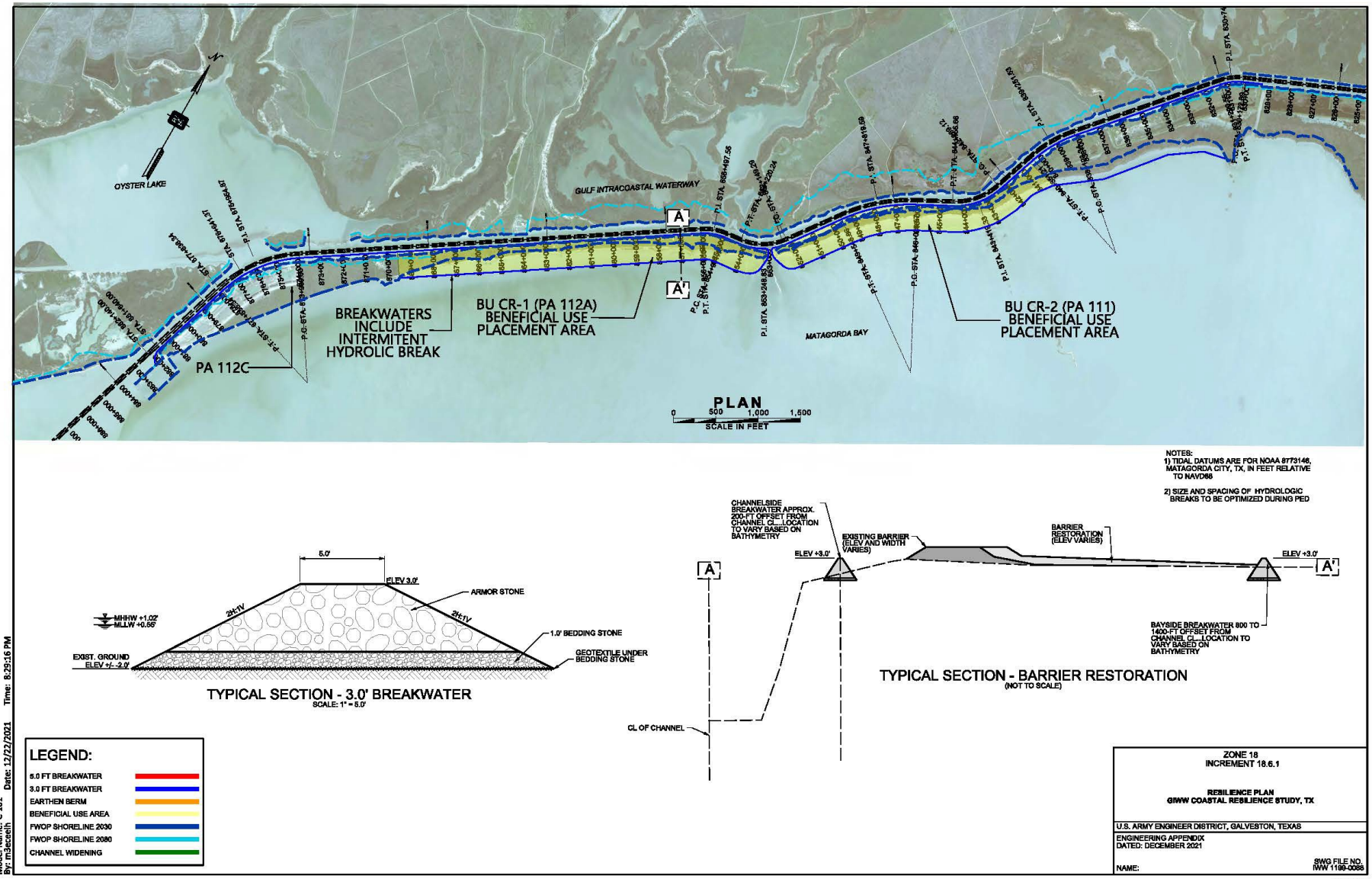
OYSTER LAKE
GULF INTRACOASTAL WATERWAY
MATAGORDA BAY
BREAKWATERS INCLUDE INTERMITENT HYDROLIC BREAK
PA 112C
BU CR-1 (PA 112A) BENEFICIAL USE PLACEMENT AREA
BU CR-2 (PA 111) BENEFICIAL USE PLACEMENT AREA
A
A'
PLAN
0 500 1,000 1,500
SCALE IN FEET
NOTES:
1) TIDAL DATUMS ARE FOR NOAA 8773146, MATAGORDA CITY, TX, IN FEET RELATIVE TO NAVD88
2) SIZE AND SPACING OF HYDROLOGIC BREAKS TO BE OPTIMIZED DURING PED
5.0'
ELEV 3.0'
ARMOR STONE
2H:1V
2H:1V
MHHW +1.02'
MLLW +0.56'
1.0' BEDDING STONE
GEOTEXTILE UNDER BEDDING STONE
EXIST. GROUND ELEV +/- -2.0'
TYPICAL SECTION - 3.0' BREAKWATER
SCALE: 1" = 5.0'
CHANNELSIDE BREAKWATER APPROX. 200-FT OFFSET FROM CHANNEL CL...LOCATION TO VARY BASED ON BATHYMETRY
EXISTING BARRIER (ELEV AND WIDTH VARIES)
ELEV +3.0'
BARRIER RESTORATION (ELEV VARIES)
ELEV +3.0'
BAYSIDE BREAKWATER 800 TO 1400-FT OFFSET FROM CHANNEL CL...LOCATION TO VARY BASED ON BATHYMETRY
CL OF CHANNEL
TYPICAL SECTION - BARRIER RESTORATION
(NOT TO SCALE)
LEGEND:
5.0 FT BREAKWATER
3.0 FT BREAKWATER
EARTHEN BERM
BENEFICIAL USE AREA
FWOP SHORELINE 2030
FWOP SHORELINE 2080
CHANNEL WIDENING
ZONE 18
INCREMENT 18.6.1
RESILIENCE PLAN
GIWW COASTAL RESILIENCE STUDY, TX
U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS
ENGINEERING APPENDIX
DATED: DECEMBER 2021
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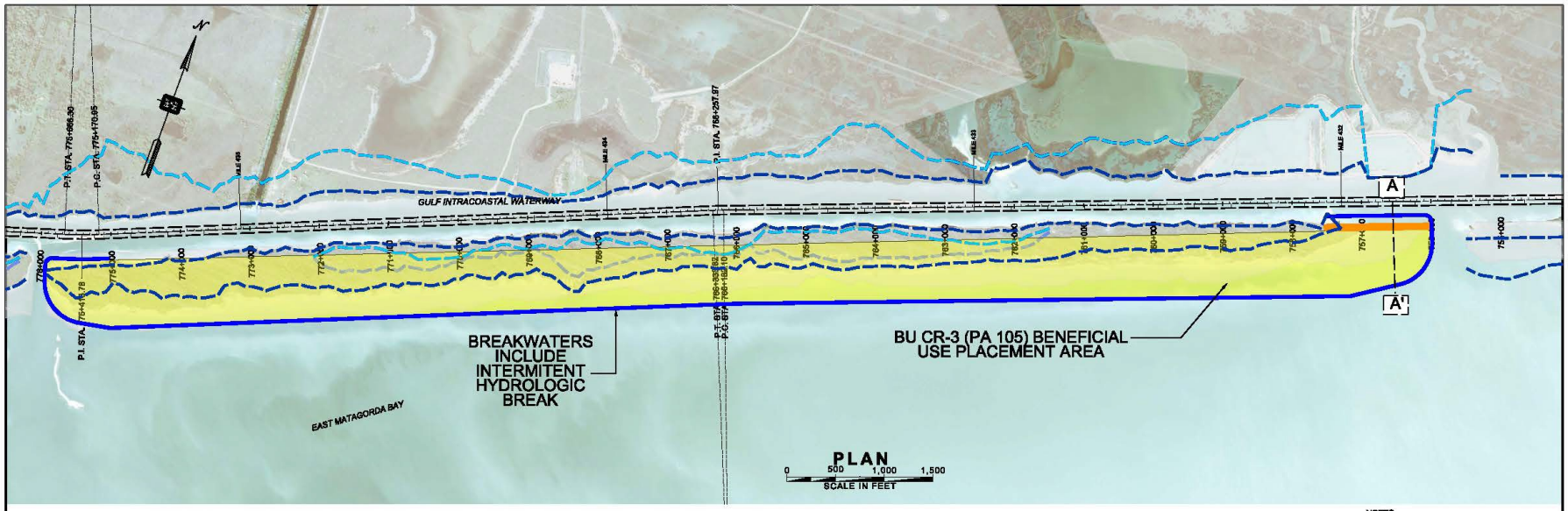

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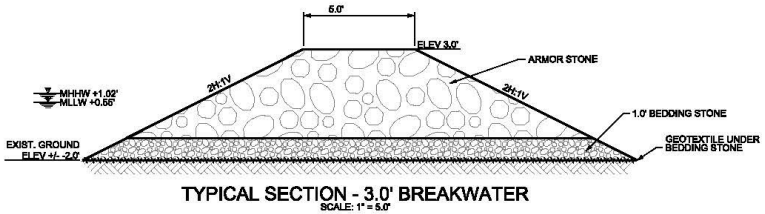

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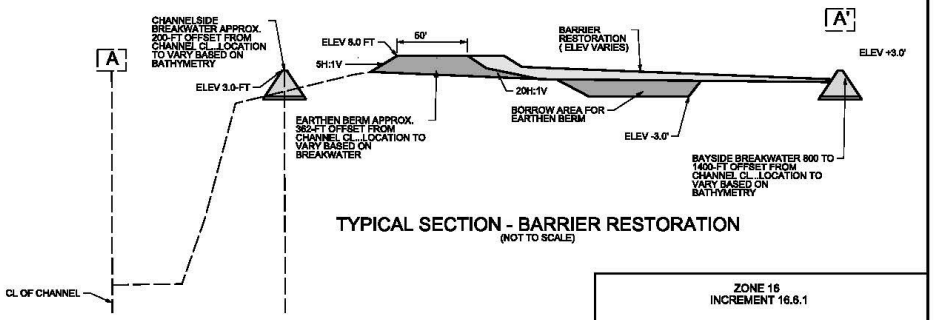

TYPICAL SECTION - BARRIER RESTORATION
(NOT TO SCALE)

LEGEND:
- 5.0 FT BREAKWATER
- 3.0 FT BREAKWATER
- EARTHEN BERM
- BENEFICIAL USE AREA
- FWOP SHORELINE 2030
- FWOP SHORELINE 2080
- CHANNEL WIDENING

ZONE 16
INCREMENT 16.6.1

RESILIENCE PLAN
GIWW COASTAL RESILIENCE STUDY, TX

U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS

ENGINEERING APPENDIX
DATED: DECEMBER 2021

NAME:

SWG FILE NO.
IWW 1199-0088

C-102

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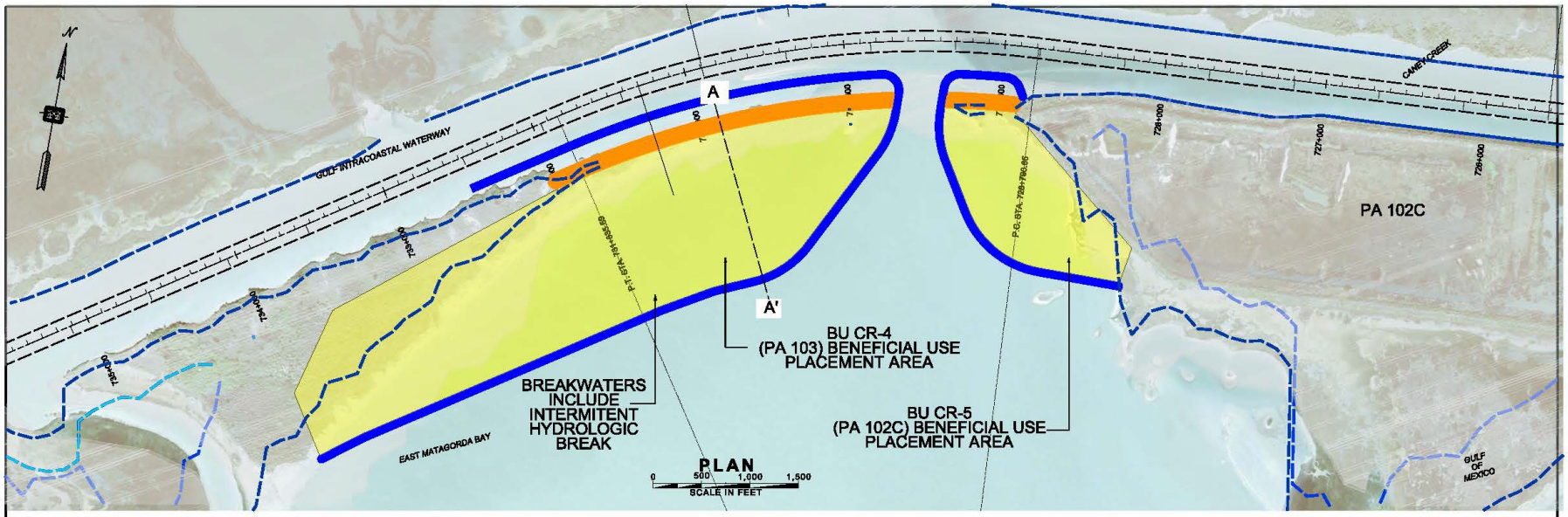

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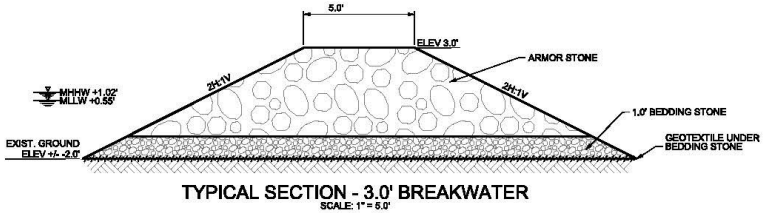
2) SIZE AND SPACING OF HYDROLOGIC BREAKS TO BE OPTIMIZED DURING PED



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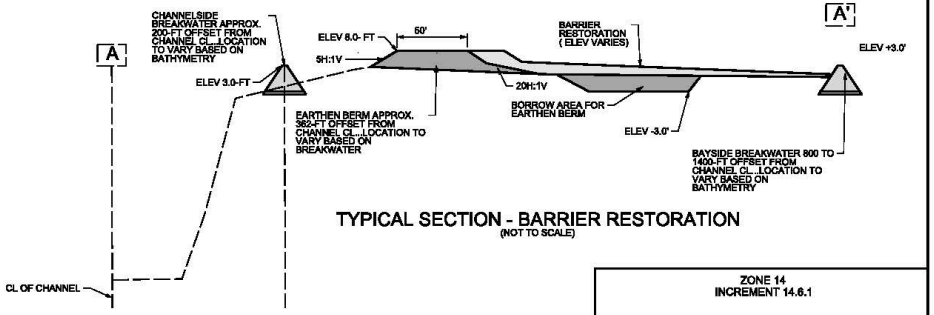

TYPICAL SECTION - BARRIER RESTORATION
(NOT TO SCALE)

LEGEND:
- 6.0 FT BREAKWATER
- 3.0 FT BREAKWATER
- EARTHEN BERM
- BENEFICIAL USE AREA
- FWOP SHORELINE 2030
- FWOP SHORELINE 2080
- CHANNEL WIDENING

ZONE 14
INCREMENT 14.6.1

RESILIENCE PLAN
GIWW COASTAL RESILIENCE STUDY, TX

U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS

ENGINEERING APPENDIX
DATED: DECEMBER 2021

NAME:

SWG FILE NO.
IWW 1199-0088

C-103

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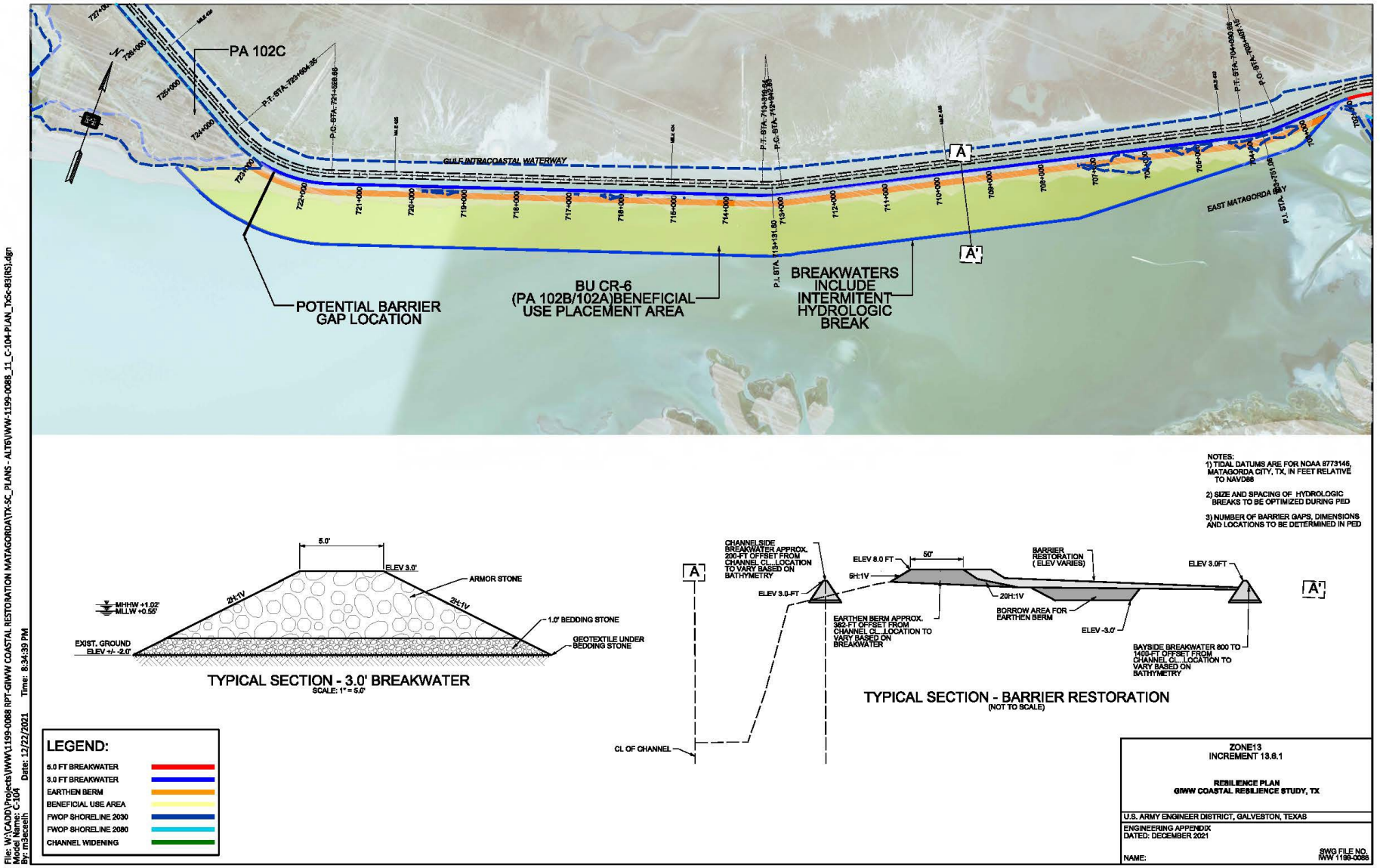
PA 102C
GULF INTRACOASTAL WATERWAY
EAST MATAGORDA BAY
POTENTIAL BARRIER GAP LOCATION
BU CR-6 (PA 102B/102A)BENEFICIAL USE PLACEMENT AREA
BREAKWATERS INCLUDE INTERMITENT HYDROLOGIC BREAK
A
A'
NOTES:
1) TIDAL DATUMS ARE FOR NOAA 8773146, MATAGORDA CITY, TX, IN FEET RELATIVE TO NAVD88
2) SIZE AND SPACING OF HYDROLOGIC BREAKS TO BE OPTIMIZED DURING PED
3) NUMBER OF BARRIER GAPS, DIMENSIONS AND LOCATIONS TO BE DETERMINED IN PED
5.0'
ELEV 3.0'
ARMOR STONE
2H:1V
MHHW +1.02'
MLLW +0.55'
1.0' BEDDING STONE
EXIST. GROUND ELEV +/- -2.0'
GEOTEXTILE UNDER BEDDING STONE
TYPICAL SECTION - 3.0' BREAKWATER
SCALE: 1" = 5.0'
CHANNELSIDE BREAKWATER APPROX. 200-FT OFFSET FROM CHANNEL CL...LOCATION TO VARY BASED ON BATHYMETRY
ELEV 8.0 FT
50'
BARRIER RESTORATION (ELEV VARIES)
ELEV 3.0FT
6H:1V
ELEV 3.0-FT
20H:1V
EARTHEN BERM APPROX. 362-FT OFFSET FROM CHANNEL CL...LOCATION TO VARY BASED ON BREAKWATER
BORROW AREA FOR EARTHEN BERM
ELEV -3.0'
BAYSIDE BREAKWATER 800 TO 1400-FT OFFSET FROM CHANNEL CL...LOCATION TO VARY BASED ON BATHYMETRY
TYPICAL SECTION - BARRIER RESTORATION
(NOT TO SCALE)
CL OF CHANNEL
LEGEND:
6.0 FT BREAKWATER
3.0 FT BREAKWATER
EARTHEN BERM
BENEFICIAL USE AREA
FWOP SHORELINE 2030
FWOP SHORELINE 2080
CHANNEL WIDENING
ZONE13
INCREMENT 13.6.1
RESILIENCE PLAN
GIWW COASTAL RESILIENCE STUDY, TX
U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS
ENGINEERING APPENDIX
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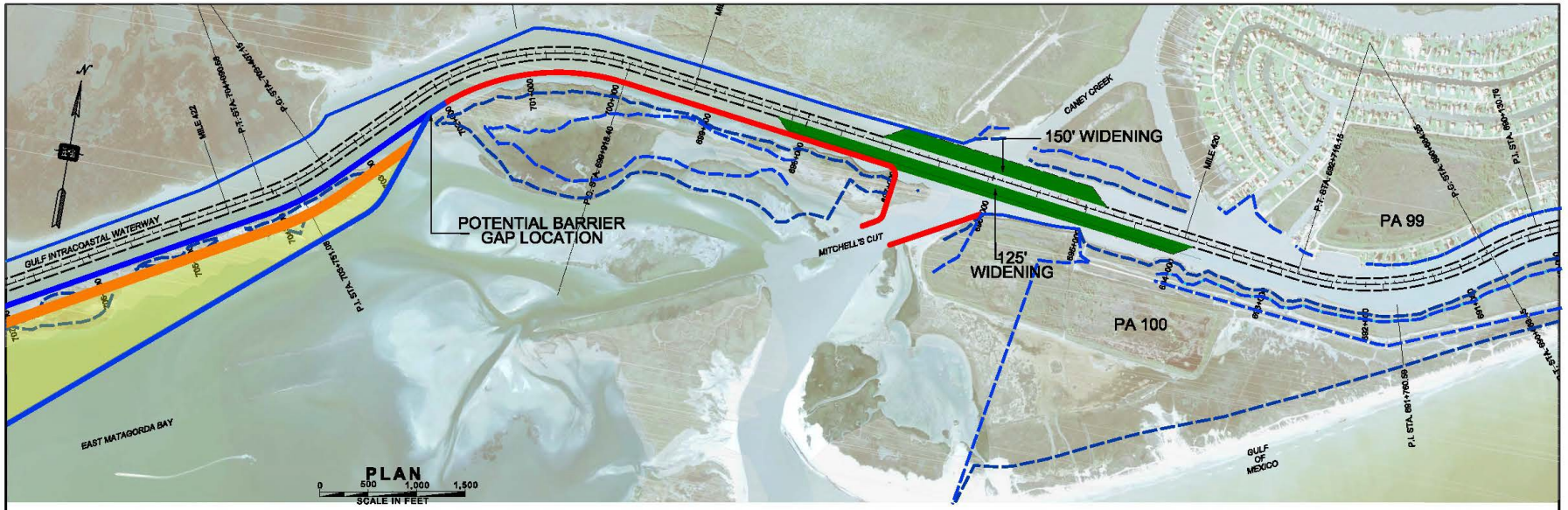

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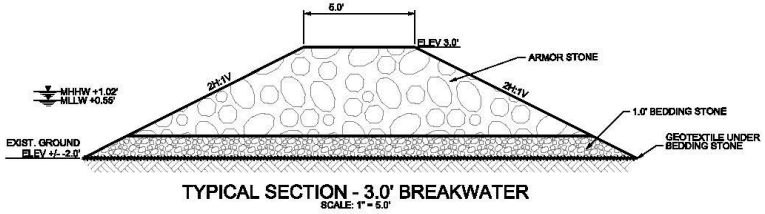
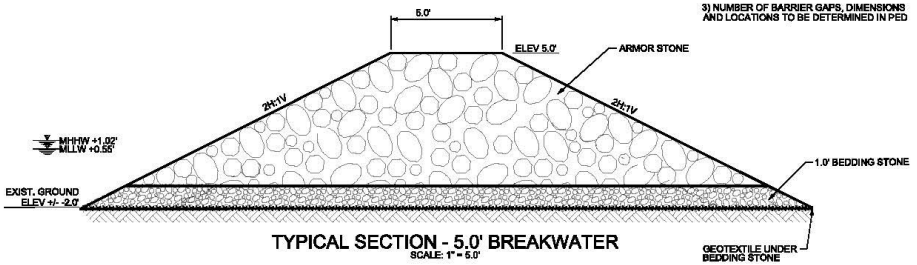
3) NUMBER OF BARRIER GAPS, DIMENSIONS AND LOCATIONS TO BE DETERMINED IN PED



TYPICAL SECTION - 3.0' BREAKWATER
SCALE: 1" = 5.0'



TYPICAL SECTION - 5.0' BREAKWATER
SCALE: 1" = 5.0'

LEGEND:
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- 3.0 FT BREAKWATER
- EARTHEN BERM
- BENEFICIAL USE AREA
- FWOP SHORELINE 2030
- FWOP SHORELINE 2080
- CHANNEL WIDENING

ZONE 12
INCREMENT 12.3.1

RESILIENCE PLAN
GIWW COASTAL RESILIENCE STUDY, TX

U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS

ENGINEERING APPENDIX
DATED: DECEMBER 2021

NAME:

SWG FILE NO.
IWW 1199-0088

C-105

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Attachment 2: EFH Mapper Report

EFH Mapper Report

EFH Data Notice

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

Query Results

Degrees, Minutes, Seconds: Latitude = , Longitude =
Decimal Degrees: Latitude = , Longitude =

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

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Red Drum	ALL	Gulf of Mexico	Red Drum Fishery
		Reef Fish (43 Species) **Balistidae - Triggerfishes** Gray triggerfish (*Balistes capriscus*) **Carangidae - Jacks** Greater amberjack (*Seriola dumerili*) Lesser amberjack (*Seriola fasciata*) Almaco jack (*Seriola rivoliana*) Banded rudderfish (*Seriola zonata*) **Labridae - Wrasses** Hogfish (*Lachnolaimus maximus*) **Lutjanidae - Snappers** Queen snapper (*Etelis oculatus*) Mutton snapper (*Lutjanus analis*)	ALL	Gulf of Mexico	Reef Fish Fishery

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Schoolmaster (*Lutjanus apodus*) Blackfin snapper (*Lutjanus buccanella*) Red snapper (*Lutjanus campechanus*) Cubera snapper (*Lutjanus cyanopterus*) Gray (mangrove) snapper (*Lutjanus griseus*) Dog snapper (*Lutjanus jocu*) Mahogany snapper (*Lutjanus mahogoni*) Lane snapper (*Lutjanus synagris*) Silk snapper (*Lutjanus vivanus*) Yellowtail snapper (*Ocyurus chrysurus*) Wenchman (*Pristipomoides aquilonaris*) Vermilion snapper (*Rhomboplites aurorubens*) **Malacanthidae - Tilefishes** Goldface tilefish (*Caulolatilus chrysops*) Blackline tilefish (*Caulolatilus cyanops*) Anchor tilefish (*Caulolatilus intermedius*) Blueline tilefish (*Caulolatilus microps*) (Golden) Tilefish (*Lopholatilus chamaeleonticeps*) **Serranidae - Groupers** Dwarf sand perch (*Diplectrum bivittatum*) Sand perch (*Diplectrum formosum*) Rock hind (*Epinephelus adscensionis*) Speckled hind (*Epinephelus drummondhayi*) Yellowedge grouper (*Epinephelus flavolimbatus*)			

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Red hind (*Epinephelus guttatus*) Goliath grouper (*Epinephelus itajara*) Red grouper (*Epinephelus morio*) Misty grouper (*Epinephelus mystacinus*) Warsaw grouper (*Epinephelus nigritus*) Snowy grouper (*Epinephelus niveatus*) Nassau grouper (*Epinephelus striatus*) Marbled grouper (*Epinephelus inermis*) Black grouper (*Mycteroperca bonaci*) Yellowmouth grouper (*Mycteroperca interstitialis*) Gag (*Mycteroperca microlepis*) Scamp (*Mycteroperca phenax*) Yellowfin grouper (*Mycteroperca venenosa*)			
		Coastal Migratory Pelagics	ALL	Gulf of Mexico	Coastal Migratory Pelagic Resources (Mackerels)
		Shrimp (4 Species) Brown shrimp (*Penaeus aztecus*) White shrimp (*Penaeus setiferus*) Pink shrimp (*Penaeus duorarum*) Royal red shrimp (*Pleoticus robustus*)	ALL	Gulf of Mexico	Shrimp Fishery
		Bull Shark	Juvenile/Adult Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Spinner Shark	Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Lemon Shark	Juvenile Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Scalloped Hammerhead Shark	Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Blacktip Shark (Gulf of Mexico Stock)	Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Atlantic Sharpnose Shark (Gulf of Mexico Stock)	Juvenile/Adult Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Bonnethead Shark (Gulf of Mexico Stock)	Adult Juvenile Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
		Finetooth Shark	ALL	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH

Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

HAPCs

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

EFH Areas Protected from Fishing

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

US Army Corps of Engineers ®
Galveston District

Appendix D-5

Clean Water Act Compliance

for

Gulf Intracoastal Waterway Coastal Resilience Study
Matagorda County, Texas

January 2022

DRAFT EVALUATION OF SECTION 404(b)(1) GUIDELINES (SHORT FORM)

GUIDELINE COMPLIANCE:

1. Review of Compliance (230.10(a)-(d))		
A review of the proposed project indicates that:	Yes	No*
a. The placement represents the least environmentally damaging practicable alternative and, if in a special aquatic site, the activity associated with the placement must have direct access or proximity to, or be located in the aquatic ecosystem, to fulfill its basic purpose (if no, see section 2 and information gathered for EA alternative).	X	
b. The activity does not appear to:		
1) Violate applicable state water quality standards or effluent standards prohibited under Section 307 of the Clean Water Act;		X
2) Jeopardize the existence of Federally-listed endangered or threatened species or their habitat; and		X
3) Violate requirements of any Federally-designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies).		X
c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see values, Section 2)		X
d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see Section 5)	X	

2. Technical Evaluation Factors (Subparts C-F)	Not Applicable	Not Significant	Significant*
a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)			
1) Substrate impacts		X	
2) Suspended particulates/turbidity impacts		X	
3) Water column impacts		X	
4) Alteration of current patterns and water circulation		X	
5) Alteration of normal water fluctuation/ hydroperiod		X	
6) Alteration of salinity gradients		X	
b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)			
1) Effect on threatened/endangered species and their habitat		X	
2) Effect on the aquatic food web		X	
3) Effect on other wildlife (mammals, birds, reptiles and amphibians)		X	
c. Special Aquatic Sites (Subpart E)			
1) Sanctuaries and refuges	X		
2) Wetlands		X	
3) Mud flats		X	
4) Vegetated shallows		X	
5) Coral reefs	X		
6) Riffle and pool complexes	X		
d. Human Use Characteristics (Subpart F)			
1) Effects on municipal and private water supplies	X		
2) Recreational and commercial fisheries impacts		X	
3) Effects on water-related recreation		X	
4) Aesthetic impacts		X	
5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves		X	

* Where a 'Significant' category is checked, add explanation below.

List Appropriate References:

There were no significant effects anticipated for the factors listed.

The biological characteristics of the with and without project scenarios are presented in the Draft Integrated Feasibility Report and Environmental Assessment and the Environmental Appendix to the Report (Appendix D). Some adverse effects to oyster reef and sea grasses were identified in the report and through coordination with the resource agencies, ecological modeling was done to develop the compensatory mitigation plan which will offset those adverse impacts.

3. Evaluation of Dredged or Fill Material (Subpart G)	
a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material (check only those appropriate)	
1) Physical characteristics	X
2) Hydrography in relation to known or anticipated sources of contaminants	X
3) Results from previous testing of the material or similar material in the vicinity of the project	X
4) Known, significant sources of persistent pesticides from land runoff or percolation	X
5) Spill records for petroleum products or designated (Section 311 of Clean Water Act) hazardous substances	X
6) Other public records of significant introduction of contaminants from industries, municipalities or other sources	X
7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities	X

3. Evaluation of Dredged or Fill Material (Subpart G) (continued)	Yes	No
b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredged or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and placement sites and not likely to degrade the placement sites, or the material meets the testing exclusion criteria.	X	

4. Placement Site Delineation (230.11(f))	
a. The following factors as appropriate, have been considered in evaluating the placement site:	
1) Depth of water at placement site	X
2) Current velocity, direction, and variability at placement site	X
3) Degree of turbulence	X
4) Water column stratification	X
5) Discharge vessel speed and direction	X
6) Rate of discharge	X
7) Fill material characteristics (constituents, amount, and type of material, settling velocities)	X
8) Number of discharges per unit of time	X
9) Other factors affecting rates and patterns of mixing (specify)	X

4. Placement Site Delineation (230.11(f)) (continued)	Yes	No
b. An evaluation of the appropriate factors in 4a above indicates that the placement site and/or size of mixing zone are acceptable.	X	

5. Actions to Minimize Adverse Effects (Subpart H)	Yes	No
All appropriate and practicable steps have been taken, through application of recommendations of 230.70-230.77 to ensure minimal adverse effects of the proposed discharge.	X	

List actions taken:

6. Factual Determination (230.11)	Yes	No*
A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short- or long-term environmental effects of the proposed discharge as related to:	X	
a. Physical substrate at the placement site (review Sections 2a, 3, 4, and 5 above)	X	
b. Water circulation, fluctuation and salinity (review Sections 2a. 3, 4, and 5)	X	
c. Suspended particulates/turbidity (review Sections 2a. 3, 4, and 5)	X	
d. Contaminant availability (review Sections 2a. 3, and 4)	X	
e. Aquatic ecosystem structure and function (review Sections 2b and c, 3, and 5)	X	
f. Placement site (review Sections 2, 4, and 5)	X	
g. Cumulative impacts on the aquatic ecosystem	X	
h. Secondary impacts on the aquatic ecosystem	X	

7. Evaluation Responsibility
a. This evaluation was prepared by: Position: Jeff Pinsky Regional Planning and Environmental Center

8. Findings (Select One)	Yes
a. The proposed placement site for discharge of or fill material complies with the Section 404(b)(1) Guidelines.	X
b. The proposed placement site for discharge of dredged or fill material complies with the Section 404(b)(1) Guidelines with the inclusion of the following conditions: N/A	X
c. The proposed placement site for discharge of dredged or fill material does not comply with the Section 404(b)(1) Guidelines for the following reason(s): 1) There is a less damaging practicable alternative 2) The proposed discharge will result in significant degradation of the aquatic ecosystem 3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem	

_____ Date	_____ Robert Morrow Chief, Environmental Branch

US Army Corps of Engineers ®
Galveston District

Appendix D-6

Coastal Zone Management Act Compliance

for

Gulf Intracoastal Waterway Coastal Resilience StudyMatagorda County, Texas

January 2022

Gulf Intracoastal Waterway Coastal Resilience Study Matagorda County, Texas

Texas Coastal Management Plan Consistency Determination

January 2022

US Army Corps of Engineers ®
Galveston District

Prepared by:

United States Army Corps of Engineers
Regional Planning and Environmental Center

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INTRODUCTION

The U.S. Army Corps of Engineers, Galveston District (USACE), in partnership with the Texas Department of Transportation, have undertaken the Gulf Intracoastal Waterway Coastal Resilience Study (the Study), which is evaluate potential improvements to provide resilience from hurricanes and storms in the Gulf Intracoastal Waterway (GIWW) in Matagorda County, Texas. Resilience is defined by USACE as the ability to *prepare, absorb, recover*, and *adapt* from disruptive events. In the context of this study, *prepare* is how proactively the proposed measures are planned, *absorb* is the how effectively the proposed measures can withstand harm, *recover* is how quickly the proposed measures allow for normal operations to resume, and *adapt* is how easily the proposed measures can be modified for changing conditions. The Study addresses three main issues within the navigation channel: 1) the chronic and episodic coastal storm erosion of shorelines and barrier islands that have historically protected vessels on the GIWW; 2) sea level rise and continued hurricanes and tropical storms that will likely exacerbate the loss of barriers around the channel; and 3) sediment carried by coastal storms from eroded shorelines shoals in the channel leading to light-loading and unintentional grounding of vessels resulting in navigation safety risks.

The authorized study area encompasses 85 miles of the Texas portion of the GIWW in Brazoria and Matagorda counties. The study area was divided into 20 zones for detailed analysis according to geography and ecology. As the evaluation progressed during the study, the study area focused on Zones 12, 13, 14, 16 and 18 (Figure 1). The focused study area contains approximately 30 miles of shoreline that includes many acres of beach and dune systems, lagoons, seagrass beds, oyster reefs, and tidal marshes. These coastal habitats are utilized by commercially and recreationally important Gulf of Mexico finfish and shellfish, as well as migratory birds and waterfowl which depend on these habitats during portions of their life cycle. These biological and geomorphic systems contribute to much of the coast's productivity, economy, and quality of life.

Currently, the Study has completed the Tentatively Selected Plan (TSP) milestone meeting phase of the USACE Specific, Measurable, Attainable, Risk Informed, Timely (SMART) Civil Works planning process, where a plan has been tentatively selected by the USACE vertical chain of command. At this stage of the planning, the major components of the plan have been identified and evaluated at a higher level of analysis. Consistent with USACE policy in Planning Bulletin PB 2017-01, there is a certain level of uncertainty expected in the size and make-up of the recommended plan, and other plans identified from the suite of alternatives analyzed in this initial phase, including the National Economic Development (NED) Plan, or a variant preferred by the non-Federal sponsor. As such, the final size of the measures (e.g. width, length, etc.), and location presented in this Consistency Determination may change in the next planning phase. These changes can affect the habitat impacted. However, because of the conservative nature of economic and engineering assumptions used during the initial planning of the recommended plan, it is anticipated that the design of proposed structures will result in equal or lesser environmental impacts.

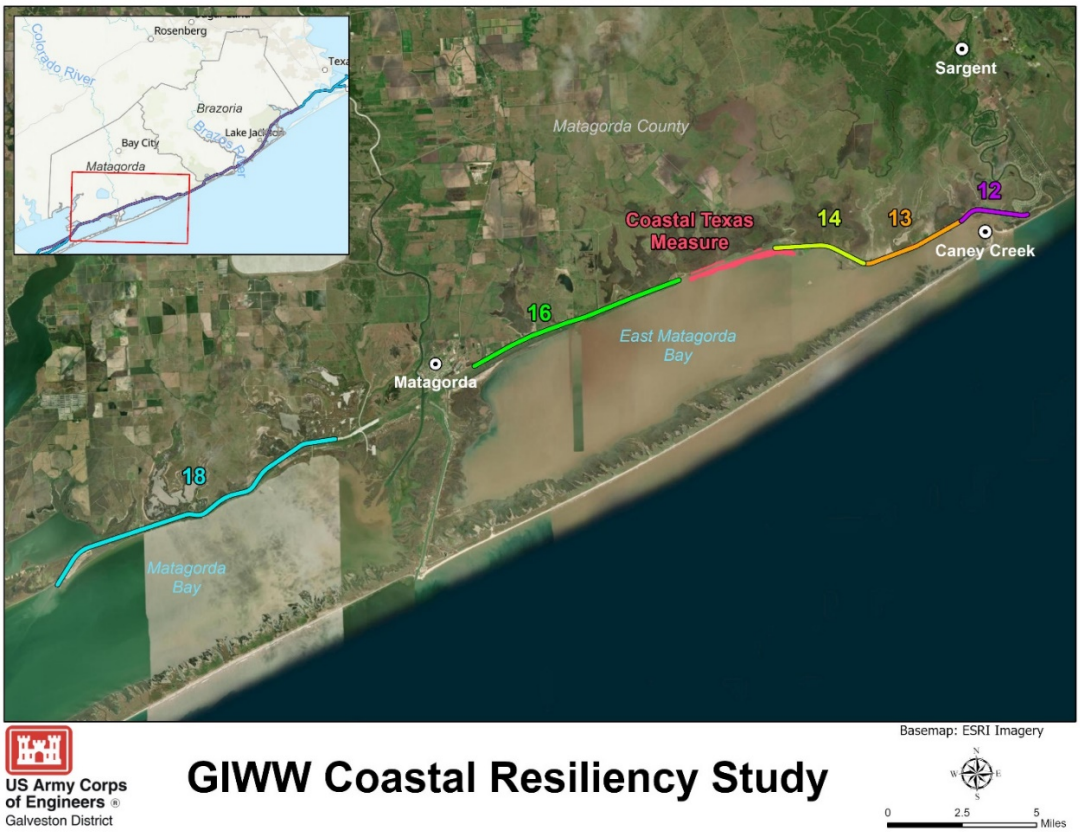

Figure 1. Study Area

Recommended Plan

The proposed Federal action (also referred to as the recommended plan) consists of shoreline stabilization using breakwaters, restoration of barrier features, creation of beneficial use dredge material placement areas designed to provide tidal marsh habitat and channel widening in project zones 12, 13, 14, 16, and 18. The Recommended Plan prevents the loss of existing barrier islands while also restoring 435 acres of barrier features. Attachment 1 contains detailed project plans for the Recommended Plan.

Work in Zone 12 includes a combination of shoreline stabilization using breakwaters and channel widening of the existing GIWW by 150-foot on either side of the channel at the confluence of Caney Creek and the GIWW. Approximately 951 linear feet of breakwater would protect 16 acres of existing barrier and 36 acres of existing marsh and mudflats predicted to be lost to erosion without the proposed work. These actions will help address a grounding hotspot which has posed safety risks to navigation. The new work widening dredge material will be placed into PA 102-C unless in PED the new work material is considered sufficient to construct the earthen berms included in nearby Zones. The frequency of emergency dredging is expected to stay the same through 2080 if channel widening is not performed. In Zone 12, with channel widening it was possible to change the dredging cycle for the entire zone to every 2 years, eliminating the existing need for out of cycle dredging as vessels should be able to navigate channel better even in high shoaling conditions. The breakwater configurations will be refined in PED using survey data, they are planned to be placed in shallow water and not on land. Due to the

erosive state of the shorelines, the breakwater footprints are shown where predictive modeling indicates future shorelines to be.

Work in Zone 13 includes construction of an earthen berm with a crest elevation of 8 feet NAVD88 to attenuate the crosswinds that vessels in the GIWW would be exposed to. Breakwaters are proposed to be constructed with crests at 5 feet NAVD88 on the channel side and 3 feet NAVD88 on the bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure. The berm would span approximately 19,000 linear feet in length with a surface area of 110 acres. The berm would be constructed using material borrowed from a 200-foot-wide by 3-foot-deep area that runs parallel to and on the bayside of the restored barrier feature. Finally, a 328-acre area between the bayside breakwater and the berm would be used as an adaptable beneficial use site. The borrow area is within the BU site and would be restored using O&M material.

Work in Zone 14 would restore barrier features along the interface of the GIWW and Live Oak Bay and includes a pass to match historic conditions for hydrologic purposes. A combination of shoreline stabilization using breakwaters and sediment placement will restore 29 acres of barrier feature and would protect 85 acres of barrier island predicted to remain at the start of construction. This work would protect 4,329 linear feet of the GIWW. The earthen berm is proposed to be constructed with a crest elevation of 8 feet NAVD88 and is designed to attenuate the crosswinds that vessels in the channel would be exposed to. Breakwaters are proposed to be constructed with crests at 5 feet NAVD88 on the channel side and 3 feet NAVD88 on the bayside of the GIWW and are designed to contain the sediment in the placement area and prevent rapid erosion from wave exposure. Work in Zone 14 also includes 85 acres of BU area. All the BU discussions for Zone 13 also apply to Zone 14. Live Oak Bay contains many oyster reefs and rookery areas. USACE will conduct habitat surveys and will coordinate with Federal and State resource agencies in PED to ensure final designs avoid and minimize impacts to these important ecological habitats. This is specifically relevant for the BU area and bayside breakwaters which will be reconfigured in PED to avoid those habitats.

Work in Zone 16 includes construction of 94 acres of berm to a crest elevation of 8 feet NAVD88 and installation of channel side and bayside breakwaters with a 3 feet NAVD88 crest elevation to protect 7,704 linear feet of GIWW channel. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Work in Zone 16 also includes 282 acres of BU area.

Work in Zone 18 includes construction of 291 acres of berm to a crest elevation of 8 feet NAVD88 and installation of channel side breakwaters to 5 feet NAVD88 and bayside breakwaters to 3 feet NAVD88 crest elevation to protect 33,115 linear feet of GIWW channel. The sediment placement is intended to restore the barrier islands, much of which would be lost by the end of the period of analysis in year 2080. Work in Zone 16 also includes 870 acres of BU area.

CONSISTENCY WITH THE TEXAS COASTAL MANAGEMENT PROGRAM

Transportation to and placement of the dredged material in the restoration units and all associated restoration activities will be analyzed in this document for consistency with the policies of the Texas Coastal Management Program (TCMP). Dredging is not assessed in this document as they have been assessed in the GIWW Draft Feasibility Report and Environmental Assessment (USACE 2021). Dredging and placement activities have been identified as consistent with the policies of the TCMP. The proposed activities would not include additional dredging needs greater than described in the DFR.

Impacts on Coastal Natural Resource Areas

Potential impacts to Coastal Natural Resource Areas (CNRAs) listed in 31 Texas Administrative Code (TAC) §501.3, and methods to minimize or avoid potential impacts, are discussed below. Eleven of the 16 CNRAs would not be temporarily or permanently affected (negatively/adversely or beneficially) by project implementation including: Coastal Historic Areas, Coastal Wetlands, Critical Dune Areas, Critical Erosion Areas, Gulf Beaches, Hard Substrate Reefs, and Waters of Gulf of Mexico, due to the lack of the resource, as defined in §501.3, in the project area. The following CNRAs have the potential to be impacted by implementation of the TSP; however, all impacts would be less than adverse.

Coastal Barriers

Coastal barriers are undeveloped areas on a barrier island, peninsula, or other protected areas in which certain development actions are not permitted. The Coastal Barrier Resources Act (CBRA) of 1982 established the Coastal Barrier Resources System (CBRS) to minimize the loss of human life, wasteful Federal expenditures, and damage to fish, wildlife, and other natural resources associated with coastal barriers. As part of the program, the Federal government refrains from spending money that encourages development on designated undeveloped coastal barriers.

The Recommended Plan includes construction of project features in Zones 12, 13, and 14 that are located within portions of CBRS units T-07 and T-07P which have an establishment date of November 16, 1991. CBRS areas are designated by the first letter of the state they are found in, followed by a number indicating which unit it is. If a letter follows the unit number, it is considered an Otherwise Protected Area. If no letter follows the unit number it is considered a System Unit. Coordination with USFWS is ongoing to ensure compliance with the CBRA and to prevent adverse impacts, such as encouraging development, within the CBRS.

Typically work within a System Unit is prohibited unless one of the exception criteria are met as outlined in the law (16 U.S.C.23§ 3505(a)(1)-(5). The Recommended Plan meets exception 16 U.S.C.23§ 3505(a)(2): “The maintenance or construction of improvements of existing federal navigation channels (including the Intracoastal Waterway) are related structures (such as jetties), including the disposal of dredged materials related to such maintenance or construction. A federal navigation channel or a related structure is an existing channel or structure, respectively, if it was authorized before the date on which the relevant System unit or portion of the System unit was included within the CBRS.” The project meets this exception because the project purpose is to improve resiliency along the GIWW to reduce economic inefficiencies and improve navigational

safety. The GIWW in Matagorda County was authorized to the current dimensions (12-foot-deep and 125-foot-wide) in 1949 which predates the establishment date of the units.

The Recommended Plan would not adversely affect the form and function of the coastal barrier as the plan is intended to protect existing barrier islands through construction of breakwaters and placement of sediment to restore barrier islands. The plan would provide long-term beneficial effects to barrier islands that are currently undergoing loss through erosion and sea level rise.

Coastal Preserves

A coastal preserve is defined as any land, including a park or wildlife management area, that is owned by the state and that is subject to Chapter 26, Parks and Wildlife Code, because it is a park, recreation area, scientific area, wildlife refuge, or historic sites; and designated by the Texas Parks and Wildlife Commission as being coastal in character. Zone 18 is adjacent to Mad Island Wildlife Management Area (WMA). The WMA was purchased with waterfowl stamp funds in 1987 to preserve coastal wetland habitat for wintering waterfowl. The 7,200 acres consists of fresh, intermediate, brackish, and saline marsh land with sparse brush and flat coastal prairie.

No adverse effects are anticipated to Mad Island WMA. No construction activities are planned within the WMA. All work in zone 18 would be completed on the south side of the GIWW and bayside of the existing remnant barrier island. Work in this zone consists of marsh creation and breakwater protection, both of which would indirectly benefit the WMA by minimizing wind, tidal, storm surge, and potentially sea level rise influences on the shoreline of the WMA thereby reducing the long-term losses along the GIWW.

Coastal Shore Areas

A coastal shore area is defined as areas within 100 feet landward of the high-water mark on submerged land. Coastal shore areas are found along the GIWW in the barrier island, earthen berm placement areas, and in marsh planting areas. These areas would not be adversely impacted by project implementation because all efforts seek to increase resiliency against wind and tidal energies, storm surge and sea level rise.

Oyster Reefs

Approximately 45 acres of oyster reefs can be found in the zone 16 and 18 of the Study Area. Eastern Oysters are a commercially important species across the US. The Eastern Oyster is the primary species of oyster found in the Gulf of Mexico and is ecologically important since they filter water from the surrounding environment, provide habitat for small fishes and invertebrates, provide food for certain aquatic animals, and serve as natural breakwaters to reduce coastal erosion.

Implementation of the recommended plan will result in unavoidable adverse impacts to approximately 5.5 acres of oyster reef. To mitigate for these unavoidable adverse impacts, 3 acres of oyster reef will be restored in Matagorda Bay and 10 acres of oyster reef in Matagorda Bay. The Ecological Modeling and Mitigation Appendix (Appendix D-2) of the Integrated Feasibility Report and Environmental Assessment provides a detailed account of modeled impacts and the mitigation plan to be implemented to offset the unavoidable impacts.

Special Hazard Areas

Special hazard areas are areas designated by the Administrator of the Federal Insurance Administration under the National Flood Insurance Act as having special flood, mudslide, and/or flood-related erosion hazards and shown on a Flood Hazard Boundary Map or Flood Insurance Rate Map as Zone VE, AE, and X. Zone VE is considered a 1% or greater chance of flooding and additional hazards with storm waves; 26% chance of flooding over a 30-year mortgage. Zone X is considered minimal or moderate risk of flooding and can either be subject to flooding during 100-year to 500-year storms or outside of the risk of flooding during 500-year storms. Zone X is also determined to be protected by levee from 100-year floods. Zone AE is considered the base floodplain elevation and subject to inundation by the 1% annual chance flood event.

The Recommended Plan is within zone AE, VE and floodways. Implementation of the plan may ease the impacts of flooding under relative sea level rise by increasing barrier island widths and heights, as well as constructing buffers such as breakwaters, which would attenuate storm surge and wave velocities. Additionally, hydrodynamic modeling indicates tidal variation and surge conditions are not expected to be significantly modified or result in an increase in flooding in any part of the study area. None of the measures would be expected to induce development of special hazard areas.

Submerged Lands

Submerged lands are lands located under waters under tidal influence or under waters of the open Gulf of Mexico, without regard to whether the land is owned by the state or a person other than the state.

The proposed channel widening alignment in zone 12 impacts only submerged lands and would be constructed under navigation servitude. However, portions of the proposed breakwaters impact emergent private lands and lands owned by the State of Texas. These impacts total approximately 1.6 acres of land. In tidal areas, navigational servitude extends to all lands below the mean high-water mark. Due to high erosion rates in the project area, it is likely that a portion, if not all, of the privately owned impacted lands will be submerged by the start of construction and will, therefore, fall under navigational servitude. However, if any portions of these lands are still emergent at the time of construction, perpetual easements will need to be acquired from the owners for the construction and maintenance of the breakwaters.

The proposed breakwaters, earthen berms, sediment placement and marsh planting at zone 13, 14 and all but 5 acres of zone 18 fall entirely within submerged lands and existing USACE Placement areas or Tracts. No acquisition of real estate is required for these sites. For the remaining five acres in zone 18, the area impacted is owned by the State of Texas and is expected to be considered submerged lands by the start of construction due to high erosion rates in the project area. It is anticipated that navigational servitude will be applicable at that time.

A coastal boundary survey is anticipated during PED to confirm the extent of submerged lands. Any locations invoking navigation servitude would be coordinated with the GLO. A state permit for any sites not eligible for navigation servitude would secured prior to construction, if needed.

In general, no adverse effects to submerged lands are anticipated. Areas where sediment and marsh plantings would cover submerged land would be restoring the site to historic conditions.

Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV) includes aquatic grasses (seagrasses) and attached macro-algae. SAV is highly valuable habitat since it provides numerous important ecological functions that are difficult to replace; yet it is especially vulnerable to coastal development and water quality degradation.

SAV in the form of seagrasses are found in zones 12, 13, 14, and 16 of the study area. Unavoidable adverse loss of seagrasses is expected from direct removal during construction and indirect impacts from changes in circulation and water quality.

Seagrass mapping provided by the TPWD was overlaid with the project footprint and a 1,000-foot buffer to account for any possible indirect effects that could result in SAV loss because of changes in water quality or circulation. A total of 38.3 acres of seagrasses were found within the footprints and 138.8 acres were identified within a 1,000-foot buffer; however, hydrologic modeling indicates that about 10 percent of the seagrasses in this area could actually be adversely affected. The spotted sea trout habitat suitability index model was used to assess potential loss in terms of average annual habitat units (AAHUs) so that the amount of mitigation could be identified. It was modeled that in zone 12 seven acres would be impacted resulting in a loss of 5.25 AAHUs; in zone 13 twelve acres would be impacted resulting in a loss of 9.7 AAHUs; in zone 14, 34 acres of habitat would be lost resulting in a loss of 27 AAHUs; and in zone 16, one acre would be lost resulting in a loss of 0.4 AAHUs. Overall the Recommended Plan will result in unavoidable adverse impacts to approximately 54 acres of sea grasses and result in a loss of 42.5 AAHUs. To mitigate for these unavoidable adverse impacts, 87 acres of sea grass meadow in East Matagorda Bay would be created. The Ecological Modeling and Mitigation Appendix (Appendix D-2) of the Integrated Feasibility Report and Environmental Assessment provides a detailed account of modeled impacts and the mitigation plan to be implemented to offset the unavoidable impacts.

Tidal Sand and Mud Flats

Mud Flats and Sand Flats were identified near Zones 12 and 13. The footprints of these measures were adjusted to avoid direct impacts to these habitats. Tidal exchange in East Matagorda Bay primarily comes through Mitchell's cut on the east side of the bay system. Relative Sea Level Change will increase tidal prism, tidal amplitudes, and tidally driven water velocities with or without the project. The mudflats and sandflats located near Mitchell's Cut are expected to expand into the bay as these increased velocities carry more sediment farther than into the bay system. The engineering analysis shows a negligible change to these dynamics which are predicted to occur with or without the project. For Matagorda Bay, the work proposed in Zone 18 is not expected to impact any mud or sand flats.

Waters under Tidal Influence

Waters under tidal influence are defined as water in the state that is subject to tidal influence according to the Texas Commission on Environmental Quality (TCEQ) stream segment map, which includes coastal wetlands. The project area is located in a tidally influenced region. Implementation of the project would result in minimal, temporary localized adverse impacts from dredging and placement activities. Temporary impacts include release of suspended solids and turbidity, both which lead to decreased water quality. In the long-term, restoration activities would be beneficial to waters under tidal influence because proposed activities would restore form and function within the restoration unit, which should

allow tidal energies to work as nature designed, including reducing subsidence, increasing sediment inputs into the system and creating nursery, foraging, and migrating habitat for a host of freshwater, marine, and terrestrial species, and creating a sustainable and resilient system.

Enforceable Policies

The 20 enforceable policies were reviewed, and it was determined that five policies are applicable to this study (Table 1).

Table 1. CMP Enforceable Policies

Policy	Applicability
§ 501.15 Policy for Major Actions	N/A
§ 501.16 Policies for Construction of Electric Generating and Transmission Facilities	N/A
§ 501.17 Policies for Construction, Operation, and Maintenance of Oil and Gas Exploration and Production Facilities	N/A
§ 501.18 Policies for discharges of Wastewater and Disposal of Waste from Oil and Gas Exploration and Production Activities	N/A
§ 501.19 Policies for Construction and Operation of Solid Waste Treatment, Storage, and Disposal Facilities	N/A
§ 501.20 Policies for Prevention, Response and Remediation of Oil Spills	N/A
§ 501.21 Policies for Discharge of Municipal and Industrial Wastewater to Coastal Waters	N/A
§ 501.22 Policies for Nonpoint Source (NPS) Water Pollution	N/A
§ 501.23 Policies for Development in Critical Areas	N/A
§ 501.24 Policies for Construction of Waterfront Facilities and Other Structures on Submerged Lands	**Yes**
§ 501.25 Policies for Dredging and Dredged Material Disposal and Placement	**Yes**
§ 501.26 Policies for Construction in the Beach/Dune System	N/A
§ 501.27 Policies for Development in Coastal Hazard Areas	**Yes**
§ 501.28 Policies for Development Within Coastal Barrier Resource System Units and Otherwise Protected Areas on Coastal Barriers	**Yes**
§ 501.29 Policies for Development in State Parks, Wildlife Management Areas or Preserves	N/A
§ 501.30 Policies for Alteration of Coastal Historic Areas	N/A
§ 501.31 Policies for Transportation Projects	N/A
§ 501.32 Policies for Emission of Air Pollutants	**Yes**
§ 501.33 Policies for Appropriations of Water	N/A
§ 501.34 Policies for Levee and Flood Control Projects	N/A

§501.24 Policies for Construction of Waterfront Facilities and Other Structures on Submerged Lands

(a) Development on submerged lands shall comply with the policies in this section.

(1) Marinas shall be designed and, to the greatest extent practicable, sited so that tides and currents will aid in flushing of the site or renew its water regularly.

Marinas designed for anchorage of private vessels shall provide facilities for the collection of waste, refuse, trash, and debris.

Marinas with the capacity for long-term anchorage of more than ten vessels shall provide pump-out facilities for marine toilets, or other such measures or facilities that provide an equal or better level of water quality protection.

Compliance: The project does not involve construction of a marina.

Marinas, docks, piers, wharves and other structures shall be designed and, to the greatest extent practicable, sited to avoid and otherwise minimize adverse effects on critical areas from boat traffic to and from those structures.

Compliance: The breakwater structure would not be placed in any critical areas and would not modify the current navigational routes; therefore, the project will not have any direct or indirect effect on critical areas.

Construction of docks, piers, wharves, and other structures shall be preferred instead of authorizing dredging of channels or basins or filling of submerged lands to provide access to coastal waters if such construction is practicable, environmentally preferable, and will not interfere with commercial navigation.

Compliance: The purpose of the study is to improve navigation along an existing channel. No new channels would be constructed and construction of docks, piers, wharves, and other structures would not be a suitable alternative to the proposed channel widening measures included in the recommended plan. Filling in of submerged lands would occur along some zones where marsh would be restored or the barrier island would be constructed. This loss is environmentally preferred as these habitats provide higher productivity than submerged lands or hardened structures. The use of barrier islands as placement areas for dredged material also provides additional flexibility to *adapt* to changing conditions. The breakwater structure placed on submerged lands is not intended to provide access to coastal waters and would protect the existing shoreline from erosion caused by commercial navigation along the GIWW and wind and tidal energies as well as sea level rise.

Piers, docks, wharves, bulkheads, jetties, groins, fishing cabins, and artificial reefs (including artificial reefs for compensatory mitigation) shall be limited to the minimum necessary to serve the project purpose and shall be constructed in a manner that:

does not significantly interfere with public navigation;

Compliance: The alignment of the breakwaters and oyster reef mitigation would be sufficiently offset from the GIWW to not interfere with public navigation or create hazardous navigational conditions.

does not significantly interfere with the natural coastal processes which supply sediments to shore areas or otherwise exacerbate erosion of shore areas; and

Compliance: The breakwaters would attenuate wave and tidal energies along the shoreline and minimize the movement of sediments into and out of the area. However, this modification is considered beneficial since the current high rates of erosion would be mitigated and the shoreline stabilized thereby protecting existing shoreline (marsh and barrier island) resources. Additionally, breakwaters have been shown to trap sediments allowing for an accretion of land and area for marsh establishment.

Construction of the oyster reef for mitigation purposes would occur in areas where historic reefs occurred. These historic areas protected the shoreline rather than limiting the supply of sediments and protected the shoreline from excessive erosion.

avoids and otherwise minimizes shading of critical areas and other adverse effects

Compliance: The alignment of the breakwater and oyster reef mitigation avoids all critical areas and would not induce adverse effects.

Facilities shall be located at sites or designed and constructed to the greatest extent practicable to avoid and otherwise minimize the potential for adverse effects from:

construction and maintenance of other development associated with the facility;

direct release to coastal waters and critical areas of pollutants from oil or hazardous substance spills or stormwater runoff; and

deposition of airborne pollutants in coastal waters and critical areas.

Compliance: The project does not involve construction of any facilities that would induce development or modify existing development operations, nor would the structure produce or emit hazardous substances or emissions.

Where practicable, pipelines, transmission lines, cables, roads, causeways, and bridges shall be located in existing rights-of-way or previously disturbed areas if necessary to avoid or minimize adverse effects and if it does not result in unreasonable risks to human health, safety, and welfare.

Compliance: The project does not involve construction or long-term operation of pipelines, transmission lines, cables, roads, causeways, or bridges.

To the greatest extent practicable, construction of facilities shall occur at sites and times selected to have the least adverse effects on recreational uses of CNRAs and on spawning or nesting seasons or seasonal migrations of terrestrial and aquatic wildlife.

Compliance: The construction of the breakwaters and oyster reef mitigation results in minor, short-term negative impacts to wildlife that may occur in Zones 12, 13, 14, 16, and 18. Any temporarily displaced wildlife would have suitable habitat immediately available to them in the project vicinity and will be able to avoid impacts from the project.

Facilities shall be located at sites which avoid the impoundment and draining of coastal wetlands. If impoundment or draining cannot be avoided, adverse effects to the

impounded or drained wetlands shall be mitigated in accordance with the sequencing requirements of §501.23 of this title. To the greatest extent practicable, facilities shall be located at sites at which expansion will not result in development in critical areas.

Compliance: Construction of the breakwaters or oyster reef mitigation, no wetlands would be affected. Over the long-term, the breakwaters would protect and stabilize the shoreline thereby also protecting marsh habitats and potentially increasing their area through accretion of sediments and reduction in saltwater intrusion.

Where practicable, piers, docks, wharves, bulkheads, jetties, groins, fishing cabins, and artificial reefs shall be constructed with materials that will not cause any adverse effects on coastal waters or critical areas.

Compliance: The breakwaters would be constructed of stone free of any chemicals or sealants that could cause adverse effects on coastal waters or critical areas. The oyster reef would be constructed of shell hash free of any contaminants.

Developed sites shall be returned as closely as practicable to pre-project conditions upon completion or cessation of operations by the removal of facilities and restoration of any significantly degraded areas, unless:

the facilities can be used for public purposes or contribute to the maintenance or enhancement of coastal water quality, critical areas, beaches, submerged lands, or shore areas; or

restoration activities would further degrade CNRAs.

Compliance: The breakwater structure and oyster reef mitigation would not be removed, and the area would not be returned to pre-project conditions at the end of the project life (estimated 50 years). The breakwaters are expected to have long-term beneficial impacts that if the breakwaters were removed would contribute to degradation of the shoreline and coastal areas. As well removal of the structure would result in the loss of hard substrate habitat that will have provided habitat for colonized by small fish, crustaceans, and mollusks, provide a food source for wildlife such as raccoons, skunks, reptiles, and small mammals, and loafing and roosting habitat for avian species.

Water-dependent uses and facilities shall receive preference over those uses and facilities that are not water-dependent.

Compliance: The breakwater would promote the protect and stabilization of the shoreline and coastal habitats which contributes to recreational opportunities in the project area. The oyster reef mitigation would replace lost water dependent uses.

Nonstructural erosion response methods such as beach nourishment, sediment bypassing, nearshore sediment berms, and planting of vegetation shall be preferred instead of structural erosion response methods.

Compliance: Methods mentioned above were considered and incorporated where the cost and benefits were warranted and screened out where it was too costly compared to the long-term benefits it would

provide. Over the long-term construction of a structural erosion response feature – a breakwater – is warranted and in the best interest of the coastal resources in the action area.

> *Major residential and recreational waterfront facilities shall to the greatest extent practicable accommodate public access to coastal waters and preserve the public's ability to enjoy the natural aesthetic values of coastal submerged lands.*
>
> *Activities on submerged land shall avoid and otherwise minimize any significant interference with the public's use of and access to such lands.*

Compliance: Construction of the breakwaters would not interfere with public access to or use of coastal waters and preserves. Openings in the structure would provide access to open water areas of the landward side of the structure.

> *Erosion of Gulf beaches and coastal shore areas caused by construction or modification of jetties, breakwaters, groins, or shore stabilization projects shall be mitigated to the extent the costs of mitigation are reasonably proportionate to the benefits of mitigation. Factors that shall be considered in determining whether the costs of mitigation are reasonably proportionate to the cost of the construction or modification and benefits include, but are not limited to, environmental benefits, recreational benefits, flood or storm protection benefits, erosion prevention benefits, and economic development benefits.*

Compliance: All environmental impacts of the proposed project have been addressed and a mitigation plan developed that will benefit shoreline and coastal habitats.

> *To the extent applicable to the public beach, the policies in this section are supplemental to any further restrictions or requirements relating to the beach access and use rights of the public.*

Compliance: Beaches and public access would be unaffected by the recommended plan, as beaches are not found in the project areas.

> *The GLO and the SLB, in governing development on state submerged lands, shall comply with the policies in this section when approving oil, gas, and other mineral lease plans of operation and granting surface leases, easements, and permits and adopting rules under the Texas Natural Resources Code, Chapters 32, 33 and 51 - 53, and Texas Water Code, Chapter 61.*

Compliance: The project does not involve development of oil, gas, or other mineral lease plans of operation or granting of surface leases, easements, or permits or adopting rules.

§501.25 Policies for Dredging and Dredged Material and Placement

(a) *Dredging and the disposal and placement of dredge material shall avoid and otherwise minimize adverse effects to coastal waters, submerged land, critical areas, coastal shore areas, and Gulf beaches to the greatest extent practicable. The policies of this section are supplement to any further restrictions or requirements relating to the beach access and use rights of the public. In implementing this section, cumulative and secondary adverse effects of dredging and the disposal and the placement of dredge material and the unique characteristics of affected sites shall be considered.*

Compliance: Placement of dredged material is beneficial for barrier island restoration. Under the Recommended Plan, periodic maintenance dredging and placement activities for the existing GIWW may result in short-term adverse impacts such as elevated levels of suspended solids (TSS). However, the frequency of these dredging events is expected to occur less often when compared to the No-Action plan and NED plan due to the reduction in channel shoaling rates because of the implementation of the Recommended Plan. Reduced shoaling of the navigation channel means that dredging cycles are spaced further apart, resulting in less impacts to water quality within the project study area.

(1) Dredging and dredged material disposal and placement shall not cause or contribute, after consideration of dilution and dispersion, to violation of any applicable surface water quality standards established under §501.21 of this title.

Compliance: Placement of dredge material would not violate any applicable surface water quality standards.

Except as otherwise provided in paragraph (4) of this subsection, adverse effects on critical areas from dredging and dredged material disposal or placement shall be avoided and otherwise minimized, and appropriate and practicable compensatory mitigation shall be required, in accordance with §501.23 of this title.

Compliance: Project implementation would result in unavoidable permanent loss of oyster reef and SAV. Compensatory mitigation has been incorporated into the plan to offset these losses. Placement of dredged material to create barrier islands and berms would result in long-term positive benefits to all coastal habitats along the study area from long-term erosion and sea level rise.

Except as provided in paragraph (4) of this subsection, dredging and the disposal and placement of dredged material shall not be authorized if:

(A) there is a practicable alternative that would have fewer adverse effects on coastal waters, submerged lands, critical areas, coastal shore areas, and Gulf beaches, so long as that alternative does not have other significant adverse effects;

all appropriate and practicable steps have not been taken to minimize adverse effects on coastal waters submerged lands, critical areas, coastal shore areas, and Gulf beaches; or

significant degradation of critical areas under §501.23(a)(7)(E) of this title would result.

Compliance: Coastal shore areas would be temporarily affected by the project during construction, but not result in a long-term net loss of any of the resources that make up these areas. The project has net environmental benefits that would result from restoration activities and project actions would result in restored form and function of critical and coastal shore areas. Construction activities have been minimized to the greatest extent practicable, including reducing overall construction footprint to only what is absolutely necessary and seasonal timing restrictions to avoid breeding/spawning and migrating fish and wildlife impacts to the greatest extent practicable.

A dredging or dredged material disposal or placement project that would be prohibited solely by application of paragraph (3) of this subsection may be allowed if it is determined to be of overriding importance to the public and national interest in light of economic impacts on navigation and maintenance of commercially navigable waterways.

Compliance: Placement is not precluded by paragraph (3), as noted above.

Adverse effects from dredging and dredged material disposal and placement shall be minimized as required in subsection (a) of this section. Adverse effects can be minimized by employing the techniques in this subsection where appropriate and practicable.

Adverse effects from dredging and dredge material disposal and placement can be minimized by controlling the location and dimensions of the activity. Some of the ways to accomplish this include:

Compliance: Placement of material into the restoration unit does not induce adverse effects. Temporary impacts associated with placement have been minimized to the greatest extent possible. See compliance discussions found in section (a) above.

locating and confining discharges to minimize smothering of organisms;

locating and designing projects to avoid adverse disruption of water inundation patterns, water circulation, erosion and accretion processes, and other hydrodynamic processes;

using existing or natural channels and basins instead of dredging new channels or basins, and discharging materials in areas that have been previously disturbed or used for disposal or placement of dredged material;

limiting the dimensions of channels, basins, and disposal and placement sites to the minimum reasonably required to serve the project purpose, including allowing for reasonable overdredging of channels and basins, and taking into account the need for capacity to accommodate future expansion without causing additional adverse effects;

discharging materials at sites where the substrate is composed of material similar to that being discharged;

locating and designing discharges to minimize the extent of any plume and otherwise dispersion of material; and

avoiding the impoundment or drainage of critical areas.

Compliance: The restoration of barrier islands allows for the navigation channel to absorb changes in sea level and improve maintenance objectives with beneficial use of dredged material. Channel modifications at zone 12 should be designed to 1) address navigation safety impacted by strong cross-currents and shoaling, 2) reduce emergency dredging operations caused by frequent and high shoaling. The channel modifications are to be a combination of widening and deepening across the intersection of Caney Creek and Mitchell's Cut. The widening shall begin with adequate distance east and west of the

intersection to account for vessel drift. It is anticipated that construction of the channel modifications will supply material to be used in the creation of the barrier islands.

Dredging and disposal and placement of material to be dredged shall comply with applicable standards for sediment toxicity. Adverse effects from constituents contained in materials discharged can be minimized by treatment of or limitations on the material itself. Some ways to accomplish this include;

disposal or placement of dredged material in a manner that maintains physiochemical conditions at discharge sites and limits or reduces the potency and availability of pollutants;

limiting the solid, liquid, and gaseous components of material discharged;

adding treatment substances to the discharged material; and

adding chemical flocculants to enhance the deposition of suspended particulates in confined disposal areas.

Compliance: Sediments dredged from the GIWW have been tested for a variety of chemical parameters of concern. Samples yielded no cause for concern and sediments are safe for beneficial use.

Adverse effects from dredging and dredged material disposal or placement can be minimized through control of the materials discharged. Some ways of accomplishing this include:

use of containment levees and sediment basins designed, constructed, and maintained to resists breaches, erosion, slumping, or leaching;

use of lined containment areas to reduce leaching where leaching of chemical constituents from the material is expected to be a problem;

capping in-place contaminated material or, selectively discharging the most contaminated material first and then capping it with the remaining material;

properly containing discharged material and maintaining discharge sites to prevent point and nonpoint pollution; and

timing the discharge to minimize adverse effects from unusually high water flows, wind, wave, and tidal actions.

Compliance: Best management practices will be employed while placing dredged material into their placement site. These include constructing exclusion dikes or barriers, use of silt fencing, and other features and monitoring discharge rates to limit the movement of sediment outside the placement area. Increased turbidity in and near the placement area is anticipated; however, material to be generated from construction activities has been tested and found not to contain harmful concentrations of pollutants. Discharges would not occur during conditions involving high water flows, waves, or tidal actions.

Adverse effects from dredging and dredged material disposal or placement can be minimized by controlling the manner in which material is dispersed. Some ways of accomplishing this include:

where environmentally desirable, distributing the material in a thin layer;

orienting material to minimize undesirable obstruction of the water current or circulation patterns;

using silt screens or other appropriate methods to confine suspended particulates or turbidity to a small area where settling or removal can occur;

using currents and circulation patterns to mix, disperse, dilute, or otherwise control the discharge;

minimizing turbidity by using a diffuser system or releasing material near the bottom;

selecting sites or managing discharges to confine and minimize the release of suspended particulates and turbidity and maintain light penetration for organisms; and

setting limits on the amount of material to be discharged per unit of time or volume of receiving waters.

Compliance: All of the sites minimize or avoid adverse dispersal effects to the greatest extent practicable during construction. Material to be used for restoration would be hydraulically discharged at specific discharge points in low elevation and open water areas. As needed, material would be mechanically moved into place with heavy equipment, which should reduce dispersal of material into undesirable areas

Adverse effects from dredging and dredged material disposal or placement operations can be minimized by adapting technology to the needs of each site. Some ways of accomplishing this include:

using appropriate equipment, machinery, and operating techniques for access to sites and transport of material, including those designed to reduce damage to critical areas;

having personnel on site adequately trained in the avoidance and minimization techniques and requirements; and

designing temporary and permanent access roads and channel spanning structures using culverts, open channels, and diversions that will pass both low and high water flows, accommodate fluctuating water levels, and maintain circulation and faunal movement.

Compliance: Dredged material placement into the placement areas would minimize impacts to the greatest extent practicable including, but not limited to siting pumps and pipes outside of environmentally sensitive and critical areas where possible; utilizing existing access roads and channels to move material, equipment and personnel; and employing Best Management Practices (BMPs) to avoid adverse impacts. During PED, ways to further reduce environmental impacts to all areas and resources will be considered and employed to the greatest extent practicable.

Adverse effects on plant and animal populations from dredging and dredged material disposal or placement can be minimized by:

avoiding changes in water current and circulation patterns that would interfere with the movement of animals;

selecting sites or managing discharges to prevent or avoid creating habitat conducive to the development of undesirable predators or species that have a competitive edge ecologically over indigenous plants or animals;

avoiding sites having unique habitat or other value, including habitat of endangered species;

using planning and construction practices to institute habitat development and restoration to produce a new or modified environmental state of higher ecological value by displacement of some or all of the existing environmental characteristics;

using techniques that have been demonstrated to be effective in the circumstances similar to those under consideration whenever possible and, when proposed development and restoration techniques have not yet advanced to the pilot demonstration stage, initiating their use on a small scale to allow corrective action if unanticipated adverse effects occur;

timing dredging and dredged material disposal or placement activities to avoid spawning or migration seasons and other biologically critical time periods; and

avoiding the destruction of remnant natural sites within areas already affected by development.

Compliance: The project would be designed and implemented in such a way to avoid adverse impacts to plant and animal populations and their habitat to the greatest extent practicable including, but not limited to seasonal timing restrictions, using existing access roads and channels, employing construction BMPs, siting pumps and pipes in areas that would have the least disturbance on the overall system, and utilizing the smallest construction footprint possible.

Adverse effects on human use potential from dredging and dredged material disposal or placement can be minimized by:

selecting sites and following procedures to prevent or minimize any potential damage to the aesthetically pleasing features of the site, particularly with respect to water quality;

selecting sites which are not valuable as natural aquatic areas;

timing dredging and dredged material disposal or placement activities to avoid the seasons or periods when human recreational activity associated with the site is most important; and

selecting sites that will not increase incompatible human activity or require frequent dredge or fill maintenance activity in remote fish and wildlife areas.

Compliance: Construction of barrier islands and berms may adversely impact the human environment in and around the placement sites by visually disturbing the scenic view with construction equipment and activity, increasing noise, and reducing the number of recreational opportunities. These impacts would be short term, lasting only the duration of the maintenance dredging event.

Adverse effects from new channels and basins can be minimized by locating them at sites:

that ensure adequate flushing and avoid stagnant pockets; or

that will create the fewest practicable adverse effects on CNRAs from additional infrastructure such as roads, bridges, causeways, piers, docks, wharves, transmission line crossing, and ancillary channels reasonably likely to be constructed as a result of the project; or

with the least practicable risk that increased vessel traffic could result in navigation hazards, spills or other forms of contamination which could adversely affect CNRAs;

provided that, for any dredging of new channels or basins subject to the requirements of §501.15 of this title (relating to Policy for Major Actions), data and information on minimization of secondary adverse effects need not be produced or evaluated to comply with this paragraph if such data and information is produced and evaluated in compliance with §501.15(b)(1) of this title.

Compliance: The project does not include constructing new channels or basins, therefore §501.25(8)(A)-D) does not apply.

Disposal or placement of dredged material in existing contained dredge disposal sites identified and actively used as described in an environmental assessment or environmental impact statement issued prior to the effective date of this chapter shall be presumed to comply with the requirements of subsection (a) of this section unless modified in design, sign, use, or function.

Dredged material from dredging projects in commercially navigable waters is a potentially reusable resource and must be used beneficially in accordance with this policy.

(1) If the costs of beneficial use of dredged material area reasonably comparable to the costs of disposal in a non-beneficial manner, the material shall be used beneficially.

If the costs of the beneficial use of dredged material are significantly greater than the costs of disposal in a non-beneficial manner, the material shall be used beneficially unless it is demonstrated that the costs of using the material beneficially are not reasonably proportionate to the costs of the project and benefits that will result. Factors that shall be considered in determining whether the costs of the beneficial use are not reasonably proportionate to the benefits include but are not limited to:

environmental benefits, recreational benefits, floor or storm protection benefits, erosion prevention benefits, and economic development benefits;

the proximity of the beneficial use site to the dredge site; and

the quantity and quality of the dredged material and its suitability for beneficial use.

Examples of the beneficial use of dredged material include, but are not limited to:

projects designed to reduce or minimize erosion or provide shoreline protection;

projects designed to create or enhance public beaches or recreational areas;

projects designed to benefit the sediment budget or littoral system;

projects designed to improve or maintain terrestrial or aquatic wildlife habitat;

projects designed to create new terrestrial or aquatic wildlife habitat, including the construction of marshlands, coastal wetlands, or other critical areas;

projects designed and demonstrated to benefit benthic communities or aquatic vegetation;

projects designed to create wildlife management areas, parks, airports, or other public facilities;

projects designed to cap landfills or other water disposal areas;

projects designed to fill private property or upgrade agricultural land, if cost-effective public beneficial uses are not available; and

projects designed to remediate past adverse impacts on the coastal zone.

If dredged material cannot be used beneficially as provided in subsection (d)(2) of this section, to avoid and otherwise minimize adverse effects as required in subsection (a) of this section, preference will be given to the greatest extent practicable to disposal in…

Compliance: Dredged material would be beneficially used to restore barrier island and marsh habitat throughout the project area; therefore, the project is consistent with §501.25(d)(1) –(3) and §501.25(c) and §501.25(e)(1) –(3) do not apply to this project.

For new sites, dredged materials shall not be disposed of or placed directly on the boundaries of submerged lands or at such location so as to slump or migrate across the boundaries of submerged lands in the absence of an agreement between the affected public owner and the adjoining private owner or owners that defined the location of the boundary or boundaries affected by the deposition of the dredged material.

Compliance: Navigation servitude is being invoked in all placement areas along the GIWW. If navigation servitude cannot be invoked for whatever reasons, appropriate real estate agreements would be drafted and in place prior to construction to ensure all landowners are appropriately notified and compensated for any loss or impacts.

Emergency dredging shall be allowed without a prior consistency determination as required in the applicable consistency rule when…

Compliance: An emergency situation does not exist with implementation of the project. Consistency of the project with program policy would be determined prior to project authorization.

Mining of sand, shell, marl, gravel, and mudshell on submerged lands shall be prohibited unless there is an affirmative showing of no significant impact on erosion within the coastal zone and no significant adverse effect of coastal water quality or terrestrial and aquatic wildlife habitat within a CNRA.

Compliance: Project activities do not involve mining for shell, marl, gravel or mudshell; therefore, §501.25(h) does not apply.

The GLO and the SLB shall comply with the policies in this section when approving oil, gas, and other mineral lease plans of operation and granting surface leases, easements, and permits and adopting rules under the Texas Natural Resources Code, Chapter 32, 33, and 51 – 53, and Texas Water Code, Chapter 61, for dredging and dredge material disposal and placement TxDOT shall comply with the policies in this subchapter when adopting rules and taking actions as local sponsor of the Gulf Intracoastal Waterway under Texas Transportation Code, Chapter 51. The TCEQ and the RRC shall comply with the policies in this section when issuing certifications and adopting rules under Texas Water Code, Chapter 26, and the Texas Natural Resources Code, Chapter 91, governing certification of compliance with surface water quality standards for federal actions and permits authorizing dredging or the discharge or placement of dredged material. The TPWD shall comply with the policies in this section when adopting rules at Chapter 57 of this title (relating to Fisheries) governing dredging and dredged material disposal and placement. TPWD shall comply with the policies in subsection (h) of this section when adopting rules and issuing permits under Texas Parks and Wildlife Code, Chapter 86, governing the mining of sand, shell, marl, gravel, and mudshell.

Compliance: This project does not involve oil, gas, and other mineral lease plans of operation or granting of surface leases, easements, or permits; therefore, §501.25(i) does not apply.

§ 501.27 Policies for Development in Coastal Hazard Areas

(a) Subdivisions participating in the National Flood Insurance Program shall adopt ordinances or orders governing development in special hazard areas under Texas Water Code, Chapter 16, Subchapter I, and Texas Local Government Code, Chapter 240, Subchapter Z, that comply with construction standards in regulations at Code of Federal Regulations, Title 44, Parts 59 - 60, adopted pursuant to the National Flood Insurance Act, 42 United States Code Annotated, §§4001 et seq.

Compliance: This project is fully compliant with the National Flood Insurance Program along with the following codes and regulations as documented in section 6.12.

(b) Pursuant to the standards and procedures under the Texas Natural Resources Code, Chapter 33, Subchapter H, the GLO shall adopt or issue rules, recommendations, standards, and guidelines for erosion avoidance and remediation and for prioritizing critical erosion areas.

- **Compliance:** No critical erosion areas as defined by the Bureau of Economic Geology exist in the project area. High erosion sites are found in the project area and the recommended plan is intended to minimize the erosion as much as possible in an effort to stabilize and make the GIWW more resilient under future conditions.

§501.28 Policies for Development Within Coastal Barrier Resource System Units and Otherwise Protected Areas on Coastal Barriers

(a) Development of new infrastructure or major repair of existing infrastructure within or supporting development within Coastal Barrier Resource System Units and Otherwise Protected Areas designated on maps dated October 24, 1990, as those maps may be modified, revised, or corrected, under the Coastal Barrier Resources Act, 16 United States Code Annotated, §3503(a), shall comply with the policies in this section.

(1) Development of publicly funded infrastructure shall be authorized only if it is essential for public health, safety, and welfare, enhances public use, or is required by law.
(2) Infrastructure shall be located at sites at which reasonably foreseeable future expansion will not require development in critical areas, critical dunes, Gulf beaches, and washover areas within Coastal Barrier Resource System Units or Otherwise Protected Areas.
(3) Infrastructure shall be located at sites that to the greatest extent practicable avoid and otherwise minimize the potential for adverse effects on critical areas, critical dunes, Gulf beaches, and washover areas within Coastal Barrier Resource System Units or Otherwise Protected Areas from:
    (A) construction and maintenance of roads, bridges, and causeways; and
    (B) direct release to coastal waters, critical areas, critical dunes, Gulf beaches, and washover areas within Coastal Barrier Resource System Units or Otherwise Protected Areas of oil, hazardous substances, or stormwater runoff.
(4) Where practicable, infrastructure shall be located in existing rights-of-way or previously disturbed areas to avoid or minimize adverse effects within Coastal Barrier Resource System Units or Otherwise Protected Areas.
(5) Development of infrastructure shall occur at sites and times selected to have the least adverse effects practicable within Coastal Barrier Resource System Units or Otherwise Protected Areas on critical areas, critical dunes, Gulf beaches, and washover areas and on spawning or nesting areas or seasonal migrations of commercial, recreational, threatened, or endangered terrestrial or aquatic wildlife.

Compliance: Coordination with USFWS is ongoing to confirm the compliance of the recommended plan with the Coastal Barrier Resources Act.

TCEQ rules and approvals for the creation of special districts and for infrastructure projects funded by issuance of bonds by water, sanitary sewer, and wastewater drainage districts under Texas Water Code, Chapters 49, 50, and 59; water control and improvement districts under Texas Water Code, Chapter 50; municipal utility districts under Texas Water Code, Chapter 54; regional plan implementation agencies under Texas Water Code, Chapter 54; special utility districts under

Texas Water Code, Chapter 65; stormwater control districts under Texas Water Code, Chapter 66; and all other general and special law districts subject to and within the jurisdiction of the TCEQ, shall comply with the policies in this section. TxDOT rules and approvals under Texas Transportation Code Chapter 201, et seq., governing planning, design, construction, and maintenance of transportation projects, shall comply with the policies in this section.

Compliance: The project does not involve creation of special district or construction of infrastructure projects.

§501.32 Policies for Emission of Air Pollutants

TCEQ rules under Texas Health and Safety Code, Chapter 382, governing emissions of air pollutants, shall comply with regulations at Code of Federal Regulations, Title 40, adopted pursuant to the Clean Air Act, 42 United States Code Annotated, §§7401, et seq, to protect and enhance air quality in the coastal area so as to protect CNRAs and promote the public health, safety, and welfare.

Compliance: The project is fully compliant with the Clean Air Act as documented in the Integrated Feasibility Report and Environmental Assessment.

CONCLUSION

The project complies with the Texas Coastal Management Program and will be conducted in a manner consistent with all rules and regulations of the program.

US Army Corps of Engineers ®
Galveston District

Appendix D-7

Fish and Wildlife Coordination Act Compliance

for

Gulf Intracoastal Waterway Coastal Resilience Study
Matagorda County, Texas

January 2022

The Fish and Wildlife Coordination Act Report (FWCAR) will be placed here when it is received from US Fish and Wildlife Service.