Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway

Environmental Appendix C DRAFT

Goose Island State Park
Aransas County, Texas

January 2023

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DIRECTIONS:

Black text denotes required language.

Blue text denotes where project specific information is required. Some sections are drop-down menus with required options available to select.

Green text denotes directions or guidance to completing the document and should be deleted in final project specific decision document.

Upon opening new template, click "File" and "Save As" to immediate save the decision document to project specific folder.

HQUSACE Office of Water Policy Review and Office of Counsel need to be consulted on when it is appropriate to deviate from the required template language. Additional language to meet project specific needs may be added as appropriate.

FINDING OF NO SIGNIFICANT IMPACT

AQUATIC ECOSYSTEM RESTORATION FOR GULF INTRACOASTAL WATERWAY – BENEFICIAL USE OF DREDGED MATERIAL TEXAS

The U.S. Army Corps of Engineers, Galveston District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Detailed Project Report and Environmental Assessment (DPR/EA) dated **DATE OF DPR/EA**, for the Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway (GIWW) – Beneficial Use of Dredged Material addresses the use of dredged material for ecosystem restoration opportunities and feasibility along the GIWW in Texas. The final recommendation is contained in the report of the Chief of Engineers, dated **DATE OF CHIEF'S REPORT**.

The Final DPR/EA, incorporated herein by reference, evaluated various alternatives that would restore and protect valuable coastal ecosystems in connection with regular operations and maintenance (O&M) dredging in the study area. The recommended plan is the **Locally Preferred Plan (LPP)** and includes:

- Goose Island State Park is at the end of Lamar Peninsula, north of Rockport, Texas between St. Charles and Aransas Bays. The proposed project area is within the boundaries of the state park, which is currently composed of two semi-contained cells with primarily open water and small, scattered islands of salt marsh. Historically, Goose Island was much larger; however, decades of tidal erosion, rising sea levels, subsidence, and altered sediment supplies have reduced the area to its current footprint. Containment levees and an offshore breakwater were constructed in 2008 during a previous attempt to restore the island encompassed by the two existing cells. It was determined to be the most viable site for beneficial use of dredged material (BUDM). The tentatively selected plan (TSP) builds 23 acres of saline marsh with target elevations between 0.6 and 0.8 feet (ft) NAVD88 (1.5 to 1.7 feet Mean lower low water [MLLW]; low elevation marsh) within the current containment levees. Two new cells would be built to the North of the existing cells, adding 9.5 and 6.5 acres, respectively. Along the southern area of the two new cells, fill material would be constructed to create a 3.7-acre and 2.5-acre higher elevation marsh (target between 1.5 and 2.0 ft NAVD88 [2.4 to 2.9 feet MLLW]), respectively. The remaining area (9.8 acres) would be filled to low elevation marsh. The higher elevation marsh would be gradually sloped to meet the lower elevation marsh at ≤1.0 ft NAVD88. A new containment berm would be constructed as with a cross-sectional area of 128 square feet.

In addition to a "no action" plan, five alternatives were evaluated. The alternatives included saline marsh within the existing containment cells, saline marsh in existing containment cells and a living shoreline, saline marsh in existing containment cells with an addition of low and high elevation emergent marsh cells.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	☒	☐	☐
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☐	☐	☒
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Historic properties	☒	☐	☐
Other cultural resources	☐	☐	☒
Floodplains	☒	☐	☐
Hazardous, toxic & radioactive waste	☐	☐	☒
Hydrology	☒	☐	☐
Land use	☒	☐	☐
Navigation	☒	☐	☐
Noise levels	☒	☐	☐
Public infrastructure	☐	☐	☒
Socio-economics	☒	☐	☐
Environmental justice	☒	☐	☐
Soils	☒	☐	☐
Tribal trust resources	☐	☐	☒
Water quality	☒	☐	☐
Climate change	☒	☐	☐

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the DPR/EA will be implemented, if appropriate, to minimize impacts.

Examples of common BMPs include, but are not limited to:

- Using of silt fencing to limit soil migration and water quality degradation.
- Refueling and maintenance of vehicles and equipment in designated areas to prevent accidental spills and potential contamination of water sources and the surrounding soils.
- Limiting idling vehicles and equipment to reduce emissions.
- Limiting ground disturbance necessary for staging areas, access routes, pipeline routes, etc. to the smallest footprint possible to safely operate during construction and restoring these areas and routes to avoid permanent loss.
- Minimizing project equipment and vehicles transiting between staging areas and the restoration site to the greatest extent practicable, including but not limited to using designated routes, confining vehicles to immediate project needs, and sequencing work to minimize the frequency and density of vehicular traffic.

If, for some reason, the BMPs are not implemented, the impacts of any of the action alternatives would only minimally increase from those described in Chapter 4. The increase in impacts would not be substantial enough to cause an adverse insignificant impact to become significant.

No compensatory mitigation is required as part of the recommended plan.

Public review of the draft DPR/EA and FONSI was completed on **DATE DRAFT EA AND FONSI REVIEW PERIOD ENDED**. All comments submitted during the public review period were responded to in the Final DPR/EA and FONSI.

ENDANGERED SPECIES ACT

FORMAL CONSULTATION:

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the Choose an item. issued a biological opinion, dated **DATE OF BIOP**, that determined that the recommended plan will not jeopardize the continued existence of the following federally listed species or adversely modify designated critical habitat: **LIST ALL SPECIES INCLUDED IN THE FORMAL CONSULTATION**. All terms and conditions, conservation measures, and reasonable and prudent alternatives and measures resulting from these consultations shall be implemented in order to minimize take of endangered species and avoid jeopardizing the species.

INFORMAL CONSULATION:

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan may affect but is not likely to adversely affect the following federally listed species or their designated critical habitat: **LIST ALL SPECIES INCLUDED IN INFORMAL CONSULTATION**. The **PICK THE**

APPROPRIATE AGENCY concurred with the Corps' determination on **DATE OF CONCURRENCE LETTER**

NO EFFECT:

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan will have no effect on federally listed species or their designated critical habitat.

NATIONAL HISTORIC PRESERVATION ACT

HISTORIC PROPERTIES ADVERSELY AFFECTED:

Pursuant to section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that historic properties may be adversely affected by the recommended plan. The Corps and the **ENTER THE APPROPRIATE SHPO(S) OR THPO(S)** entered into a **PICK TYPE OF AGREEMENT**, dated **DATE OF AGREEMENT.** All terms and conditions resulting from the agreement shall be implemented in order to minimize adverse impacts to historic properties.[1]

HISTORIC PROPERTIES NOT ADVERSELY AFFECTED:

Pursuant to section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that historic properties would not be adversely affected by the recommended plan. The **ENTER THE APPROPRIATE SHPO OR THPO** concurred with the determination on **DATE OF CONCURRENCE LETTER.**

NO EFFECT TO HISTORIC PROPERTIES:

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the recommended plan has no effect on historic properties.

CLEAN WATER ACT SECTION 404(B)(1) COMPLIANCE

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in Appendix C of the DPR/EA.

CLEAN WATER ACT SECTION 401 COMPLIANCE:

401 WQC OBTAINED:

A water quality certification pursuant to section 401 of the Clean Water Act was obtained from the **NAME OF ISSUING AUTHORITY.** All conditions of the water quality certification shall be implemented in order to minimize adverse impacts to water quality.

401 WQC WAIVED:

[1] Required by 36 CFR 800.6(c)(3) meeting the terms and conditions of the MOA[2] 40 CFR 1505.2(B) requires identification of relevant factors including any essential to national policy which were balanced in the agency decision.

The **NAME OF ISSUING AUTHORITY** has waived water quality certification pursuant to section 401 of the Clean Water Act, as follows. **DESCRIBE DOCUMENTATION OF THE WAIVER OF THE WQC.**

401 WQC PENDING:

A water quality certification pursuant to section 401 of the Clean Water Act will obtained from the **NAME OF ISSUING AUTHORITY** prior to construction. In a letter dated **DATE OF LETTER**, the **STATE, TERRITORY, OR TRIBE** stated that the recommended plan appears to meet the requirements of the water quality certification, pending confirmation based on information to be developed during the pre-construction engineering and design phase. All conditions of the water quality certification will be implemented in order to minimize adverse impacts to water quality.

COASTAL ZONE MANAGEMENT ACT

CZMA CONSISTENCY ISSUED:

A determination of consistency with the **STATE OR TERRITORY NAME** Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 was obtained from the **NAME OF CZM ISSUING AUTHORITY**. All conditions of the consistency determination shall be implemented in order to minimize adverse impacts to the coastal zone.

CZMA CONSISTENCY WAIVED:

A determination of consistency with the **STATE OR TERRITORY NAME** Coastal Zone Management program was provided to **NAME OF CZM ISSUING AUTHORITY** on **DATE OF SUBMITTAL** pursuant to Section 307 of the Coastal Zone Management Act of 1972. Due to the lack of response of **STATE OR TERRITORY NAME** within six months of the Corps' submittal, consistency is presumed under 16 U.S.C. 1456(c)(3)(A).

CZMA CONSISTENCY PENDING:

A determination of consistency with the **STATE OR TERRITORY NAME** Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 will be obtained from the **NAME OF CZM ISSUING AUTHORITY** prior to construction. In a letter dated **DATE OF LETTER**, the **STATE OR TERRITORY NAME** stated that the recommended plan appears to be consistent with state Coastal Zone Management plans, pending confirmation based on information to be developed during the pre-construction engineering and design phase. All conditions of the consistency determination shall be implemented in order to minimize adverse impacts to the coastal zone.

OTHER SIGNIFICANT ENVIRONMENTAL COMPLIANCE:

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. **ADD BRIEF DISCUSSION IF OTHER ISSUES WERE RAISED RELATIVE TO OTHER ENVIRONMENTAL LAWS AND/OR EOs SUCH AS ENVIRONMENTAL JUSTICE, CLEAN AIR ACT, PRIME OR UNIQUE FARMLANDS, MARINE MAMMAL PROTECTION ACT, ESSENTIAL FISH HABITAT, WILD AND SCENIC RIVERS, OR COASTAL BARRIER RESOURCES ACT.**

FINDING

Technical, environmental, **PICK OPTION BASED ON PROJECT PURPOSE(S)** criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives.[2] Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.[3]

____
Date

____
NAME
RANK, Corps of Engineers
District Commander

[2] 40 CFR 1505.2(B) requires identification of relevant factors including any essential to national policy which were balanced in the agency decision.

[3] 40 CFR 1508.13 stated the FONSI shall include an EA or a summary of it and shall note any other environmental documents related to it. If an assessment is included, the FONSI need not repeat any of the discussion in the assessment but may incorporate by reference.

Appendix C-1 Ecological Modeling

Ecological Modelling

for

Aquatic Ecosystem Restoration for GIWW

Aransas County, Texas

Wetland Value Assessment Coastal Marsh Community Modeling for Civil Works – Saline Marsh Model

Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway Aquatic

Wetland Value Assessment Modelling

January 2023

Prepared by:

United States Army Corps of Engineers

Regional Planning and Environmental Center

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1.0 Introduction

The U.S. Army Corps of Engineers, Galveston District (USACE), in partnership with the Texas General Land Office (TGLO), is reviewing restoration opportunities in Aransas County, Texas using dredged material from the Gulf Intracoastal Waterway (GIWW). An aquatic ecosystem restoration for GIWW draft Detailed Project Report and Environmental Assessment (DDPR-EA) is being prepared to describe the results of investigations and analyses used to determine the feasibility of restoring marsh habitat in the study area.

The authority for this project is Section 204 of the Water Resources Development Act (WRDA) of 1992, as amended and administered under the USACE Continuing Authorities Program (CAP). USACE is the lead Federal agency for the proposed project and will oversee compliance with applicable federal laws and regulations required for the project, as well as protection measures for sensitive biological resources. The TGLO is the Non-Federal Sponsor (NFS) who recognizes the opportunity to support maintenance of navigation resources in combination with restoring coastal habitat in the region.

The purpose of this study is to recommend a viable Beneficial Use of Dredge Material (BUDM) along the GIWW to restore habitat along the navigation resource and capture ecological output through beneficially placing Operations and Maintenance (O&M) material in areas degraded from coastal and navigation forces. The GIWW is at risk from eroding shorelines, powerful storms and sedimentation, lost habitat, impaired water quality, and increasing land use and development.

Salt marshes are among the most productive ecosystems in the world[1,2]; however, many are becoming unsustainable due to hydrologic alterations caused by natural degradation, often exacerbated by anthropogenic activities[3,4]. Along the Texas coast, salt marsh loss is predominantly caused by wave action, subsidence, sea level-rise, and insufficient sediment supply[5].

Restoration of salt marsh is a technique used to protect and improve degraded habitat quality[6], of which dredged material can be used. BUDM is a specific opportunity to demonstrate viability, and develop practices that facilitate, rather than challenge, the justification of BUDM efforts.

The study will help contribute to larger ongoing efforts to improve, preserve, and sustain ecological resources along the Texas coast by stakeholder groups, non-governmental organizations, and government agencies at the local, state, and federal level. Specific study problems include:

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[1] Deegan, L.A., Johnson, D.S., Warren, R.S., Peterson, B.J., Fleeger, J.W., Fagherazzi, S., WIllheim, W. 2012. Coastal eutrophication as a driver of salt marsh loss. *Nature*, 490(7420), 388-392.
[2] Gedan, K.B., Silliman, B.R., Bertness, M.D. 2009. Centuries of human-driven change in salt marsh ecosystems. *Annual Review of Marine Science*, 1, 117-141
[3] Bouma, T.J., Belzen, J.V., Balken, T., Herman, P.M.J. 2014. Identifying knowledge gaps hampering application of intertidal habitats in coastal protection: Opportunities and steps to take. *Coastal Engineering*, 87-147-157.
[4] Bromber, G.K.; Silliman, B.R., and Bertness, M.D.
2009. Centuries of human-driven change in salt marsh. *Annual Review of Marine Science*, 1(), 117-141.
[5] Ravens, T.M., Thomas, R.C., Roberts, K.A., Santschi, P.H. 2009. Causes of salt marsh erosion in Galveston Bay, Texas. *Journal of Coastal Research,* 25(2 (252)), 265-272.
[6] Billah, M.M., Bhuiyan, M.K.A., Islam, M.A., Das, J., Hoque, A.R. 2022. Salt marsh restoration: an overview of techniques and success indicators. *Environmental Science and Pollution Research*, 29, 15347-15363.

- Land loss due to erosion, subsidence, and relative sea level change (RSLC) threatens the geomorphic structure and hydrologic function of the coastal shoreline and marsh systems.
- Altered hydrologic conditions are contributing to the conversion of saline coastal habitats (e.g., saline marsh) to open water.
- Longshore sediment transport is significantly reduced, limiting the sustainability of the coastal ecosystem.

1.1 Plan Formulation

During the early stages of plan formulation, it was decided to develop costs and benefits and conduct cost effective and incremental analysis (CEICA) on fully formed plans, rather than measure by measure. The final array of plans, based on planning strategies, resulted in six alternatives (including the No Action Alternative), in which the scale increased with each alternative (Table 1). All alternatives are proposed at Goose Island State Park in Aransas County, Texas.

Table 1. Summary of alternatives

Alternative	Description
Alternative 3a	Two cells enclosed with an existing containment levee (east and west cell) will be filled with O&M dredged material to a target elevation ranging between 0.6- and 0.8-foot NAVD88 but may be up to 1-foot NAVD88 for final elevations.
Alternative 3b	Marsh elevations for the east and west cells target 0.6- to 0.8-foot NAVD88 as described in Alternative 3a, with the addition of a living shoreline that would begin at the containment levee and slope outwards to 0.00-foot NAVD88.
Alternative 3c	Two new cells (totaling 16-acres) are constructed north of the existing east and west cells with a containment levee/berm built using material sourced from the project area. Six acres along the southern edge of the existing cells containment levee would be constructed to an emergent marsh elevation not to exceed 2-foot NAVD88. Seventeen acres of the existing cells and the new 16-acre cells would target 0.6- to 0.8-foot NAVD88.
Alternative 3d	Two cells are constructed north of the existing east and west cells as described in Alternative 3c. Six acres along the southern edge of the new cells would be constructed to an emergent marsh elevation not to exceed 2-foot NAVD88. The existing 23-acre cells and the remaining 1o-acres in the new cells would target 0.6- to 0.8-foot NAVD88.
Alternative 3e	To maximize utilization of source material, the existing 23-acre east and west cells would be constructed to a target elevation 4-foot MLLW, sloping outwards to meet 0.00 MLLW. Two new cells would be created on either side of the existing containment levee, one to the north totaling 6.1-acres and another to the south totaling 14 acres, with target elevation 1- to 2-foot MLLW. Another two cells would be constructed adjacent to these with target elevations of 0.00 MLLW, the north being a 10-acre marsh and southern 9.1 acres. Finally, a living shoreline would be constructed along the outer edge of the marsh system with 7.1 acres on the northern side and 8.1 acres on the southern side.

1.2 Wetland Value Assessment Model

The aquatic ecosystem GIWW study utilized the Wetland Value Assessment (WVA) Coastal Marsh Community Model (Version [v] 2.0) to calculate benefits to each of the alternatives developed.

The WVA methodology is similar to the U.S. Fish and Wildlife Services (USFWS) Habitat Evaluation Procedures (HEP), in that habitat quality and quantity are measured for baseline conditions and predicted for future without-project (FWOP) and future with-project (FWP) conditions. Instead of the species-based approach of HEP, the WVA models use an assemblage of variables considered important to the suitability of a habitat type for supporting a diversity of fish and wildlife species. As with HEP, the WVA allows a numeric comparison of each future condition and provides a combined quantitative and qualitative estimate of project-related benefits on fish and wildlife resources.

WVA models operate under the assumption that optimal conditions for fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated and expressed with a mathematical model developed specifically for each habitat type. Each model consists of 1) a 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 (Suitability Indices) and different variable values; and 3) a mathematical formula that combines the Suitability Indices for each variable into a single value for wetland habitat quality, termed the Habitat Suitability Index (HSI).

The product of a HSI value and the acreage of available habitat for a given target year (TY) is known as the Habitat Unit (HU). The HU is the basic unit for measuring project effects/benefits on fish and wildlife habitat. Future HUs change according to changes in habitat quality and/or quantity. Results are annualized over the period of analysis to determine the Average Annual Habitat Units (AAHUs) available for each habitat type.

The change (increase or decrease) in AAHUs for each FWP scenario, compared to the FWOP conditions, provides a measure of anticipated impacts. A net gain in AAHUs indicates that the project is beneficial to the habitat being evaluated, while a net loss indicates that the project is damaging.

The habitat variable-habitat suitability relationships within these WVA models have not been verified by field experiments or validated through a rigorous scientific process. However, the variables were originally derived from HEP suitability indices taken from species models for species found in that habitat type. An independent external peer review of the WVA Models has been conducted by the USACE Eco-PCX[7]. The reviewers agreed that the concept and application of the models are sound for planning efforts. The models seem to sufficiently capture the habitats being modeled and do not have any irreparable deficiencies.

1.2.1 Agency Coordination

A meeting with representatives of USACE, National Marine Fisheries Service (NMFS), USFWS, Texas Commission on Environmental Quality (TCEQ), Texas Water Development Board (TWDB), Texas Parks and Wildlife Department (TPWD), TGLO, and Ducks Unlimited (DU) was held on July 29, 2022, to discuss the use of the WVA models.

[7] Battelle Memorial Institute. 2010. Final Model Review Report for the Wetland Value. Prepared for the Department of the Army, U.S. Army Corps of Engineers, Ecosystem Planning Center of Expertise, Mississippi Valley Division. Retrieved 28 July 2017 from https://cw-environment.erdc.dren.mil/models/WVA%20Model%20Review_TCN09032_Final%20Report_083110.pdf.

A subsequent meeting with representatives from USACE, NMFS, USFWS, TPWD, and DU was held on September 7, 2022, to examine the values of the variables for the existing conditions, FWOP, and FWP conditions. A collaborative discussion was undertaken for each variable of each of the models including the FWOP and FWP conditions. Concurrence by all representatives was required before model outputs were accepted. The model discussions in Section 2.0 and 3.0 describe the assumptions made during the meeting to determine variable scores and the data used to help inform those decisions.

2.0 Saline Marsh Community Model

The WVA Marsh Models (Fresh/Intermediate, Brackish, and Saline Marsh) were initially developed as the primary means of measuring the wetland benefits of candidate projects proposed for funding under the Coastal Wetlands Planning, Protection and Restoration Act. In addition, the WVA Marsh Models have also been used for determining potential impacts and/or benefits under USACE civil works projects and for mitigation purposes. Since the initial development, the WVA Marsh Models have undergone several revisions including the omission of certain variables, modifications to the Suitability Index (SI) Graphs, and modifications to the Habitat Suitability Index (HSI) formulas.

The marsh community models were developed to determine the suitability of marsh and open water habitats in the Louisiana coastal zone but have since been revised and certified for use along the Texas coast. The WVA Marsh Models were designed to function at a community level and therefore attempt to define an optimal combination of habitat conditions for all fish and wildlife species utilizing coastal marsh ecosystems.

For purposes of the GIWW 204 study the WVA Marsh Models v2.0 was used. Version 2.0 incorporates recommendations made by independent reviewers of the v1.0 model[8]. The WVA suite of marsh models in v2.0 was approved for Regional Use in specified EPA Level IV Ecoregions within the Galveston and New Orleans Districts on October 31, 2017.

2.1 Period of Analysis/Target Years

The environmental period of analysis for the study is 50 years. HSI values are determined for each TY. Target years, determined by the model user, represent when significant changes in habitat quality or quantity were expected during the 50-year period of analysis, under FWOP and FWP conditions. For this study, target years were 1, 5, 15, 35, and 50. In determining FWP conditions, all project-related direct (construction) impacts were assumed to occur in TY1. It was assumed by TY5 that a marsh would mature and reach optimum suitability for FWP. TY15 and TY35 coincided with years of projected relative sea level change (RSLC) from the National Oceanic and Atmospheric Administration’s (NOAA’s) Sea Level Rise Viewer (Appendix A).

2.2 Area of Application

Tidal marsh landscapes have two major components, the vegetated intertidal zone and the aquatic habitats of pools and channels[9]. The WVA Marsh Model was applied to the project area under consideration for restoration. Each restoration alternative was delineated using a number of variables including sufficient size to accommodate pools and/or channels, similar rates of

[8] Battelle Memorial Institute. 2010.

[9] Kneib, R.T. 1997. The role of tidal marshes in the ecology of estuarine nekton. *Oceanography and Marine Biology: an Annual Review*, 35, 163-220.

wetland loss, and similar factors influencing wetland loss. The acreage used to calculate the habitat quality score was based on the area within the restoration unit, including open water areas. Therefore, the acreage is held constant within each alternative analysis for the FWOP or FWP conditions. Wetland degradation caused by erosion, subsidence, RSLC, and other factors is captured in the model input variables, specifically V_3 Marsh Edge and Interspersion (see Section 2.4.3).

2.3 Marsh Model Selection

The coastal marsh community models are applied to all marsh and associated open water habitats within the coastal zone. The WVA Marsh Models manual specifies that model application should correspond to the marsh type(s) found within the project area according to the habitat classification data obtained from the United States Geologic Survey (USGS).

Existing condition marsh vegetation and water acreages are based on a USGS classification using 2010 imagery[10], coordination with resource agencies, and 2022 Google Earth imagery. The USGS mapping effort indicates that salt marsh occurs at Goose Island State Park, thus the saline marsh model was used to calculate benefits.

2.4 Model Variables

2.4.1 Variable 1 (V_1): Percent of Wetland Area Covered by Emergent Vegetation

Persistent emergent vegetation provides foraging, resting, and breeding habitat for a variety of coastal fish and wildlife species. Detritus from coastal marshes also provides a source of mineral and organic nourishment for organisms at the base of the food chain. In this model, an area that is 100 percent shallow water is assumed to have minimal habitat suitability (SI = 0.1). For all marsh types, optimal vegetative coverage is assumed to be 60 to 80 percent (SI = 1.0). This assumption was changed from v1.0 in response to comments submitted during peer-review. This assumption is in line with the general biological understanding that optimum cover falls in the 60 to 80 percent range.

Existing Condition: Baseline total marsh and water acres of the Goose Island State Park marsh cells were calculated using the 2022 aerial imagery. Geographic Information System (GIS) tools were used to calculate the percent of total visible emergent vegetation (i.e., not open water). Due to some uncertainty with aerial imagery in identifying emergent versus floating vegetation, these values were verified by experts with local knowledge that the ratio of emergent vegetation to open water was realistic.

FWOP: NOAA's Marsh Migration[11] 0.59-foot and 3.18-foot sea level rise data were used to determine the future percent of emergent vegetation in year 2025 and 2080, respectively, within the project area in the absence of restoration. This rise data is slightly more aggressive than the USACE intermediate curve, which predicates a 0.43-foot and 1.89-foot sea level rise in 2025 and 2080, respectively.

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[10] Enwright, N.M., Hartley, S.B., Couvillion, B.R., Brasher, M.G., Visser, J.M., Mitchell, M.K., Ballard, B.M., Parr, M.W., and Wilson, B.C., 2015, Delineation of marsh types from Corpus Christi Bay, Texas, to Perdido Bay, Alabama, in 2010: U.S. Geological Survey Scientific Investigations Map 3336, 1 sheet, scale 1:750,000. Available at: http://dx.doi.org/10.3133/sim3336 (Downloaded 12 September 2022).

[11] National Oceanic and Atmospheric Administration (NOAA). 2022. Digital Coast Sea Level Rise Data Download. NOAA Office for Coastal Management. Available at: https://coast.noaa.gov/slrdata/ (Downloaded 2 September 2022).

FWP: The marsh restoration measure would involve placing dredged material within approximately 60% of the marsh, leaving 40% shallow open water. The emergent marsh platform would be raised anywhere from +0.6- to 0.8-foot NAVD88 at year 0 to +2-foot NAVD88 at year 30, or a combination of these, dependent on the alternative. The elevation and ratio of emergent marsh to open water can be largely controlled through strategically placed dredged material and reworking the material until the targets are reached. Additionally, adaptive management triggers have been set that would initiate adaptive management in the event the target ratios are not at a minimum maintained, but preferably increase in emergent cover. Therefore, the anticipated value of V_1 has minimal uncertainty for the FWP.

2.4.2 Variable 2 (V_2): Percent of Open Water Area Covered by Aquatic Vegetation

For the purpose of this model, aquatic vegetation is defined as any of the diverse array of floating-leaved and submerged aquatic plants that are typically found in the study area, including seagrasses which grow entirely underwater. Aquatic vegetation coverage is included as an important marsh variable because it provides important food and cover to a wide variety of fish and wildlife[12]. Aquatic vegetation provides a refuge from predation, and because of this protection, densities of many invertebrates (infaunal and epifaunal) and small fish are greater in floating or submerged vegetated areas than in nearby unvegetated areas. Aquatic vegetation provides additional benefits by stabilizing sediments and filtering water. The species composition and primary productivity of aquatic vegetative communities corresponds to the salinity regime.

Saline marshes typically do not contain an abundance of aquatic vegetation as often found in fresh/intermediate and brackish marshes. Open water areas in saline marshes typically contain sparse aquatic vegetation and are primarily important as nursery areas for marine organisms.

The absence of aquatic vegetation is assumed to have low suitability for a saline marsh (SI=0.08); however, habitat suitability is assumed to decrease with aquatic plant coverage approaching 100 percent due to the potential for mats of aquatic vegetation to hinder fish and wildlife utilization, adversely affect water quality by reducing photosynthesis due to shading, and contribute to oxygen depletion spurred by warm-season decay of large quantities of aquatic vegetation. Therefore, optimal conditions for saline marsh occurs between 65.91 and 90.91 percent cover for saline marsh. Areas with a greater percent cover than the optimal range see a declining trend in SI value as the area approaches 100 percent aquatic vegetation coverage. For areas with 100 percent coverage, saline marsh would receive an SI of 0.60.

Existing Condition: Estimating percent aquatic vegetation coverage can be difficult and problematic because coverage varies across different environmental conditions, including seasonality variances in abundance and distribution that may be cyclical across years. Because of the variability, baseline values for this variable were based largely upon observations in the area by agency representatives consulted for this project, their knowledge of aquatic vegetation types and prevalence in the general area, and examination of 2022 aerial imagery.

FWOP: Based on the NOAA Marsh Migration data, it was assumed that areas that convert to open water would typically be too deep for aquatic vegetation and areas that may be shallow

[12] Smith, P. and D. Meden. 2017. US Army Corps of Engineers Planning Model Improvement Program: Wetland Value Assessment Methodology Coastal Marsh Community Models. US Army Corps of Engineers, New Orleans District.

enough for vegetation growth near the containment levee were like to be affected by sedimentation. Percent aquatic vegetation was based on the shallow water habitat expected under a 0.59-foot and 3.18-foot of sea level rise.

FWP: It was assumed that the open water areas created and/or left during marsh restoration would eventually fill in with aquatic vegetation. It was assumed that at TY0, there would be no aquatic vegetation coverage, whereas by TY5 there would be 30 percent coverage. Aquatic vegetation would be expected to increase over time with the assumed maximum coverage of 50 percent occurring in TY50 and increasing in coverage by about 10 percent every 15 years.

2.4.3 Variable 3 (V3): Marsh Edge and Interspersion

This variable considers the relative amount of marsh to open water, and the degree to which open water is dispersed throughout the marsh. Interspersion is an important characteristic for freshwater and estuarine fish and shellfish nursery and foraging habitat in all marsh types[12]. The marsh/open-water edge provides cover for post-larval and juvenile organisms. Smaller, isolated ponds are less turbid and contain more aquatic vegetation, thereby may provide more suitable waterfowl habitat. Conversely, a large degree of interspersion is assumed indicative of marsh degradation, as solid marsh converts to ever-larger areas of open water. Areas with a high degree of interspersion in the form of tidal channels and small ponds (Class 1) were considered optimal condition (SI = 1.0). Large ponds (Class 3) and open water areas with little surrounding marsh (Class 4) offer lower interspersion values and indicate advanced stages of marsh loss. Class 3 was also assigned to areas of “carpet” marsh which contain no or relatively insignificant tidal channels, creeks, or ponds but still provide aquatic organism habitat during tidal flooding. If the entire area is open water or contains a few small marsh islands, Class 5 interspersion was assigned (SI = 0.1). In some cases, a marsh can contain wetlands of more than one interspersion class, in which the summation of percent cover of each class would need to be equivalent to 100 percent.

Existing: The degree of marsh/waterbody interspersion was assessed for Goose Island State Park using the 2022 aerial imagery at the same scale as the photographs of class examples shown in the WVA marsh model (v2.0). The marsh was carefully examined and assigned interspersion classes by comparing it to the photographic examples. The percentage of acreage exhibiting each class was entered in the spreadsheet, such that all added up to 100 percent.

FWOP: No change in interspersion was assumed for any of the TY. Given that the Goose Island State Park marsh already resembles Class 5 interspersion and interior marsh break-up usually results in conversion of marsh to open water, it was assumed the marsh would not accrete more march to change the interspersion class composition.

FWP: For marsh restoration it was assumed that interspersion could be controlled by strategic placement of dredged material and the ratio of interspersion classes would remain similar in the future due to adaptive management. If the percent of open water exceeds a certain threshold at any point during or outside of the 10-year cost-shared monitoring window, measures would be implemented to correct the deficiency returning the extent and type of interspersion to desired conditions. Over the 50-year period of analysis, some transition in interspersion classes were expected; however, it was assumed these would still result in an ideal marsh composition.

2.4.4 Variable 4 (V4): Percent of Open Water ≤ 1.5 Feet Deep in Relation to Marsh Surface

Shallow water areas are assumed to be more biologically productive than deeper water due to a general reduction in sunlight, oxygen, and temperature as water depth increases. Also, shallower water provides greater bottom accessibility for certain species of waterfowl, better foraging habitat for wading birds, and more favorable conditions for aquatic plant growth. Optimal open water conditions in saline marsh are assumed to occur when 70 to 80 percent of the open water area is less than or equal to 1.5 feet deep. At 100 percent shallow water, the saline graph yields an SI= 0.5. That change reflects the increased abundance of tidal channels and generally deeper water conditions prevailing in a saline marsh due to increased tidal influences.

Existing: Baseline values for this variable were based largely upon previous observations in the area by resource agencies, the team's knowledge of the open water areas, and examination of 2022 aerial imagery.

FWOP: No change in V_4 was assumed for TY1. RSLC of about 3.18 feet by TY50 is assumed to increase the depth of current shallow water and to inundate new areas. Therefore, V_4 values were assumed to change in proportion to decreases in V_1.

FWP: For marsh restoration measures, the target design would incorporate 75 percent of the open water areas to be less than 1.5 feet deep. It was assumed that the extent of shallow water would gradually decrease between TY15 and TY35 in proportion to decreases in V_1. After TY35, the trend in declining shallow water areas was assumed to resume similar to decreases in V_1 as RSLC continues.

2.4.5 Variable 5 (V5): Salinity

Salinity is one of the most important factors affecting coastal marsh loss. Salinity projections affect all the other WVA variables except for aquatic organism access. Small increases in mean salinity can adversely affect aquatic systems by reducing overall biological productivity. Productivity algorithms, based upon measurements of total biomass, stem/leaf elongation, and photosynthesis, were developed that predict changes in primary productivity for every part per thousand (ppt) change in salinity. Salinity and primary productivity were found to be inversely related, as salinity increases, primary productivity decreases by different amounts dependent upon the salinity tolerance of the vegetation community[12].

Optimum salinity ranges assumed by the WVA model for saline marsh ≤21 ppt. The SI graph for saline marsh is constructed to represent optimal conditions when salinities are between 9 ppt and 21 ppt. Likewise, average annual salinities below 10 ppt will effectively define a marsh as brackish, not saline. However, the suitability index graph makes allowances for lower salinities to account for occasions when there is a trend of decreasing salinities through time toward a more fresh/intermediate or brackish condition. The assumption is that lower salinities are not detrimental to the marsh type. For the saline SI curve, salinities greater than 21 ppt are assumed to be slightly stressful to saline marsh vegetation. For the saline marsh model, average annual salinity is used as the salinity parameter.

Existing: Baseline salinities for marsh areas were taken from the Texas Commission on Environmental Quality (TCEQ) water quality monitoring stations. Model values were obtained from the two nearest model output nodes and averaged.

FWOP: Salinity rates were determined by averaging mean salinity values from the two closest TCEQ water quality monitoring stations over a 38-year period (1985-2022). Salinity was assumed to be constant to TY50.

FWP: It was assumed that project area would remain saline through the entire planning horizon; therefore, the values for V_5 were constant. If RSLC or other factors affect salinities differently than expected, adaptive management would be employed if higher than optimal conditions are reached. Measures would be implemented to reduce salinities to optimal conditions.

2.4.6 Variable 6 (V6): Aquatic Organism Access

Access by aquatic organisms, particularly estuarine-dependent fishes and shellfishes, is considered to be a critical component in assessing the quality of a given marsh system. Additionally, a marsh with a relatively high degree of access by default also exhibits a relatively high degree of hydrologic connectivity with adjacent systems, and therefore may be considered to contribute more to nutrient exchange than would a marsh exhibiting less access. The SI for V_6 is determined by calculating an "access value" based on the interaction between the percentage of the project area wetlands considered accessible by aquatic organisms during normal tidal fluctuations, and the type of man-made structures (if any) across identified points of ingress/egress (bayous, canals, etc.). Standardized procedures for calculating the Access Value have been established in the WVA Marsh v2.0 Manual. It should be noted that access ratings for man-made structures were determined by consensus and that scientific research has not been conducted to determine the actual access value for each of those structures. Optimal conditions are assumed to exist when all of the study area is accessible, and the access points are entirely open and unobstructed.

A saline marsh with no access is assigned an SI=0.1, reflecting the assumption that, it is important habitat for estuarine-dependent fish and shellfish.

Existing: Baseline values for this variable were based largely upon previous observations in the area by resource agencies, their knowledge of existing water control structures in the area, and examination of 2022 aerial imagery. The V_6 calculator included in the Marsh Model Spreadsheet was used to calculate access value.

FWOP: The resource agencies had no knowledge of planned water control structures, impoundments, or other impediments that would affect fisheries access through the period of analysis. The fisheries access value was projected to increase through TY35 and Ty50 as more of the marsh area becomes inundated with water due to RSLC, it is assumed to be more accessible to estuarine organisms.

FWP: Implementation of any of the alternatives is not anticipated to restrict access to estuarine organisms. Some access restriction was assumed for TY1 during construction because of the need to contain sediments being place in the restoration area. After Ty5, no changes to the fisheries access value was projected.

2.5 Model Results

The AAHU model output increased with each alternative, in part, due to an increase in acreage (Table 2). More detailed results, including total acres and HSI scores by variable, are provided for all six alternatives in Tables 3 – 8. To ensure the value of open water and emergent vegetation components of the marsh environments to fish and wildlife communities is appropriately captured, the WVA saline Marsh Model uses a split model approach. In this approach, two HSI formulas are utilized – one characterizes emergent habitat using only variables important in assessing that habitat quality (i.e., V1, V3, V5, and V6), and likewise for open water habitat (i.e., V2, V3, V4, V5, and V6)[12]. As such, two sets of scores are shown for each alternative – emergent marsh and open water – along with the total AAHUs for each habitat.

Table 2. WVA Saline Marsh model net benefit AAHUs results. AAHU = average annualized habitat unit

Alternative	AAHUs
FWOP	0
Alternative 3a	7.87
Alternative 3b	11.87
Alternative 3c	16.52
Alternative 3d	17.27
Alternative 3e	37.48

The No Action Alternative is represented by the FWOP in Table 3, whereby this was assumed to be the FWOP conditions for comparison with all other alternatives. The FWOP open water acreage, and thus HUs, increase over the 50-year period of analysis because as marsh acres are lost through inundation, RSLC, and wave action, the open water area is expected to increase.

Table 3. Detailed results of the WVA marsh model for FWOP

TY	***Emergent Marsh***				***Open Water***			
	Marsh Acres	**HSI**	**Total HUs**	**Cumulative HUs**	**Water Acres**	**HSI**	**Total HUs**	**Cumulative HUs**
0	3.45	0.45	1.55		19.55	0.5	9.86	
1	3.45	0.45	1.55	1.55	19.55	0.5	9.86	9.86
5	3.45	0.45	1.55	6.20	19.55	0.5	9.86	39.44
15	3.45	0.45	1.56	15.57	19.55	0.53	10.30	100.80
35	2.3	0.40	0.91	24.56	20.7	0.54	11.16	214.60
50	1.15	0.33	0.38	9.54	21.85	0.53	11.58	170.59
	AAHUs			**1.15**	**AAHUs**			**10.71**

Alternative 3a model resulted in an increase in emergent marsh acreage through TY15 as the project would be placing material to build marsh, while open water acreage decreased over the same period. The suitability of the habitat would be maximized at TY5 when the marsh becomes fully established and TY15, given the adaptive management measures in place over 10 years. However, the marsh would be expected to suffer degradation and loss over TY35 and TY50 as the adaptive management plan (and any addition of sediment) is concluded and RSLC, wave action, and inundation is expected to begin breaking down the interior marsh area, albeit an optimal marsh is expected to remain (Table 4).

Table 4. Detailed results of the WVA marsh model for Alternative 3a

TY	*Emergent Marsh*				*Open Water*			
	Marsh Acres	**HSI**	**Total HUs**	**Cumulative HUs**	**Water Acres**	**HSI**	**Total HUs**	**Cumulative HUs**
0	3.45	0.45	1.55		19.55	0.5	9.86	
1	8.05	0.68	5.50	3.35	14.95	0.5	7.42	8.64
5	13.8	1.00	13.80	37.39	9.2	0.86	7.95	32.16
15	13.8	0.99	13.60	137.00	9.2	0.85	7.86	79.07
35	12.65	0.93	11.73	253.04	10.35	0.88	9.11	169.66
50	11.5	0.85	9.81	161.30	11.5	0.89	10.24	145.13
	AAHUs			**11.84**	**AAHUs**			**8.69**

The Alternative 3b model resulted in an increase in emergent marsh acreage through TY35, while open water acreage decreased over the same period. It was assumed this alternative would offer additional protection through the living shoreline; thus, the interior marsh would not begin degrading as quickly as Alternative 3a. The suitability of the habitat would be maximized similarly to Alternative 3a. The marsh would be expected to undergo some degradation, mostly from a change in the distribution of interspersion classes, by TY50 because of repeated inundation from RSLC that is exacerbated with wave action (Table 5).

Table 5. Detailed results for the WVA marsh model for Alternative 3b

TY	*Emergent Marsh*				*Open Water*			
	Marsh Acres	**HSI**	**Total HUs**	**Cumulative HUs**	**Water Acres**	**HSI**	**Total HUs**	**Cumulative HUs**
0	3.45	0.45	1.55		19.55	0.5	9.86	
1	13.28	0.77	10.21	5.36	16.23	0.5	8.06	8.95
5	17.7	1.00	17.70	55.14	11.8	0.86	10.20	37.59
15	17.7	0.99	17.60	176.51	11.8	0.86	10.15	101.76
35	17.7	0.98	17.35	349.48	11.8	0.85	9.98	201.39
50	16.23	0.91	14.84	241.16	13.28	0.86	11.45	160.73
	AAHUs			**11.84**	**AAHUs**			**10.21**

Alternative 3c resulted in an increase in emergent marsh acreage through TY35, while open water acreage decreased over the same period. It was assumed this alternative would offer additional protection to the interior marsh from the higher elevated areas along the southern portion of the existing marsh units; thus, the interior marsh would not begin degrading as quickly as Alternative 3b. However, this protection was not be included on the newly added marsh units to the north because those would be constructed to a lower elevation, similar to that of the interior marsh units. Thus, it was expected that RSLC would have a greater impact on these exterior marsh units, ultimately reducing overall emergent vegetation for the entire restoration area, as marsh is repeatedly inundated and broken apart (Table 6).

Table 6. Detailed results for the WVA marsh model for Alternative 3c

TY	*Emergent Marsh*				*Open Water*			
	Marsh Acres	**HSI**	**Total HUs**	**Cumulative HUs**	**Water Acres**	**HSI**	**Total HUs**	**Cumulative HUs**
0	3.45	0.45	1.55		19.55	0.5	9.86	
1	17.55	0.77	13.50	6.77	21.45	0.5	10.65	10.26
5	23.4	1.00	23.40	72.89	15.6	0.86	13.48	49.70
15	23.4	0.99	23.06	232.31	15.6	0.85	13.33	134.07
35	23.4	0.98	23.00	460.59	15.6	0.90	14.01	273.38
50	19.5	0.87	16.99	298.82	19.5	0.91	17.79	238.32
	AAHUs			**21.43**	**AAHUs**			**14.11**

Alternative 3d was expected to result in similar HUs as Alternative 3c because they are similar in construction and acreage; however, placing the higher elevation marsh area in the newly constructed marsh units were expected to offer better protection to a greater coverage of the lower elevation marsh than Alternative 3c. The placement of the higher elevated marsh would combat inundation of the interior marsh (23 acres) likely preventing degradation or loss in this 23-acre area. However, there would likely be degradation of the exterior marsh due to inundation and RSLC by TY50 which minimally reduced the HSI score for this year (Table 7).

Table 7. Detailed results for the WVA marsh model for Alternative 3d

TY	*Emergent Marsh*				*Open Water*			
	Marsh Acres	**HSI**	**Total HUs**	**Cumulative HUs**	**Water Acres**	**HSI**	**Total HUs**	**Cumulative HUs**
0	3.45	0.45	1.55		19.55	0.50	9.86	
1	17.55	0.77	13.50	6.77	21.45	0.50	10.65	10.26
5	23.4	1.00	23.40	72.89	15.6	0.86	13.48	49.70
15	23.4	1.00	23.40	234.00	15.6	0.86	13.48	134.82
35	23.4	0.99	23.14	465.40	15.6	0.90	14.07	275.52
50	23.4	0.98	23.01	346.13	15.6	0.94	14.62	215.14
	AAHUs			**22.50**	**AAHUs**			**13.71**

Alternative 3e was expected to result in the greatest AAHUs, in part, because of the increased scale. Alternative 3e constructed marsh elevations to be the highest in the central marsh units and gradually slope outwards to meet sea level. Because of this, the only degradation is expected to occur along the edge of the marsh, rather than degrading any of the interior marsh units. Loss was not expected by TY50, rather the lower HSI score comes from change in the proportion of the interspersion classes, whereby some shifting towards less suitable classes would be expected due to RSLC and inundation (Table 8).

Table 8. Detailed results for the WVA marsh model for Alternative 3e

TY	***Emergent Marsh***				***Open Water***			
	Marsh Acres	**HSI**	**Total HUs**	**Cumulative HUs**	**Water Acres**	**HSI**	**Total HUs**	**Cumulative HUs**
0	3.45	0.45	1.55		19.55	0.50	9.86	
1	34.65	0.77	26.65	12.44	42.35	0.50	21.03	15.48
5	46.20	1.00	46.20	143.92	30.80	0.86	26.62	98.13
15	46.20	1.00	46.20	462.00	30.80	0.86	26.62	266.19
35	46.20	1.00	46.20	924.00	30.80	0.91	28.01	546.26
50	46.20	0.99	45.94	691.08	30.80	0.94	29.09	428.19
	AAHUs			**44.67**	**AAHUs**			**27.08**

3.0 Summary

The USACE and team of resource agency members agreed on the model results as presented in this document. Net AAHU benefits are calculated using AAHU values from the emergent marsh and open water resources:

$$Net\ Benefits = \frac{(3.5 \times\ EM\ AAHU) + OW\ AAHU}{4.5}$$

where *EM* refers to emergent marsh and *OW* is open water. The weighting of the open water and emergent marsh components reflects the relative value of these environments for fish and wildlife. A weighted average of the net benefits (net AAHUs) for marsh and open water is computed with the emergent marsh AAHUs weighted proportionally higher than open water[12].

As expected, net AAHU benefit increased with each subsequent alternative due, in part, to the increase in acreage. Alternative 3c and 3d included the same acreage but placed a higher elevation marsh area in different locations, which offered a different level of protection to lower emergent marsh, contributing to the observed difference in net AAHU benefit. In general, the net AAHU benefit is small; however, this is attributed to the small acreage of all the alternatives (range 23 – 77 acres), because the final AAHU benefit is largely dependent on the total acreage (Table 9). Overall, any alternative in the project would have a net benefit to the environment through restoration of critical saline marsh habitat.

Table 9. Summary of AAHU for each alternative and net benefits

Alternative	Emergent Marsh (AAHU)	Open Water (AAHU)	Net AAHU Benefit
FWOP	1.15	10.71	-
Alternative 3a	11.84	8.69	7.87
Alternative 3b	11.84	10.21	11.87
Alternative 3c	21.43	14.11	16.52
Alternative 3d	22.50	13.71	17.27
Alternative 3e	44.67	27.08	37.48

3.1 Sea Level Rise Scenarios Discussion

NOAA's intermediate RSLC is comparable to the USACE intermediate sea level rise (SLR) curve. The NOAA intermediate curve predicted 3.18-feet of SLR, while the USACE intermediate SLR curve predicts 2.28 feet by TY50. The NOAA intermediate high predicted 4.23-feet, and high curve predicts 5.28-feet. For the purpose of this study, the intermediate curve was the most logical given it was slightly higher than the USACE intermediate curve, but not so high as to eliminate the ecological benefits of the project. The intermediate-low curve would not change the outcomes of the alternative selection, rather net AAHU's may have been slightly higher as less dispersion from SLR would be expected under those conditions. Under the intermediate high and high SLR scenarios, the study area would be consistently inundated with water, thus the ecological lift would not be observed, but this would be scaled across all alternatives.

Percent emergent vegetation (V_1) is the most weighted variable in the HSI calculation, and thus, is the most sensitive to change. Emergent vegetation would change under the intermediate high and high SLR scenarios, albeit scaled across all alternatives, and therefore, would not change the alternative selection. Because of this, the intermediate SLR curve was selected for the development of the ecological analysis.

Appendix A

For this analysis, the NOAA Sea Level Rise Viewer online tool was accessed, and the “Local Scenarios” feature selected to generate maps of RSLC for the project area under the intermediate sea level rise conditions (Figures A-1 through A-4). Under these conditions, NOAA predicts mean high, high-water levels will reach 3.18-feet by TY50.

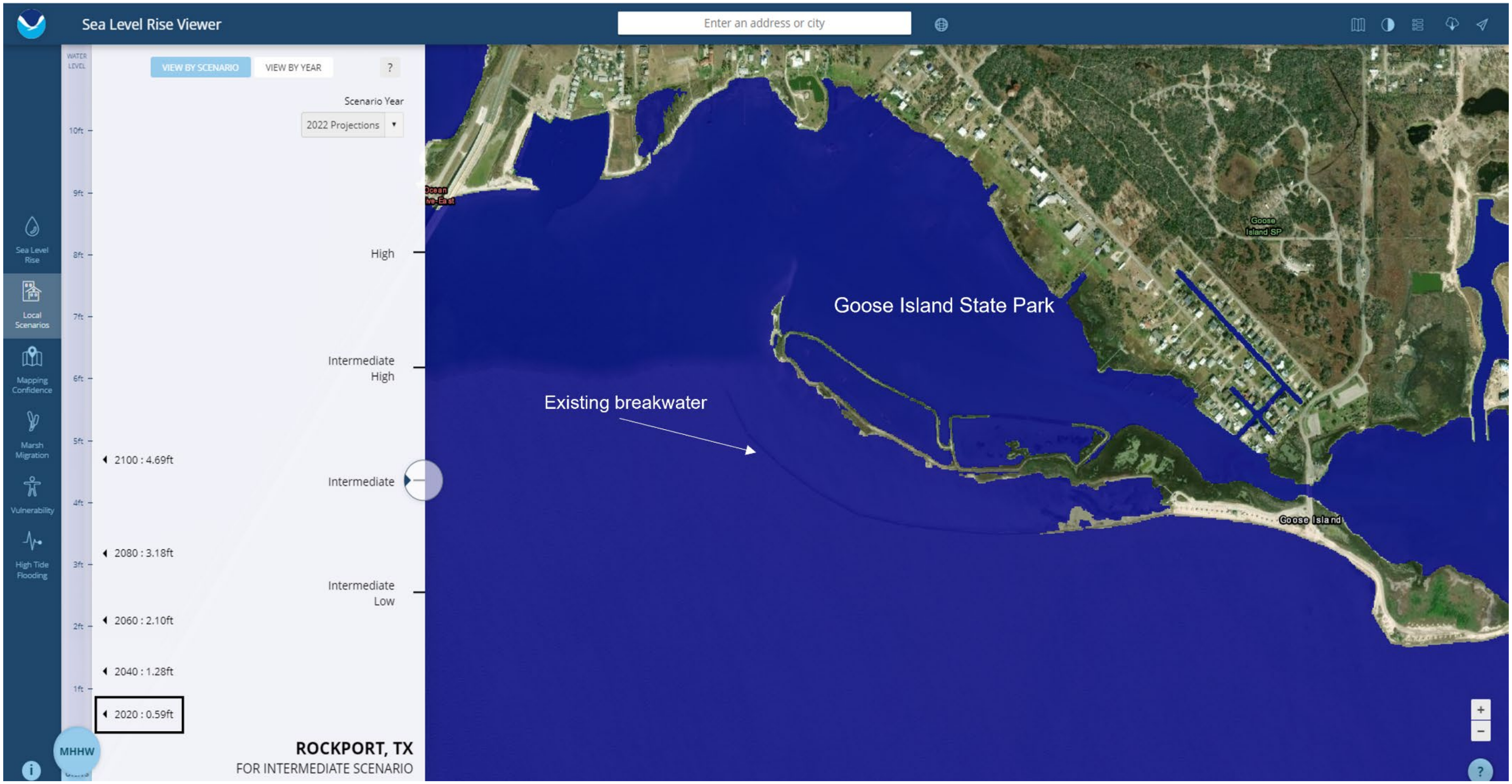

Figure A- 1. Current sea level (0.59-feet) under MHHW under NOAA's intermediate sea level rise scenario used for assessing existing conditions.

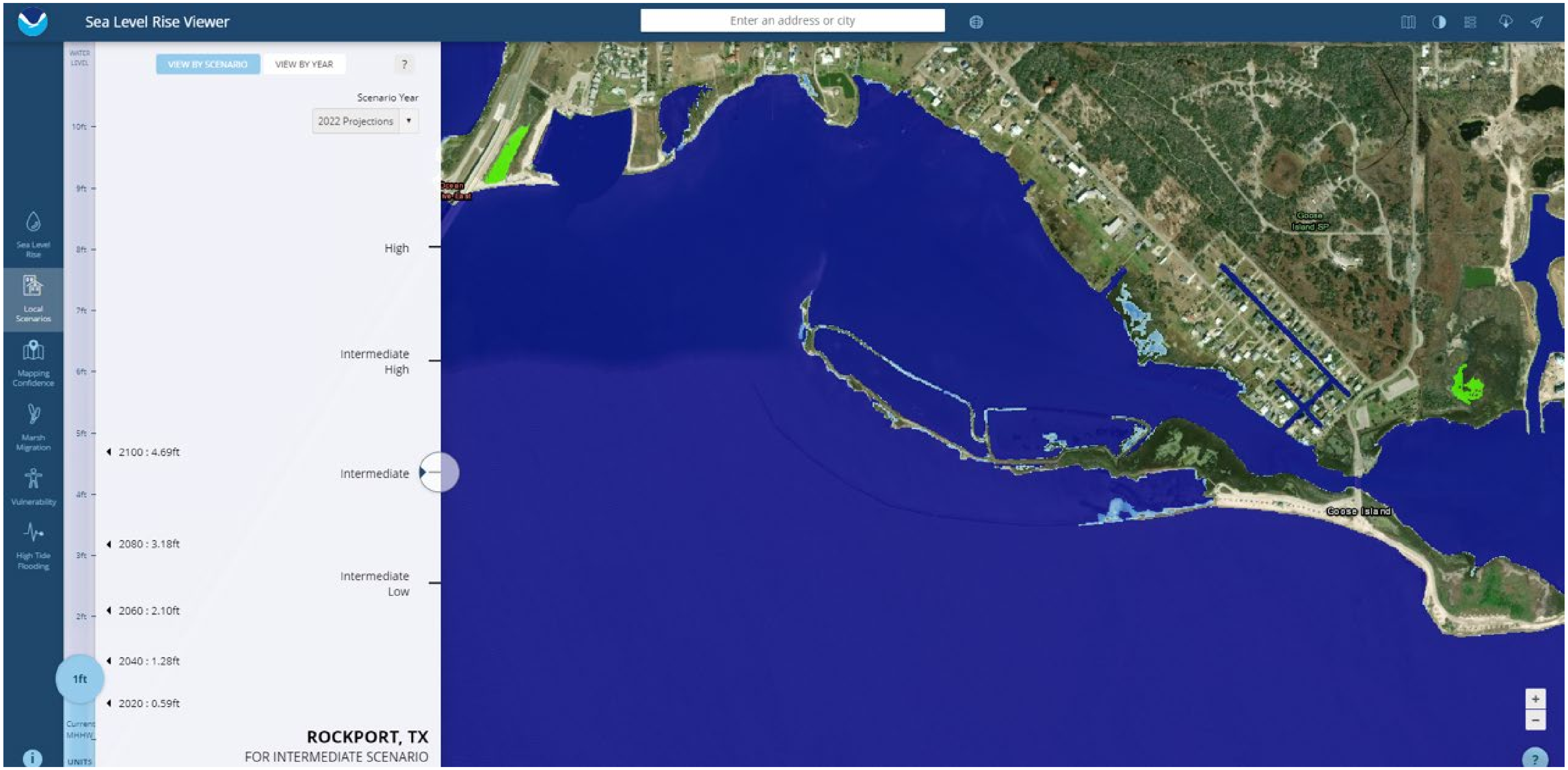

Figure A- 2. Sea level (1-foot) under MHHW under NOAA's intermediate sea level rise scenario used for assessing TY5 conditions.

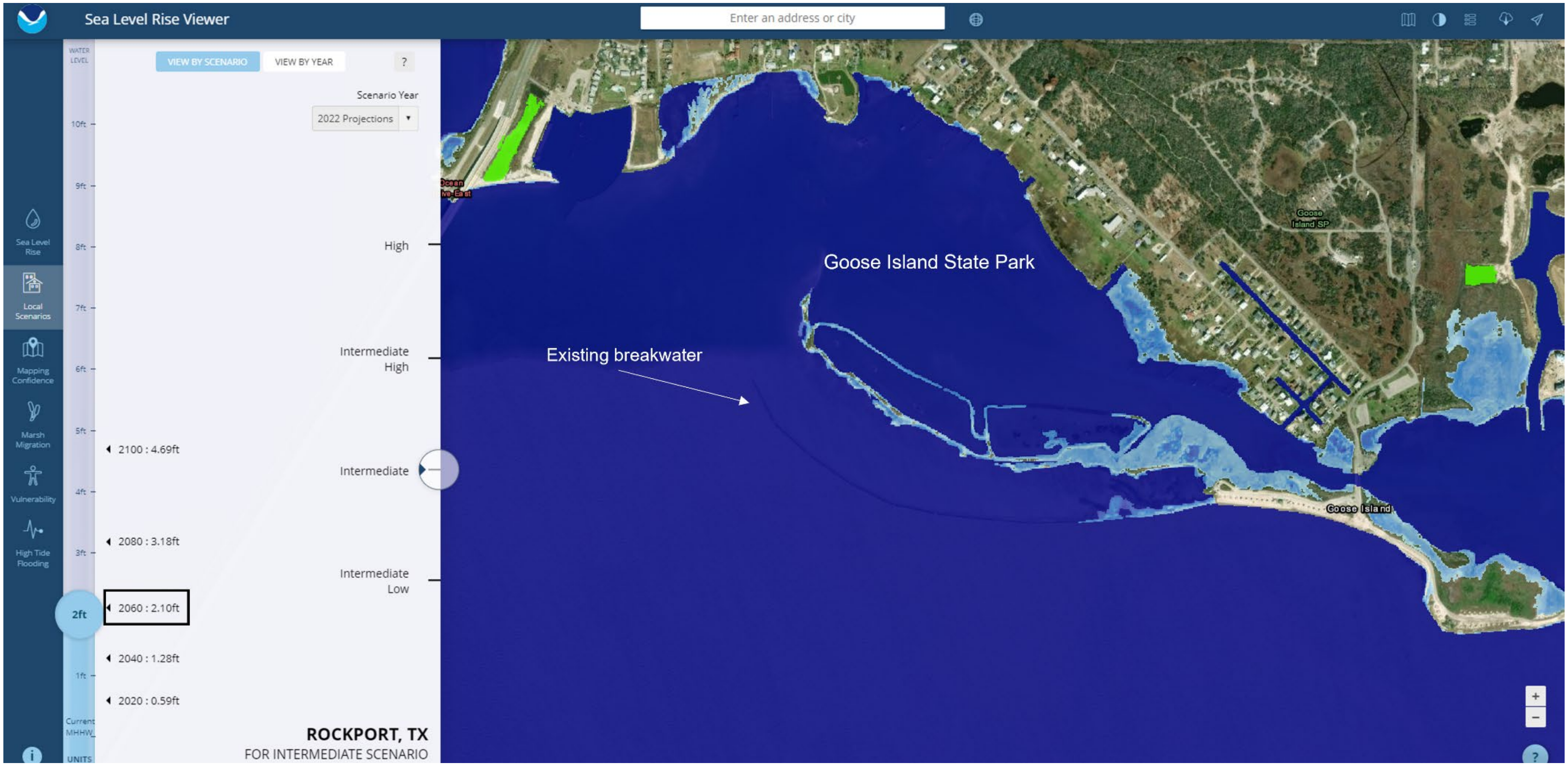

Figure A- 3. Sea level (2.10-foot) under MHHW under NOAA's intermediate sea level rise scenario used for assessing TY35 conditions.

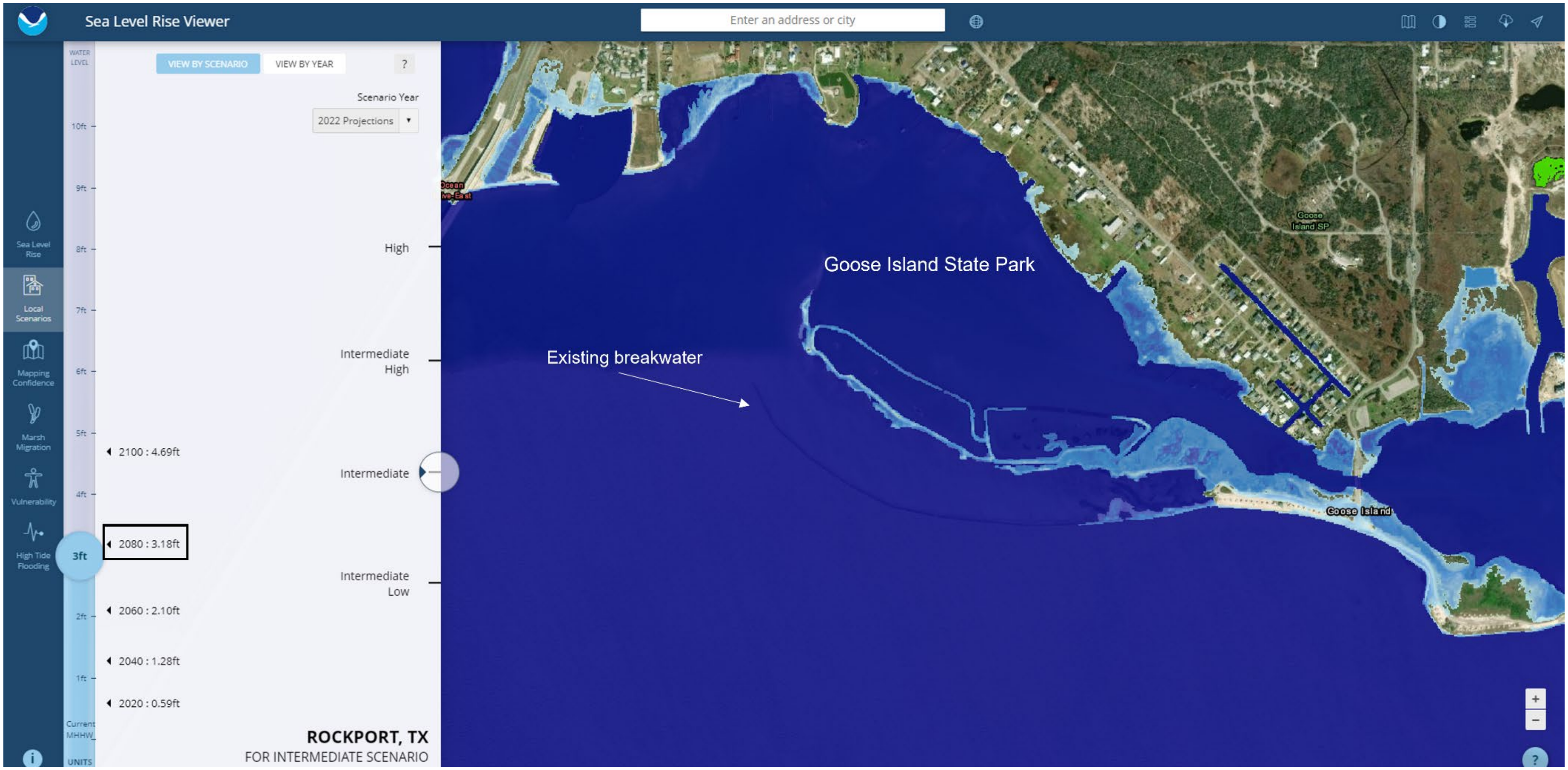

Figure A- 4. Sea level (3.18-foot) under MHHW under NOAA's intermediate sea level rise scenario used for assessing TY50 conditions.

Appendix C-2 Monitoring and Adaptive Management Plan

Monitoring and Adaptive Management Plan

for

Aquatic Ecosystem Restoration for GIWW
Aransas County, Texas

Monitoring and Adaptive Management Plan for Goose Island State Park Ecosystem Restoration

Monitoring and Adaptive Management Plan

Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway

Monitoring and Adaptive Management Plan

January 2023

Prepared by:

United States Army Corps of Engineers

Regional Planning and Environmental Center

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1.0 Introduction
This document provides a feasibility-level monitoring and adaptive management plan for the Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway (GIWW) Continuing Authorities Program (CAP) 204 Beneficial Use of Dredged Material (BUDM) feasibility study (herein referred to as GIWW 204). The study reviewed opportunities for ecosystem restoration (ER) along the GIWW, which could contribute to larger ongoing efforts to improve, preserve, and sustain ecological resources along the Texas coast. The study is recommending a project that would restore coastal marshes at Goose Island State Park.

This plan identifies potential monitoring activities, outlines how results from the monitoring would be used to assess project success and, if needed, adaptively manage the project to achieve the desired ER objectives. The plan specifies who would be responsible for monitoring and adaptive management activities and provides estimated costs.

This Monitoring and Adaptive Management Plan (MAMP) was prepared by members of the GIWW CAP 204 project delivery team (PDT) and resource agencies, including U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, National Marine Fisheries Service, and the Texas General Land Office (TGLO). The level of detail in this plan and costs are based on currently available data and information developed during plan formulation as part of the feasibility study. Uncertainties remain concerning the exact project features, monitoring elements, and adaptive management opportunities; however, these will be addressed in the preconstruction, engineering, and design (PED) phase. This plan will be revised to incorporate more detailed monitoring and adaptive management plans and cost breakdowns during the PED phase.

1.1 Authorization for Monitoring and Adaptive Management
In accordance with the Water Resources Development Act of 2016 Section 1161, and subsequent implementation guidance (CECW-P Memorandum dated October 19, 2017), MAMPs are required for both National Ecosystem Restoration (NER) project components and for any Mitigation Plan required for the National Economic Development (NED) component.

Section 1161 of WRDA 2016 amends Section 2039 of WRDA 2007, to specify information required to be included in monitoring plans for ER projects. Section 2039 of WRDA 2007, as amended, directs the Secretary of the Army to ensure that when conducting a feasibility study for a project (or component of a project) for ER that the recommended project includes a plan for monitoring the success of the ER. The implementation guidance for Section 2039 specifies that ER projects include plans to track and improve restoration success through monitoring and adaptive management. Guidance stipulates that the monitoring plan includes a description of the monitoring activities, the criteria for success, and the estimated cost and duration of the monitoring. It also specifies that monitoring will be performed until restoration success is achieved.

This MAMP includes all elements required by the WRDA 2016 implementation guidance for Section 1161 for ER measures.

1.2 Introduction to Monitoring and Adaptive Management
Monitoring and adaptive management provides a directed, iterative approach to achieve restoration project goals and objectives by focusing on strategies promoting flexible decision making that can be adjusted in the face of uncertainties. MAMP attempts to better understand

unexpected outcomes of restoration management actions and develop solutions in the face of that uncertainty. Initiating a formal MAMP early in the study process enables the ability to identify and resolve key uncertainties and other potential issues that can positively or negatively influence project outcomes during every stage of the planning and project implementation process. Hence, early implementation of monitoring and adaptive management will result in a project that can better succeed under a wide range of uncertain conditions and can be adjusted as necessary. Furthermore, careful monitoring of project outcomes both advances scientific understanding and helps adjust policies and/or operations as part of an iterative learning process.

Learning from the management experience is not a new idea; but the purposeful and systematic pursuit of knowledge to address identified uncertainties has rarely been practiced. Adaptive management acknowledges the uncertainty about how ecological systems function and how they may respond to management actions. Nevertheless, adaptive management is not a random trial-and-error process nor is it ad-hoc or reactionary. An essential element of adaptive management is the development and execution of a monitoring and assessment program to analyze and understand responses of the system to implementation of the project as restoration progresses. The MAMP was developed and will be used to:

- Allow scientists and managers to collaboratively design plans for managing complex and incompletely understood ecological systems.
- Reduce uncertainty over time.
- Implement systematic monitoring of outcomes and impacts.
- Incorporate an iterative approach to decision-making.
- Provide a basis for identifying options for improvements in the design, construction, and operation of restoration through adaptive management.
- Ensure interagency collaboration and productive stakeholder participation as they are key elements to success.

1.2.1 Monitoring and Adaptive Management Process

The developed monitoring and adaptive management program and process is complimentary to the U.S. Army Corps of Engineers (USACE) Project Life Cycle (planning, design, construction, and operation and maintenance). The process is not elaborate or duplicative and enhances activities that already take place. The basic process was adapted from a technical note published by the Engineering Research and Development Center (ERDC; Fischenich et al. 2012). Elements of the program include an iterative process involving planning a program or project, designing the project, building the project, operating and maintaining the project, monitoring and assessing project performance, and continuing, adjusting, or terminating a project if the goals and objectives are not being achieved (Figure 1).

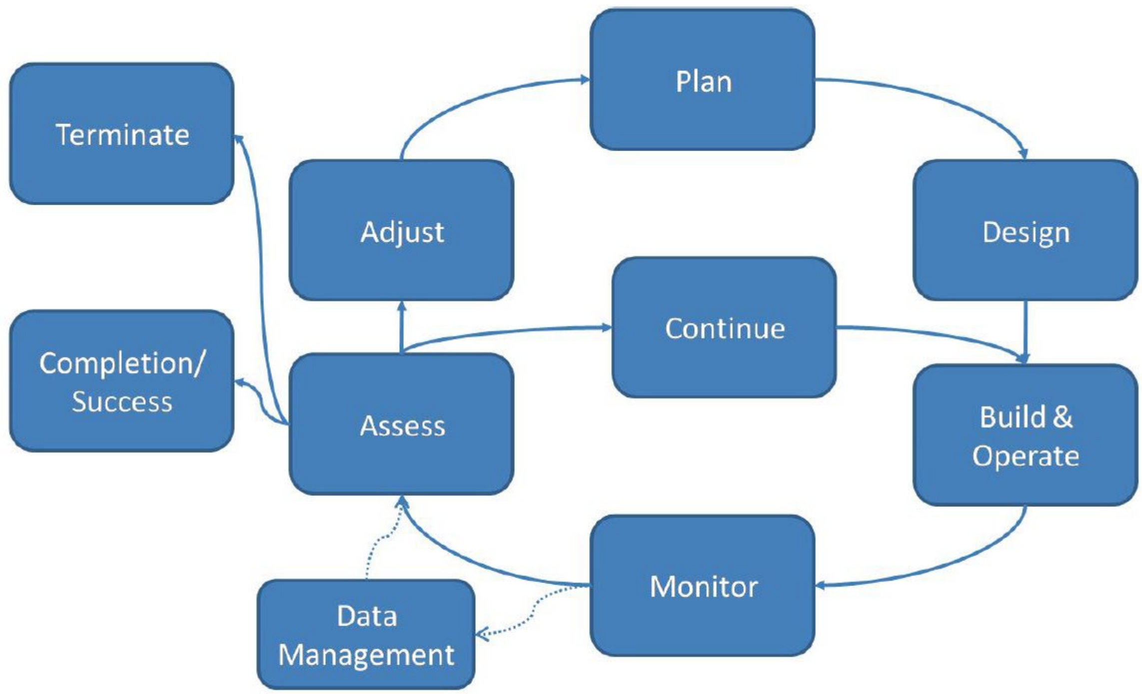

Figure 1. Monitoring and adaptive management process for USACE Civil Works'

1.2.2 Adaptive Management Team

As part of the MAMP, the framework and guidance for an Adaptive Management Team (AMT) is developed, to review and assess monitoring results, to identify decision criteria, and to consider and recommend adaptive management actions when ecological success is not achieved. The AMT members shall work together to make recommendations relevant to implementing the MAMP. The AMT is composed of USACE staff, the non-Federal sponsor (NFS), and interested resource agencies and/or other stakeholders. Although the USACE has coordinated with the entities that will comprise the AMT in development of the Draft Detailed Project Report and Environmental Assessment (DDPR-EA), the AMT will be officially established during PED.

The AMT focuses on the ecological function of the habitats through related management actions to maintain and provide functional coastal marsh habitat within the project area. The AMT shall review the monitoring results and advise on and recommend actions that are consistent with the project goals and reflect the current and future needs of the habitat and the species they support within the project area. The USACE shall have final determination on all adaptive management actions recommended.

The USACE is responsible for ensuring that monitoring data and assessments are properly used in the adaptive management decision-making process. If the USACE determines that adaptive management actions are needed, it will coordinate with the AMT on implementation of those actions. The USACE is also responsible for project documentation, reporting, and external communication.

The AMT shall meet at a minimum of once per year, as scheduled by the USACE during the monitoring period, to review the results of monitoring and assess whether project objectives are being met. If objectives are not being met, the AMT may recommend that adaptive management actions be taken in response to monitoring results as compared to decision-making triggers.

The AMT may also consider other related projects in the hydrologic basin in determining the appropriate adaptive management actions and may consult with other recognized experts or stakeholders as appropriate, to achieve project goals.

Recommendations for adaptive management should be based on:

- Monitoring data from previous years,
- Consideration of current habitat conditions,
- Consideration of current and potential threats to habitat establishment success, and
- Past and predicted response by target species and habitats.

1.2.2.1 Team Structure

The AMT shall include representatives from USACE, Galveston District and the Regional Planning and Environmental Center (RPEC), and the NFS responsible for cost-sharing construction and future operations and maintenance. The USACE may be represented by the project biologist(s), Hydrology and Hydraulics (H&H) representative, geotechnical representative, project manager, real estate specialists, and/or operations and maintenance designees, as needed.

For the feasibility study, the NFS is the TGLO. The NFS would ultimately be responsible for all Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRRR) activities once the USACE notifies the NFS of project completion. Prior to final project completion, the USACE would transfer responsibility of functional elements of the project to the NFS as they are completed. The NFS may be represented by its designees which may include project managers, planners, design engineers, environmental specialists, etc.

The AMT should also include representatives from resource agencies who would serve in an advisory capacity, to assist in the evaluation of monitoring data and assessment of adaptive management needs. The agencies may include, but are not limited to:

- U.S. Fish and Wildlife Service, Corpus Christi Ecological Services Office
- National Marine Fisheries Service
- Texas Parks and Wildlife Department, Goose Island State Park
- Texas General Land Office
- Texas Commission on Environmental Quality

1.3 Recommended Plan

Alternative 3D was selected as the recommended plan based on preliminary analyses because it meets the study objectives, reasonably maximizes benefits for the associated costs, and includes key restoration features to restore and sustain the form and function of the coastal system in the study area. This plan incorporates low and high elevation marsh restoration features which are critical to the stabilization and sustainment of the crucial marsh resources in Goose Island State Park now and into the future. Marsh measures consist of marsh restoration to increase land coverage in the area and improve estuarine wildlife habitat, hydrology, water quality, and fish nurseries. The marsh was designed to reach two elevations – the lower targeting a final elevation of 0.6 to 0.8 feet (ft) NAVD88 (+1.5 to +1.7 feet mean lower low water [MLLW]) and higher reaching 1.5 to 2.0 ft NAVD88 (+2.4 to +2.9 ft MLLW). The higher elevation would aid in providing additional protection to lower elevation marsh for an extended period by reducing overtopping under sea level rise and wave action.

Measures for this alternative would be constructed on lands owned by Texas Parks and Wildlife Department (TPWD).

1.3.1 Marsh Measures

Marsh restoration measures involve placement of borrow material dredged from the GIWW during regular operations and maintenance dredging into these locations. Material placed into the marsh would have similar properties to the existing material. Under the existing and projected future dredging cycles, there is sufficient suitable material available to meet all restoration needs without seeking other borrow sources.

Alternative 3D would restore and nourish 39 acres of technically significant marsh habitat at Goose Island State Park. Within the four marsh restoration units (cells 1 – 4), material dredged from the GIWW would be hydraulically pumped into open water and low-lying areas assuming a post-construction settlement elevation of +0.6 to +0.8 ft NAVD88 (+1.5 to +1.7 feet MLLW; Figure 3). Within cells 3 and 4, along the southern area, dredge material would be hydraulically pumped to construct a 3.7-acre and 2.5-acre, respectively, higher elevation marsh targeting +1.5 to +2.0 ft NAVD88 (+2.4 to +2.9 feet MLLW). It is estimated that 196,500 cubic yards (cy) of dredged material would be required to restore the 39 acres of marsh. Final project design criteria will be developed during the pre-engineering, design, and construction (PED) phase.

The vegetated areas would target 60% coverage but can be up to 70% coverage at final settlement. This allows for 30-40% open water cover for suitable salt marsh habitat. Lower elevation marsh areas are expected to be inundated with salt water more frequently and, thus, require saline tolerant vegetation that prefer hydric soils. Saltmarsh cordgrass (*Sporobolus alterniflorus*, formerly *Spartina alterniflora*) will be planted in these areas. Higher marsh areas are expected to be inundated with salt water less frequently but still require saline tolerant plants that may be in dryer soils. Saltmeadow cordgrass (*Sporobolus pumilus*, formerly *Spartina patens*) will be planted in these areas.

Sediment transport equipment would most likely include hopper or cutterhead dredges, pipelines (submerged, floating, and land), and booster pumps. Heavy machinery would be used to move sediment and facilitate construction which could include bulldozers, front-end loaders, track-hoes, marshbuggy, and backhoes. Marsh restoration would occur after levee construction is finished and could take approximately five months to complete. The start of material placement for restoration will depend on dredging cycles.

Marsh restoration activities will be broken down and divided into multiple confined cells along the proposed work area. Work will begin in an individual cell and continue until that cell is completed. Marsh-quality material will not be placed in multiple cells/areas at the same time.

1.3.1.1 Low elevation marsh

Low elevation marsh areas will target +0.6 to 0.8-feet NAVD88 in the green cells represented in Figure 2, with solid green being the current containment cells and hashed green the newly constructed containment cells. The vegetated areas would target 60% coverage but can be up to 70% coverage at final settlement. This allows for 30-40% open water cover for suitable salt marsh habitat. Lower marsh areas are expected to be inundated with salt water more frequently and, thus, require saline tolerant vegetation that prefer hydric soils. Saltmarsh cordgrass (*Sporobolus alterniflorus*, formerly *Spartina alterniflora*) will be planted in these areas.

1.3.1.2 High elevation marsh

High elevation marsh areas will target +1.5 to 2.0-feet NAVD88 in the yellow cells represented in Figure 2. A target ratio of 60:40, vegetation to open water coverage is proposed, though 70:30 coverage at final settlement is also acceptable. Higher marsh areas are expected to be inundated with salt water less frequently but still require saline tolerant plants that may be in dryer soils. Saltmeadow cordgrass (*Sporobolus pumilus*, formerly *Spartina patens*) will be planted in these areas.

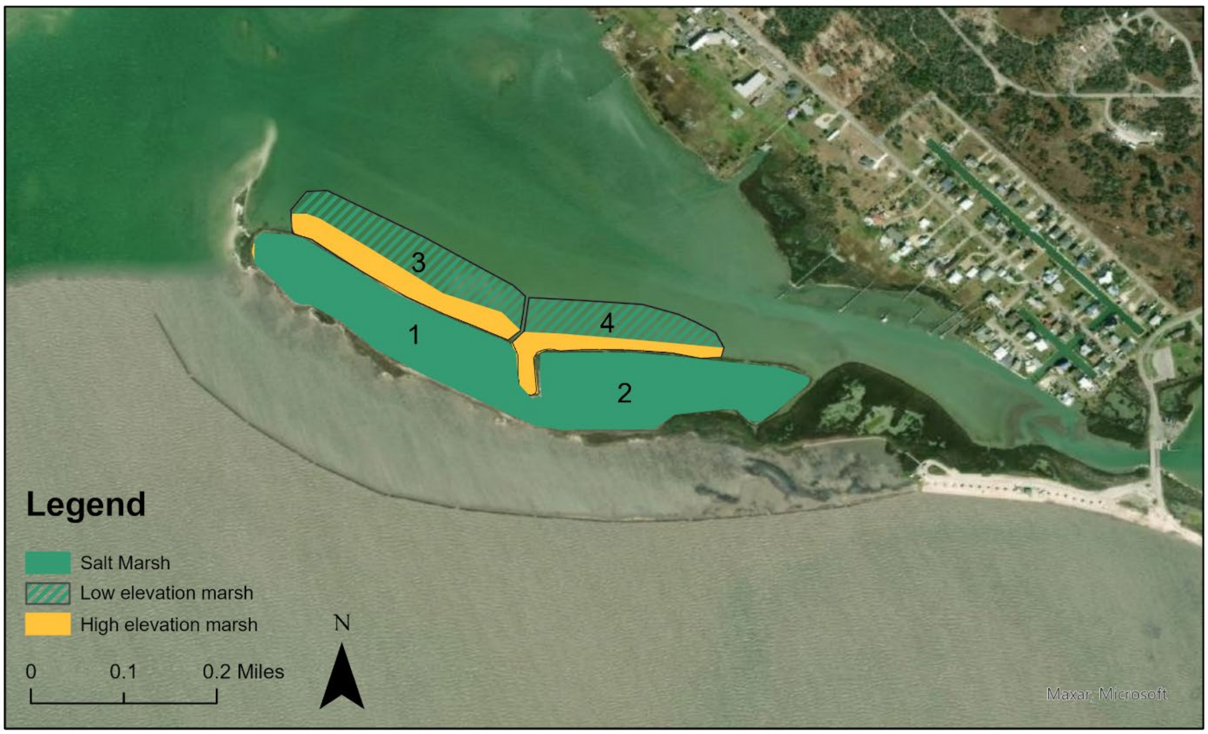

Figure 2. Alternative 3D marsh restoration for Goose Island State Park

Monitoring and adaptive management are applicable to ER features because of the variability and uncertainty that are associated with these systems. For instance, coastal marshes are highly complex transition zones between terrestrial and aquatic ecosystems, in which restored marshes require time to develop the ecological functions and services of natural marshes. The sediments used to create the substrate in marsh restoration projects do not possess the biogeochemical properties and functions of natural wetland soils. These processes are not well understood and there is considerable variation in ecosystem trajectories and outcomes. Therefore, monitoring these sites is essential to identifying the sources of uncertainty to provide the data that are necessary to guide decision making and adaptive management.

2.0 Monitoring

An effective monitoring program will be required to determine if the project outcomes are consistent with the original goals and objectives. The power of a monitoring and adaptive management program lies in the establishment of feedback between the monitoring and management components. A carefully designed monitoring program is the central component of the MAMP as it supplies the information to assess whether the project is functioning as planned.

Monitoring must be closely integrated with the adaptive management components because it is key to evaluating the needs of the strategies. Objectives must be considered to determine appropriate indicators to monitor. To be effective, monitoring must be able to distinguish between ecosystem responses that result from project implement (i.e., management actions) and natural ecosystem variability.

2.1 Monitoring Plan

According to the USACE implementation guidance memo for WRDA 2016 Section 1161, "Monitoring includes the systematic collection and analysis of data that provides information useful for assessing project performance, determining whether ecological success have been achieved, or whether adaptive management may be needed to attain project benefits."

The following discussion outlines a monitoring plan that will support the GIWW 204 Adaptive Management Program. The plan identifies performance measures along with desired outcomes and monitoring design in relation to specific objectives. A performance measure includes specific feature(s) to be monitored to determine project performance. Additional monitoring is identified as supporting information needs that will help further understand interrelationships of restoration features and external environmental variability and to corroborate project effects.

Ecological success criteria, or decision-making triggers, are related to each performance measure and desired outcome and identify the need to discuss potential implementation of adaptive management actions with the AMT. These criteria/triggers are identified in Section 3.0

Overall, monitoring results will be used to evaluate habitat restoration project objectives and to inform the need for adaptive management actions to ensure successful restoration is achieved.

2.1.1 Monitoring Period

Pre-construction/baseline data, during construction, and post-construction monitoring will be utilized to determine restoration success. Baseline monitoring will begin during PED prior to project construction and continue during construction when possible. Monitoring will continue until the trajectory of ecological change and/or other measures of project success are determined as defined by project-specific objectives. Section 1161 of WRDA 2016 allows ecological success monitoring to be cost-shared for up to ten years post-construction. Once ecological success has been achieved, which may occur in less than ten years post-construction, no further monitoring would be performed. If ecological success cannot be determined within the ten-year post construction period of monitoring, any additional required monitoring would be the responsibility of the NFS.

Per USACE policy, cost-shared monitoring would cease if additional monitoring beyond what is described in this plan (e.g., need for more frequent monitoring, change in monitoring protocols) would result in costs exceeding 1 percent of the total project cost, minus the costs of monitoring and adaptive management of the restoration features.

2.1.2 Monitoring Elements

Defining and assessing progress towards project objectives are crucial components of the MAMP. The following section outlines the proposed performance measure metrics, desired outcomes and monitoring design needed to measure restoration progress, determine ecological success, and support the adaptive management program, should changes need to be made to improve project performance.

The elements described in this section are based on the available project information from the monitoring and adaptive management plans for the Coastal Texas Protection and Ecosystem Restoration Feasibility Study (USACE 2021), Jefferson County Ecosystem Restoration study (USACE 2019), the Sabine-Neches Waterway Channel Improvement project (USACE 2011), and the Sabine Pass to Galveston Bay Coastal Storm Risk Management/ER study (USACE 2017). The project objectives, performance measures, ecological success criteria, and timetables for the GIWW 204 study are consistent with these previous projects. In addition, most of the monitoring techniques in this study will utilize remote sensing and GIS in a manner that is similar to the methods of the aforementioned projects. However, the monitoring and adaptive management plan for this study will be updated and refined during PED.

2.1.2.1 Marsh Restoration

Marshes will be restored through placing material inside the current and newly constructed containment levees and will consist of two target elevations – a low and high emergent marsh. As such, the following desired outcomes for each performance measure is described separately based on elevation.

Project Objective 1: Restore coastal marsh to re-establish ecological integrity of the habitat insofar as possible to restore structure, composition, and natural processes of biotic communities and the physical environment to maintain and/or improve their function as essential habitats for fish, migratory birds, and other aquatic and terrestrial species, mimicking, as closely as possible, conditions which occur naturally in the area.

***Performance Measure 1:* *Marsh Elevation*.** The elevation of the marsh platform is critical to the long-term success of the target marsh type and affects the establishment of desired vegetation species and hydrologic regimes. If marshes are not within the optimal range, non-target marsh or upland habitats could establish if the elevation is too high, while too low elevation, the area could convert to open water.

Monitoring Purpose: Marsh elevation monitoring can be used to confirm the target elevations (low/high) to establish ecological success has been achieved and to identify areas of concern such as where erosion, subsidence, or accretion rates are not conducive to maintain the marsh type.

Monitoring Design Summary: One LiDAR topographic survey covering all restoration units will be collected prior to construction (completed as a PED task for engineering and not included as part of the monitoring costs here) and recollected three times post-construction in year 1, 3, and 6. LiDAR data will be used to assess overall marsh elevation throughout the restoration unit.

The resulting data will provide a density of approximately 1 elevation point per square meter accurate to approximately +/-15 cm (root-mean-square-error [RMSE]) vertical elevation and +/-1.5 m (RMSE) horizontal position. The data would be used to identify low lying areas by surface elevation. If success has not be achieved by Year 6, additional LiDAR collection will be necessary and will need to be determined by the AMT when the next collection(s) should occur.

To determine changes of vegetated and non-vegetated areas within the project area, near-vertical color-infrared digital aerial imagery will be acquired during pre-construction and used as a pre-construction standard for future changes in marsh changes and shoreline position. Three additional satellite and/or aerial photographic acquisitions will be conducted at year 1, 3, and 6. These data will be collected in conjunction with LiDAR missions and under separate acquisition in non-LiDAR years, if needed. The photography will be geo-referenced, classified, and analyzed using standard operating procedures developed during PED. Opportunities should be sought to utilize existing aerial imagery (e.g., Google Earth, county/state contracted flights) if the data is comparable to previous surveys (i.e., timing is similar).

Desired Outcome: Establish marsh elevation post-construction sufficient for healthy marsh.

Ecological success criteria:

- *Marsh Restoration (low elevation marsh):* Marsh elevation (following de-watering and settlement) is sustained between +0.6 and +0.8 feet NAVD88 for at least 5 years with approximately 40 percent of the restoration area targeting open water and the remaining 60 percent 0.6 to 0.8-feet NAVD88 vegetated area. The exact target elevation to achieve ecological success will be determined during PED.
- *Marsh Restoration (high elevation marsh):* Marsh elevation (following de-watering and settlement) is sustained between +1.5 and +2.0 feet NAVD88 for at least 5 years with approximately 40 percent of the restoration area targeting open water and the remaining 60 percent vegetated area. The exact target elevation to achieve ecological success will be determined during PED.

Performance Measure 2: Vegetation Composition. The vegetation composition of a marsh indicates the health and success of the habitat. If vegetation or desired species fail to establish or undesirable species establish, the valuable ecological process and functions that vegetation provide (e.g., food and shelter for wildlife, water quality filtering capabilities), would be diminished or unavailable.

Monitoring Purpose: Identify the vegetation composition and percent cover of desirable species to confirm the target marsh habitat type is being established and maintained.

Monitoring Design Summary: Vegetation will be sampled annually within each of the restoration units. Permanent 100 m vegetation monitoring stations and/or transects will be established for assessing the vegetation community at each site. For purposes of this plan, it is assumed that one vegetation transect per cell and elevation unit should be established (6 sites), along with one reference site for each vegetative community being assessed (2 reference sites).

Sampling will occur during August, to the best extent practicable, one time prior to construction and then annually thereafter. Monitoring will measure percent cover of native and non-native plant species and structural diversity. Photographic stations will also be established along the transect to document vegetation conditions. All transects and photographic stations will be documented via Global Positioning System (GPS) coordinates to reoccupy in each year of sampling.

In addition to community composition, each station will be sampled for water level, above-and below-ground biomass, and soil parameters such as pH, temperature, salinity, and redox potential. General observations, such as fitness and health of plantings, native plant species recruitment, and signs of drought stress should be noted during the surveys. Additionally, potential soil erosion, flood damage, vandalism and intrusion, trampling, and pest problems would be qualitatively identified.

A general inventory of all wildlife species observed and detected using the project area would be documented. Nesting sites, roosting sites, animal burrows, and other signs of wildlife use of the newly created habitat would be recorded. The notes would be important for early identification of species colonization patterns.

Desired Outcome: Establish marsh vegetation communities' post-construction sufficient for healthy marsh.

Ecological Success Criteria: Average cover of 80% desirable vegetation on the vegetated cover areas (approximately 60% of the total marsh areas), of which less than 5% of the cover is composed of invasive, noxious, and/or exotic plant species on marsh restoration sites at Year 6 when compared to pre-construction conditions.

- *Marsh Vegetation (low elevation marsh):* The low elevation marsh should be characteristic of a saltmarsh cordgrass (*Sporobolus alterniflorus*) salt marsh community.
- *Marsh Vegetation (high elevation marsh):* The low elevation marsh should be characteristic of a saltmeadow cordgrass (*Sporobolus pumilus*) salt marsh community.

Interim Target: One year following completion of final construction activities achieve a minimum average cover of 25%, comprised of native herbaceous species. Three years following construction, achieve a minimum average cover of 75% native species, with less than 5% invasive, noxious, and/or exotic plant species. For the period beginning 5 years post-construction and continuing through project success, maintain a minimum average cover of 80%, comprised of native herbaceous species, and less than 5% invasive, noxious, and/or exotic plant species.

2.2 Cost of Monitoring

Based on a high-level cost estimate, it is anticipated monitoring will cost $106,940 to complete all monitoring tasks as described in the previous section (Table 1). This monitoring plan is approximately 0.9% of the estimated construction costs of the recommended plan.

Table 1. Summary of monitoring actions and costs

Objective	Parameter	Methodology	Frequency	Cost Assumptions	Estimated Total Cost
1	Elevation	LiDAR	Pre-construction+ (1 flight) Yrs 1, 3, 6 (3 flights)	**Data Collection: $1,390** ~39 acres of survey @ $10.00/ac = $390 +/- $1,000 for mobilization/demobilization **Data Processing and Analysis: $3,240** 24 hours @ $135/hr = $3,240 **Total for 1 year= $4,630**	**$18,520**
1	Area Change	Imagery	Pre-construction (1 flight) Yrs 1, 3, 6 (3 flights)	**Data Collection: $1,780** 39 acres of survey @ $20/acre = $780 +/- $1,000 for mobilization/demobilization **Data Processing and Analysis: $2,160** 16 hours @ $135/hr = $2,160 **Total for 1 year = $3,940**	**$11,820**
2	Vegetation	Transects	Pre-construction (1 survey) Annually (6 surveys)	**Data Collection: $2,700** 8 monitoring sites = assume 8 sites/day = 1 day 2 biologists @ $135/hr @ 10 hours/day = $2,700/day 1.0 hrs/monitoring site with an average of 8 plots/day + 2.0 hrs travel to/from and between sites = 10 hours/day **One-time set-up costs: $16,000** $2,000/site * 8 sites = $16,000 **Boat rental*: $2,000** **Data Processing and Analysis: $5,400** 40 hours @ $135/hour = $5,400 **Total for 1 year = $10,100**	**$76,600**
Total Monitoring Costs					**$106,940**

*The site is best reached by boat, thus, rental is included for each site visit.

+ A survey pre-construction is included in the monitoring plan, but costs for this survey are not included here as this is an engineering task during PED.

2.3 Use of Monitoring Results and Analysis

Results of monitoring will be compared to project objectives and decision-making triggers to evaluate whether the project is functioning as planned and whether adaptive management actions are needed to achieve those objectives. The monitoring results will be provided to the AMT to evaluate and compare data to project objectives and decision-making triggers. The AMT will use the monitoring results to assess habitat responses to management, evaluate overall project performance, and make recommendations for adaptive management actions as appropriate. If monitoring result that project objectives are not being met, the AMT will evaluate causes of failure and recommend adaptive management actions to remedy the underlying problems.

As data is gathered through monitoring, more information will also be available to address uncertainties and fill information gaps. Uncertainties such as effective operational regimes, restoration design needs, benefits generated by restored features, and accuracy of models can be evaluated to inform adaptive management actions and future restoration needs.

USACE will document and report the monitoring results, assessments, and the results of the AMT deliberations to the managers and decision-makers designated for the GIWW 204 project. USACE, with assistance from the monitoring team, will also produce annual reports that show progress towards meeting project objectives as characterized by the performance measures. Results of the assessments will be used to evaluate adaptive management needs and inform decision-making.

2.4 Database Management

Database management is an important component of the monitoring plan and the overall adaptive management program. Data collected as part of the monitoring and adaptive management plans will be archived as prescribed in the refined monitoring and adaptive management plan developed during PED. The database manager will be responsible for storing final monitoring reports and other study documentation (decisions, agendas, reports) and making them available when requested. Monitoring reports and associated data will be searchable by a variety of fields determined by the project sponsors and AMT.

Data standards, quality assurance and quality control procedures, and metadata standards will also be prescribed in the refined monitoring and adaptive management plan. The database will be designed to store and archive the monitoring and adaptive management data. The format of each data set will vary as appropriate to the type of monitoring. Therefore, data are expected to be archived separately, rather than collated in one master database. Each dataset will include data and metadata transfer and input policies and standards; data validation procedures, and mechanisms to ensure data security and integrity.

3.0 Adaptive Management

A fundamental tenet underlying the adaptive management process is achieving desired project outcomes in the face of uncertainties. Scientific uncertainties and technological challenges are inherent with any large-scale restoration project with the principal sources of uncertainty typically including:

1. Incomplete description and understanding of relevant ecosystem structure and function.

2. Imprecise relationships between project management actions and corresponding outcomes.
3. Engineering challenges in implementing project alternatives; and
4. Ambiguous management and decision-making processes.

It is important to determine the type of risk each uncertainty comprises and to discern what constitutes sufficient knowledge to proceed considering those risks. There is significant institutional knowledge regarding the construction of the restoration measures; therefore, there is minimal uncertainty from a construction standpoint. Uncertainties relating to measure design and performance are mainly centered on site specific, design-level details (e.g., exact sediment quantities, invasive species removal needs, extent of erosion control needs, construction staging area locations, pipeline pathways, timing and duration of construction, engineering challenges, etc.), which would be addressed during the PED phase. Identified uncertainties with the GIWW 204 recommended plan include:

- **Relative Sea Level Change (RSLC)** including whether sea level rise will be greater than assumed in the design;
- **Climate Change**, such as drought conditions and variability of significant storm frequency, intensity, and timing;
- **Natural Variability** in ecological and physical processes;
- **Sediment Dynamics**, including subsidence and accretion rates;
- **Habitat Requirements** such as water, sediment, and nutrient requirements including magnitude and duration of inundation, annual sediment needs, and type and quantity of nutrients to achieve desired productivity;
- **Invasive and Nuisance Species**, including invasive *Spartina* hybrids; and
- **Project Feature Implementation Timing**, including schedule and timeline, availability of construction funds.

Issues such as climate change, RSLC, and regional subsidence are significant scientific uncertainties for most Gulf Coast restoration projects. These uncertainties were incorporated in the plan formulation process and will be monitored by gathering data on water levels, salinities, and land elevation. Specifically, for RSLC, USACE EC-11165-2-21 provides an 18-step process for developing a “low”, “intermediate” and “high” future RSLC scenario and provides guidance to incorporate these potential effects into project management, planning, engineering, design, construction, operation, and maintenance. The study team evaluated and designed the recommended plan under the “intermediate” scenario in accordance with the EC-1165 (See Engineering Appendix). This information will be assessed and will inform adaptive management actions. In addition, procedures to evaluate sea level change impacts, response and adaptation will continue to be examined under USACE ETL 1100-2-1 which provides guidance for understanding the direct and indirect physical and ecological effects of projected future RSLC on USACE projects and systems of projects and considerations for adapting to those effects.

Many factors such as ecosystem dynamics, engineering applications, institutional requirements, and many other key uncertainties can change or evolve over a project’s life. The MAMP will be regularly updated to reflect data acquired during monitoring; new/revised protocols, metrics, and success criteria; resolution and progress on key uncertainties; and any new uncertainties that may emerge. Specifically, the MAMP will be revised in the PED phase as more detailed project designs are developed and uncertainties are better understood. The MAMP would then be used during and after project construction to adjust the project as necessary to better achieve goals, objectives, and restoration results.

Scientific, technological, socio-economic, engineering, and institutional uncertainties are challenges inherent with any large-scale ecosystem restoration project. A structured monitoring plan will be implemented to provide the feedback necessary to inform decisions about future adjustments.

Adaptive management is distinguished from more traditional monitoring in part through implementation of an organized, coherent, and documented decision process. For GIWW 204 adaptive management program, the decision process includes:

1. Anticipation of the kinds of management decisions that are possible within the original project design.
2. Specification of values of performance measures that will be used as decision-criteria.
3. Establishment of a consensus approach to decision making; and
4. A mechanism to document, report, and archive decisions made during the timeframe of the adaptive management program.

3.1 Rationale for Adaptive Management

The primary incentive for implementing an adaptive management program is to increase the likelihood of achieving desired project outcomes given project uncertainties. All ecosystem restoration projects face uncertainty due to incomplete understanding of relevant ecosystem structure and function, resulting in imprecise relationships between project actions and corresponding outcomes. Given these uncertainties, adaptive management provides an organized and coherent process that suggests management actions in relation to measured project performance compared to desired project outcomes. Adaptive management establishes the critical feedback among project monitoring, and informed project management, and learning through reduced uncertainty.

Many factors such as ecosystem dynamics, engineering applications, institutional requirements, and other key uncertainties can change and/or evolve over a project's life. The MAMP will be regularly updated to reflect monitoring-acquired and other new information as well as resolution and progress on resolving existing key uncertainties or identification of any new uncertainties that may emerge. Specifically, the MAMP will be revised and updated to include specific plans by project measure, developed during the feasibility level of design phase and further in PED as more detailed project designs are developed and uncertainties are better understood. The MAMP would then be used during and after project construction to adjust the project, as necessary to better achieve goals, objectives, and restoration/management outputs/results.

3.2 Assessment

Assessment of the adaptive management framework describes the process by which the results of the monitoring efforts will be compared to the project performance measures, which reflect the objectives of the restoration actions.

The results of the monitoring program will be assessed annually through the AMT. This assessment process will measure the progress of the project in relation to the stated project objectives, evaluate project efficacy, and consider if adaptive management actions are necessary. Assessments will also inform the AMT if other factors are influencing the response that may warrant further research.

3.3 Decision-Making

Decisions on the implementation of adaptive management actions are informed by the assessment of monitoring results. The information generated by the monitoring plan will be used by USACE and the NFS in consultation with other AMT members to guide decisions on adaptive management that may be needed to ensure that the ecosystem restoration projects achieve success. Final decisions on implementation of adaptive management actions are made by USACE.

If monitoring determines that a management trigger has been "activated" then there are three possible response pathways:

1. Determine that more data is required and continue (or modify) monitoring;
2. Identify and implement a remedial action;
3. Revisit project goals and objectives if the data indicates they were inadequate and/or inaccurate (this option would only be considered as a last resort and upon careful consideration by and consensus of the PDT and AMT).

3.3.1 Decision Criteria

Decision criteria, also referred to as adaptive management triggers, are used to determine if and when adaptive management opportunities should be implemented. They can be qualitative or quantitative based on the nature of the performance measure and the level of information necessary to make a decision. Desired outcomes can be based on reference sites, predicted values, or comparison to historic conditions. Several potential decision criteria are identified below, based on the project objectives and performance measures. More specific decision criteria, possibly based on other parameters such as hydrology, geomorphology, and vegetation dynamics, may be developed during PED.

More specific decision criteria, possibly based on other parameters such as hydrology, geomorphology, and vegetation dynamics, may be developed during PED. If assessments show that any of these triggers are met, USACE would consult with the AMT to discuss whether an adaptive management action is warranted, and if so, what that action should be. Investigations may be required to determine the cause of failure to inform the type of adaptive management actions that should be implemented, if needed. Additionally, prior to enacting any adaptive management measures, USACE would assess whether supplemental environmental analyses are required.

Project Objective 1: Restore coastal marsh to re-establish ecological integrity of the habitat insofar as possible to restore structure, composition, and natural processes of

biotic communities and the physical environment to maintain and/or improve their function as essential habitats for fish, migratory birds, and other aquatic and terrestrial species, mimicking, as closely as possible, conditions which occur naturally in the area.

Performance Measure 1: Marsh Elevation

Trigger: Target elevation is not sustained.

Potential Causes: Loss of sediment through erosion or scour, minimal to no sediment input, or higher than expected subsidence or RSLC rate.

Potential Response Options: A hydrologist will investigate the cause of failure and recommend minor topographic modifications including but not limited to addition of dredged material, runnels to increase water conveyance, small berms to hold back drainage, drainage swales, straw wattles, erosion mats, or vegetative planting.

Performance Measure 2: Vegetation Composition.

Trigger 1: Less than 80% of the average cover is composed of desirable species.

Potential Causes: Improper geomorphic, hydrologic, or biogeochemical conditions (e.g., erosion/scour, sedimentation, high redox potential, poor water quality including salinity, tidal influences), or natural events (e.g., loss during storm events or drought, herbivory, or trampling).

Potential Response Options: Replant desired species. If issues of vegetation establishment persist beyond two years post-construction, an ecologist will investigate the cause of failure and recommend modifications to maintain the distribution of habitat types.

Trigger 2: Invasive, noxious, and/or exotic plant species comprise >5% of the average cover.

Potential Causes: Introduction of seed source by construction activities, other activities on adjacent lands, or natural sources (e.g., wildlife, wind, water); slow establishment of native species allowed undesired species to outcompete desired species.

Potential Response Options: Removal of invasive species by pulling or controlled herbicide use.

3.4 Adaptive Management Costs

The MAMP establishes a feedback mechanism whereby monitored conditions will be used to adjust or refine construction or maintenance actions to better achieve project goals and objectives. Monitoring and adaptive management are not to be used as a substitute for Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R). Per WRDA 1986, as amended by Section 210 of WRDA 1996, the NFS would be responsible for all OMRR&R. This includes operations and maintenance (O&M) that provides day-to-day activities necessary to properly operate a component of a system and routine maintenance activities to keep the system operating as designed. This also include non-routine or beyond the scope of typical O&M activities of repair or fixing damage caused by an event; rehabilitation or fixing long-term wear and tear; and replacement of components when the useful life is exceeded. For all marsh restoration features, renourishment actions are expected to be required after the

NFS's O&M responsibilities cease. With these two assumptions, OMRR&R actions are not included for the recommended plan.

In contrast, periodic monitoring of performance indicators which contain trigger values informs the iterative process of implementing specified adaptive management measures to help achieve ecological success. Gulf Coast marsh restoration throughout Texas and Louisiana has proven to reach ecological success within 3 to 5 years post-construction. However, the project area is susceptible to several uncertainties that could significantly impact the ecological success of constructed restoration features as described in Section 3.0.

Costs for the adaptive management program were based on estimated level of effort and potential frequency of need and include participation in the AMT and reporting. Only those actions which are most likely to be needed have associated costs. Measures included in the recommended plan have been successfully implemented with very similar designs and throughout the coastal zone in Texas; therefore, the desired outcomes are expected and reasonable based on experience. Other adaptive management measures that could help achieve ecological success may require significantly more modeling, design, and feasibility analysis than permits with adaptive management such as construction or modification of tidal exchange barriers (e.g., levees, dunes, or breakwaters).

The total estimate for implementing the adaptive management program is $227,500 (Table 2), or approximately 1.9 percent of the total estimated construction costs. For this project, marsh renourishment is not expected to be a necessary adaptive measure due to the limited amount of sediment that would be needed (~2,000 cy) vs. the cost to place the material with a hydraulic dredge (approximately $1,000,000). Additionally, the design of the marsh system overall and current breakwater would help to reduce erosional loss that would trigger the need for renourishment. Instead, other measures would be used to adjust elevation in low areas, for example, such as re-grading.

Table 2. Estimated adaptive management costs for the recommended plan.

Adaptive Management Measure	Assumptions	Cost
Re-planting	• Assume that 10% of vegetation may require replanting in the 10 years (approximately 4 acres). • $5,000/acre (most likely seed with a minimal plug per acre).	**$20,000**
Invasive and Nuisance Plant Control (low elevation marsh)	• Assume that up to 20% of acreage may require treatment beyond spot treatment or alternative control methods (approximately 6.5 acres). • $5,000/acre	**$32,500**
Invasive and Nuisance Plant Control (high elevation marsh)	• Assume that up to 15% of acreage may require treatment beyond spot treatment or alternative control methods (approximately 1 acre). • $5,000/acre	**$5,000**
Erosion Control	• Assume installation of erosion control (e.g., straw waddles, erosion mats) in one location once in 6 years. • $50,000/site/year (assume mobilization/demobilization, minimal work at each site = higher cost per site, minimal heavy equipment, difficult in accessing the sites)	**$50,000**
Re-grading	• Assume one modification in a 6-year period would be needed. • $75,000 for small fixes/site (assumes mobilization/demobilization, minimal work at each site = higher cost per site, difficult in accessing the sites)	**$75,000**
Total		**$182,500**
Adaptive Management Team and Reporting		
Team Meetings	Assume 1, 2.0-hour meeting per year over 6 years @ $1,500/meeting	**$9,000**
Annual Report	Assume 6 reports @ $6,000	**$36,000**
Total		**$45,000**
Total Adaptive Management		**$227,500**

3.5 Project Close-Out

Once ecological success has been documented by the District Engineer in consultation with the Federal and State resource agencies, and a determination has been made by the Secretary of the Army that ecological success has been achieved, no further monitoring or adaptive management will be required, and the project can be closed out. Ecological success will be documented through an evaluation of the predicted outcomes as measured against the actual results. Success would be considered to have been achieved when project objectives have been met or when it is clear they will be met based upon the trend of site conditions and processes.

The project could also be closed out when the maximum 10-year monitoring period has been reached. If that should occur prior to ecological success being achieved, the NFS would be responsible for monitoring and adaptive management beyond the 10 years.

References

Fischenich, C., Vogt, C. et al. 2012. The Application of Adaptive Management to Ecosystem Restoration Projects. EBA Technical Notes Collection. ERDC TN-EMRRP-EBA-10. Vicksburg, MS: US Army Engineering Research and Development Center. www.wes.army.mil/el/emrrp.

U.S. Army Corps of Engineers (USACE). 2017. Sabine Pass to Galveston Bay, Texas Coastal Storm Risk Management and Ecosystem Restoration Final Integrated Feasibility Report – Environmental Impact Statement. U.S. Army Corps of Engineers, Galveston District. Galveston, TX.

USACE. 2019. Jefferson County Ecosystem Restoration Feasibility Study Integrated Feasibility Report and Environmental Assessment. U.S. Army Corps of Engineers, Galveston District. Galveston, TX.

USACE. 2021. Coastal Texas Protection and Ecosystem Restoration Feasibility Study and Final Environmental Impact Statement. U.S. Army Corps of Engineers, Galveston District. Galveston, TX.

Appendix C-3 Fish and Wildlife Coordination Act Compliance

Fish and Wildlife Coordination Act

for

Aquatic Ecosystem Restoration for GIWW

Aransas County, Texas

Request for FWCA Consultation

From:	Blakeway, Raven D CIV (USA)
To:	Hardegree, Beau
Cc:	Gardiner, Dawn
Subject:	Request for FWCA Consultation - GIWW CAP 204
Date:	Tuesday, October 4, 2022 2:08:00 PM
Attachments:	PAL_JCER_2017.pdf PAL_Coastal_TX_20Nov2017.pdf Alt 3d_26SEPT2022.png

Good afternoon,

The Galveston District of the U.S. Army Corps of Engineers (USACE) is requesting the U.S. Fish and Wildlife Services (USFWS) Texas Coastal Ecological Services Field Office in Corpus Christi, Texas to assist the USACE in evaluating the Gulf Intracoastal Waterway Continuing Authorities Program 204 Beneficial Use of Dredged Material (GIWW CAP 204) study located in Aransas County, Texas for compliance with the Fish and Wildlife Coordination Act (FWCA). The study is authorized under Section 204 of the Water Resources Development Act of 1992, as amended, for purpose of recommending a viable aquatic or wetland habitat restoration in connection with maintenance dredging of an authorized Federal navigation project.

The purpose of this study is to recommend a viable beneficial use of dredged material along the GIWW to restore habitat and capture ecological output through beneficially placing operations and maintenance material in areas degraded from coastal and navigation forces over time. The project location proposed for this study is Goose Island State Park, located north of Rockport, Texas between St. Charles, and Aransas Bays. The proposed project area is within the boundaries of the state park, which is currently composed of two semi-contained cells with primarily open water and small, scattered islands of salt marsh. Historically, Goose Island was much larger; however, decades of tidal erosion, rising sea levels, subsidence, and altered sediment supplies have reduced the area to its current footprint. Containment levees and an offshore breakwater were constructed in 2008 during a previous attempt to restore the island encompassed by the two existing cells. The previous restoration attempt did not result in creating a functional marsh, likely due to inadequate quantities of fill material.

The GIWW CAP 204 study developed a range of alternatives and assessed the existing, future without project, and future with project conditions under relative sea level change scenarios for a 50-year period of analysis (2025-2075). As of now, the tentatively selected plan proposes to place dredged material in the existing containment cells and build two new cells that contain high and low elevation marsh, for a total of 39 acres of saline marsh restoration (Figure Attached).

The draft report is anticipated to be completed by November 2022 and released for public review in January 2023. The USACE anticipates the final report will be completed by March 2023 and report approval would occur in July 2023. The USACE requests the FWCA compliance be completed in time for the final report in March 2023.

I have attached two examples of planning aid letters (PAL) the USACE has received for recent projects. Overall, the USACE requests the USFWS to present concerns with the study area and recommend any conservation measures that can be addressed to reduce impacts to fish and wildlife resources. Please contact me if you have any questions regarding this study.

Sincerely,

Raven Blakeway, PhD | Biologist
Regional Planning and Environmental Center
U.S. Army Corps of Engineers
Galveston Office
Mobile: 409-790-9058

Appendix C-4 Magnuson-Stevens Fishery Conservation and Management Act Compliance

Magnuson-Stevens Fisheries Conservation and Management Act

for

Aquatic Ecosystem Restoration for GIWW

Aransas County, Texas

Appendix C-5 Endangered Species Act Compliance

Fish and Wildlife Service Biological Assessment

for

Aquatic Ecosystem Restoration for GIWW
Aransas County, Texas

FWS Consultation No:

Section 7 Consultation Request
Biological Assessment

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

January 20, 2023

Mr. Andy Strelcheck
Regional Administrator
National Marine Fisheries Service
Southeast Regional Office
Protected Resources Division
263 13th Avenue South
St. Petersburg, FL 33701-5505

Dear Mr. Strelcheck,

The U.S. Army Corps of Engineers Galveston District (USACE), in partnership with the Texas General Land Office, is conducting the Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway (GIWW) – Beneficial Use of Dredged Material (BUDM), Aransas County, TX continuing authorities' study as authorized by Section 204 of the Water Resources Development Act of 2016. The study purpose is to recommend a viable site for employing the BUDM along the GIWW to restore ecologically suitable marsh habitat that has been degraded, converted, or lost along the navigation resource.

A Draft Detailed Project Report and Environmental Assessment (DDPR-EA) was prepared to present the findings and recommendations and disclose the potential impacts to the human and natural environment if the Tentatively Selected Plan (TSP) is implemented (Enclosure). The TSP, Alternative 3D, involves placing material dredged during operations and maintenance dredging, an authorized Federal action, to create 39 acres of saline marsh habitat at Goose Island State Park in Aransas County, TX. Material would be hydraulically dredged and pumped into low elevation areas of the marsh through a series of submerged or floating pipelines, then shaped using heavy equipment (e.g., bulldozers) to achieve 40% open water to 60% vegetated marsh upon final settlement. A containment levee would be constructed by excavating existing material onsite.

To implement this plan, material would be dredged from the GIWW following the regular Maintenance Dredging Cycles and Plans of the GIWW. Dredging operations for the channel have undergone formal Section 7 consultation, which issued a Biological Opinion (BO) on November 19, 2003 (#F/SER/2000/01287). Your agency determined the proposed action was ***likely to adversely affect but not likely to jeopardize*** the continued existence of loggerhead, Kemp's Ridley, or green sea turtles and would have ***no effect*** on leatherback sea turtles due to lack of suitable habitat or regular occurrence within the action areas.

The USACE has determined the proposed use of dredged material for marsh restoration would not significantly modify dredging operations or induce effects on listed species or critical habitats beyond those in which the aforementioned BO was issued. Implementation of the TSP would not trigger the re-initiation of consultation. The USACE also considered an additional four listed or candidate species (two whales and two fish) within NMFS jurisdiction, for which a ***no effect*** determination was made for Rice and sperm whales, giant manta rays, and oceanic whitetip sharks due to the lack of suitable habitat or the project area being outside the species' known range (Enclosure).

If you have any questions or need additional information to conduct your review, please contact Dr. Raven Blakeway, Biologist, Environmental Branch, Regional Planning and Environmental Center at 409-790-9058 or Raven.Blakeway@usace.army.mil.

Sincerely,

Jeffrey F. Pinsky
Chief, Environmental Branch
Regional Planning and Environmental Center

Enclosure (2)

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

January 20, 2023

Mr. Chuck Ardizzone
U.S. Fish and Wildlife Service Ecological Services
1849 C St.
Washington, D.C. 20240

Dear Mr. Ardizzone,

The U.S. Army Corps of Engineers Galveston District (USACE), in partnership with the Texas General Land Office, is conducting the Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway (GIWW) – Beneficial Use of Dredged Material (BUDM), Aransas County, TX continuing authorities' study as authorized by Section 204 of the Water Resources Development Act of 2016. The study purpose is to recommend a viable site for employing the BUDM along the GIWW to restore ecologically suitable marsh habitat that has been degraded, converted, or lost along the navigation resource.

A Draft Detailed Project Report and Environmental Assessment (DDPR-EA) was prepared to present the findings and recommendations and disclose the potential impacts to the human and natural environment if the Tentatively Selected Plan (TSP) is implemented (Enclosure). The TSP, Alternative 3D, involves placing material dredged during operations and maintenance dredging, an authorized Federal action, to create 39 acres of saline marsh habitat at Goose Island State Park in Aransas County, TX. Material would be hydraulically dredged and pumped into low elevation areas of the marsh through a series of submerged or floating pipelines, then shaped using heavy equipment (e.g., bulldozers) to achieve 40% open water to 60% vegetated marsh upon final settlement. A containment levee would be constructed by excavating existing material onsite.

A Biological Assessment was prepared to analyze the impacts of implementing marsh restoration at the state park and surrounding action area (Enclosure). The USACE requests initiation of formal consultation under Section 7(a)(2) of the Endangered Species Act for the Aquatic Ecosystem Restoration for GIWW – BUDM study (Project Code: 2022-0070249). Based on the enclosed analysis, the USACE has determined the TSP would have ***no effect*** on Attwater's Greater prairie chicken, Northern aplomado falcon, and leatherback sea turtles due to lack of suitable habitat and/or use of the action area. USACE has determined the action ***may affect but is not likely to adversely affect*** piping plover, rufa red knot, Eastern black rail, whooping crane; West Indian manatee; loggerhead, green, hawksbill, and Kemp's ridley sea turtles; and monarch butterflies because all effects to the species and their habitat would be insignificant and/or discountable. Finally, USACE reviewed critical habitat for whooping crane in this analysis and determined the action would ***not likely adversely modify*** the habitat as the negative effects are temporary and long-term beneficial impacts are anticipated with the increase in marsh habitat.

If you have any questions or need additional information to conduct your review, please contact Dr. Raven Blakeway, Biologist, Environmental Branch, Regional Planning and Environmental Center at 409-790-9058 or Raven.Blakeway@usace.army.mil.

Sincerely,

Jeffrey F. Pinsky
Chief, Environmental Branch
Regional Planning and Environmental Center

Enclosure (2)

Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway – Beneficial Use of Dredged Material, Texas

Section 204

Biological Assessment for Federally-listed Threatened and Endangered Species

Goose Island State Park

Aransas County, Texas

January 2023

Prepared by:

United States Army Corps of Engineers

Regional Planning and Environmental Center

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1.0 Executive Summary

This project intends to recommend a viable location for the beneficial use of dredged material (BUDM) along the Gulf Intracoastal Waterway (GIWW) to restore habitat along the navigation resource as authorized under Section 204 of the Water Resources Development Act of 1992, as amended, and administered under the US Army Corps of Engineers (USACE) Continuing Authorities Program. Sediment dredged during regular operations and maintenance (O&M) cycles is proposed to be placed at Goose Island State Park to create 39 additional acres of emergent coastal marsh, in an otherwise degrading ecosystem, to establish a more functional habitat that benefits fish and wildlife species. This Biological Assessment (BA) discusses the presence and status of threatened and endangered species in the Action Area, evaluates the impacts expected to these species through project actions, and makes a final determination on the effects anticipated for those species. Table 1 provides a summary of the thirteen ESA-listed, candidate, or proposed for listing species identified in the US Fish and Wildlife Services (USFWS) Information for Planning and Consultation (IPaC) database, four additional National Marine Fisheries Service (NMFS) listed species, and one designated critical habitat (CH).

Table 1. USFWS and NMFS effect determination summary for proposed action. NLAA = not likely to adversely affect; LAA = likely to adversely affect. Species protected solely by NMFS are demarcated with an asterisk (*). Sea turtles jurisdiction is shared jointly by USFWS (inland waters and nesting beaches) and NMFS (offshore marine environment). A superscript (CH) indicates critical habitat for a species in the Action Area.

Species **Common Name** ***Scientific Name***	**Federal Status**	**Habitat Association**	**Effect Determination**	**Summary of Effects**
BIRDS				
Attwater's greater prairie chicken *Tympanuchus cupido attwateri*	Endangered	Coastal prairie habitat with mid- to tall-grass diverse in grasses and flowering plants	*No effect*	Lacks suitable habitat
Piping plover *Charadrius melodus*	Threatened	Bayshore tidal sand & algal flats, ocean side beaches, washover passes, and mainland tidal mud flats	*NLAA*	*Negative effects*: Potential to have temporary effects from construction activities in or near foraging/roosting habitats causing displacement to adjacent areas.
Rufa red knot *Calidris canutus rufa*	Threatened	Coastal marine & estuarine habitats with large areas of exposed intertidal sediments in migration & wintering areas. Supra-tidal sandy habitats of inlets for roosting. Artificial habitats that mimic natural conditions (e.g., nourished beaches, dredged spoil sites, impoundments)	*NLAA*	*Negative effects:* Potential to have temporary effects from construction activities in or near foraging/roosting habitats causing displacement to adjacent areas. *Beneficial effects:* create estuarine habitat that can be used for wintering and roosting.
Eastern black rail *Laterallus jamaicensis* ssp. *jamaicensis*	Threatened	Salt, brackish, and freshwater marsh habitats that can be tidally or non-tidally influenced with soils that are moist to saturated, occasionally dry, and interspersed with, or adjacent to, very shallow water of 1-6 cm. Requires dense vegetation cover that allows movement underneath the canopy	*NLAA*	*Negative effects:* Temporary impacts from construction activities (noise disturbance) on foraging/roosting habitats, resulting in avoidance or displacement to adjacent areas. *Beneficial effects:* create more preferred marsh habitat used for foraging, nesting, and roosting, that is expected to outweigh the negative effects.

Species Common Name *Scientific Name*	Federal Status	Habitat Association	Effect Determination	Summary of Effects
Whooping crane [CH] *Grus americana*	Endangered	Breed, migrate, and forage in coastal marshes and estuaries, inland marshes, lakes, open ponds, shallow bays, salt marsh, and sand or tidal flats, upland swales, wet meadows and rivers, pastures, and agricultural fields.	*NLAA*	*Negative impacts:* Temporary impacts from construction activities (noise disturbance) on foraging habitat, resulting in avoidance or displacement to adjacent areas. *Beneficial impacts:* create more suitable marsh habitat used for foraging.
Northern aplomado falcon *Falco femoralis septentrionalis*	Endangered	Require open grassland or savannah habitat with scattered trees or shrubs	*No effect*	Lacks suitable habitat
MAMMALS				
West Indian manatee *Trichechus manatus*	Threatened	Marine, brackish, and freshwater systems in coastal and riverine areas with preference near the shore featuring underwater vegetation like seagrass & eelgrass.	*NLAA*	*Negative impacts:* In-water activities could result in habitat avoidance, noise & visual disturbance, entrapment and/or collision. These impacts are highly unlikely to occur due to the rarity of manatees in the Action Area. The most recent manatee was observed in 2021 19 miles SW of the Action Area.
Sperm whale* *Physeter macrocephalus*	Endangered	Prefer steep depth gradients, with resident populations near the Mississippi Canyon, and transient populations moving along the shelf break (2,300 – 3,280 feet) and deeper oceanic waters.	*No effect*	Lacks suitable habitat; outside of species known range
Rice's whale* *Balaenoptera ricei*	Endangered	Restricted to a very narrow depth corridor along the shelf break in the northeastern Gulf of Mexico.	*No effect*	Outside of species known range
REPTILES				

Species Common Name *Scientific Name*	Federal Status	Habitat Association	Effect Determination	Summary of Effects
Loggerhead sea turtle *Caretta caretta*	Threatened	Foraging throughout the shallow continental shelf waters, but also found in bays, estuaries, lagoons, and river mouths. Adults occupy turbid bays to clear water reefs; subadults occur in nearshore and estuarine waters. High-energy, open sandy beaches above the high-tide mark and seaward of well-developed dunes preferred for nesting	*NLAA*	*Negative impacts:* In-water activities could result in habitat avoidance, noise & visual disturbance, entrapment and/or collision. Minimal to no impacts are expected on nesting turtles as construction would occur in a coastal marsh, which is unsuitable for nesting.
Green sea turtle *Chelonia mydas*	Threatened	Shallow habitats such as lagoons, bays inlets, shoals, estuaries, & other areas with abundant marine algae & seagrass. High-energy beaches with deep sand for nesting, usually coarse to fine grain sizes, with little organic content	*NLAA*	*Negative impacts:* In-water activities could result in habitat avoidance, noise & visual disturbance, entrapment and/or collision. Minimal to no impacts are expected on nesting turtles as construction would occur in a coastal marsh, which is unsuitable for nesting.
Atlantic hawksbill sea turtle *Eretmochelys imbricata*	Endangered	Largely inhabit nearshore foraging grounds, especially healthy coral reefs. Hatchlings take shelter in floating algal mats & drift lines of flotsam and jetsam; juveniles migrate to shallower coastal feeding grounds and remain into adulthood. Found around rock formations, high energy shoals, and estuaries that provide habitat for sponge growth	*NLAA*	*Negative impacts:* In-water activities could result in habitat avoidance, noise & visual disturbance, entrapment and/or collision. Minimal to no impacts are expected on nesting turtles as construction would occur in a coastal marsh, which is unsuitable for nesting.
Leatherback sea turtle *Dermochelys coriacea*	Endangered	Mainly pelagic, inhabiting the open ocean, where they dive to great depths continuously. Found in coastal waters during nesting or when following concentrations of jellyfish. Typically nests on beaches with a deep-water approach in Malaysia, Mexico, French Guiana, Suriname, Costa Rica, and Trinidad	*No effect*	Lacks suitable habitat; outside known range

Species Common Name *Scientific Name*	Federal Status	Habitat Association	Effect Determination	Summary of Effects
Kemp's ridley sea turtle *Lepidochelys kempii*	Endangered	Shallow coastal & estuarine waters, usually over sand or mud bottoms. Adults primarily shallow-water benthic feeders; juveniles feed on *Sargassum* and associated infauna	*NLAA*	*Negative impacts:* In-water activities could result in habitat avoidance, noise & visual disturbance, entrapment and/or collision. Minimal to no impacts are expected on nesting turtles as construction would occur in a coastal marsh, which is unsuitable for nesting.
INSECTS				
Monarch butterfly *Danaus plexippus*	Candidate	Require milkweed and flowering plants for foraging during breeding and migration. Lay eggs on milkweed plants	*NLAA*	*Negative impacts:* Construction activities could result in habitat avoidance, noise disturbance, collision with equipment, and trampling of preferred vegetation in traffic corridors. Milkweed is a freshwater plant, thus, is not likely to occur in the Action Area; however, it cannot be determined that no vegetation preferred by Monarchs will go unimpacted.
FISH				
Oceanic whitetip shark* *Carcharhinus longimanus*	Threatened	Reside in tropical and subtropical seas worldwide in the pelagic ocean, generally offshore, on the outer continental shelf, or around oceanic islands in water depths greater than 604 feet.	*No effect*	Lacks suitable habitat; outside of species known range
Giant manta ray* *Mobula birostris*	Threatened	Known to occur along the east coast, within the Gulf of Mexico, and off the coast of the U.S. Virgin Islands, Puerto Rico, Hawaii, and Jarvis Island. Inhabits tropical, subtropical, and temperate water bodies and are commonly found offshore in oceanic waters and near productive coastlines. Can occur in estuarine waters near oceanic inlets	*No effect*	Lacks suitable habitat

2.0 Introduction

This Biological Assessment (BA) has been prepared to fulfill requirements of the U.S. Army Corps of Engineers, Galveston District (USACE), as outlined under Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, to evaluate Federal actions with respect to any species that are proposed or listed as endangered or threatened, as well as their designated critical habitat (CH). The Proposed Action requiring this assessment is a Department of Army feasibility study that is recommending the beneficial use of dredged material (BUDM) at Goose Island State Park in Aransas County, Texas to restore coastal marsh habitat with material sourced from the Gulf Intracoastal Waterway (GIWW). The intent of this assessment is to address impacts to listed, proposed to be listed, or candidate species and designated CH under the jurisdiction of the U.S. Fish and Wildlife Services (USFWS) and National Marine Fisheries Services (NMFS) to occur in the vicinity of the Goose Island State Park. The proposed project is located at the state park, northwest of the GIWW, in Aransas County, Texas. The study is authorized under Section 204 of the Water Resources Development Act of 1992, as amended, and would be administered under the USACE Continuing Authorities Program (CAP).

The information provided herein has been prepared in accordance with legal requirements set forth under Section 7(a)(2) of the ESA, and follows the standards established in the USFWS and NMFS Endangered Species Consultation Handbook (USFWS and NMFS, 1998). This BA demonstrates the Proposed Action is compliant with Section 7, which assures, that through consultation with the USFWS and 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.

2.1 Project Location

Goose Island State Park is at the end of Lamar Peninsula, north of Rockport, Texas between St. Charles and Aransas Bays (Figure 1). The proposed project area is within the boundaries of the state park, which is currently composed of two semi-contained cells with primarily open water and small, scattered islands of salt marsh (Figure 1). Historically, Goose Island was much larger; however, decades of tidal erosion, rising sea levels, subsidence, and altered sediment supplies have reduced the area to its current footprint. Containment levees and an offshore breakwater were constructed in 2008 during a previous attempt to restore the island encompassed by the two existing cells. The previous restoration attempt did not result in creating a functional marsh elevation, likely due to inadequate quantities of fill material. Since 2008, no additional restoration attempts have been made at this location.

Figure 1. Map of the region with the project location, Goose Island State Park, in the inlay.

2.2 Definition of the Action Area

The regulations governing consultations under the ESA define the “Action Area” as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (51 F.R. 19957). Therefore, the Action Area is typically larger than the project area directly affected by the Proposed Action. The affected areas for the proposed project include the marsh and in-water work areas (construction footprint), the contractor stockpiling and staging areas, temporary pipeline route, and the placement area in the state park. The sediment source location is already a Federally authorized project for operations and maintenance (O&M) dredging that is dredged with relative frequency. The effects of O&M dredging actions have undergone Section 7 compliance and, thus, the resource impacts of dredging are not considered/analyzed in this BA, as they are covered under the Gulf Regional Biological Opinion (Consultation Number F/SER/2000/01287).

The construction footprint (10.64 square miles) for marsh restoration activities includes the 23 acres of the current containment cells at the state park, an additional 16 acres north of the existing cells, approximately four linear miles of open water in the Aransas Bay (for sediment transport), and approximately 5,280 acres of open water in Aransas Bay to move sediment from the source site to the placement area (Figure 2). This is presented as a conservative estimate to afford an analysis that would encompass movement of any marine traffic related to transport of the dredge material; however, it is highly unlikely the open water area would be used in its entirety.

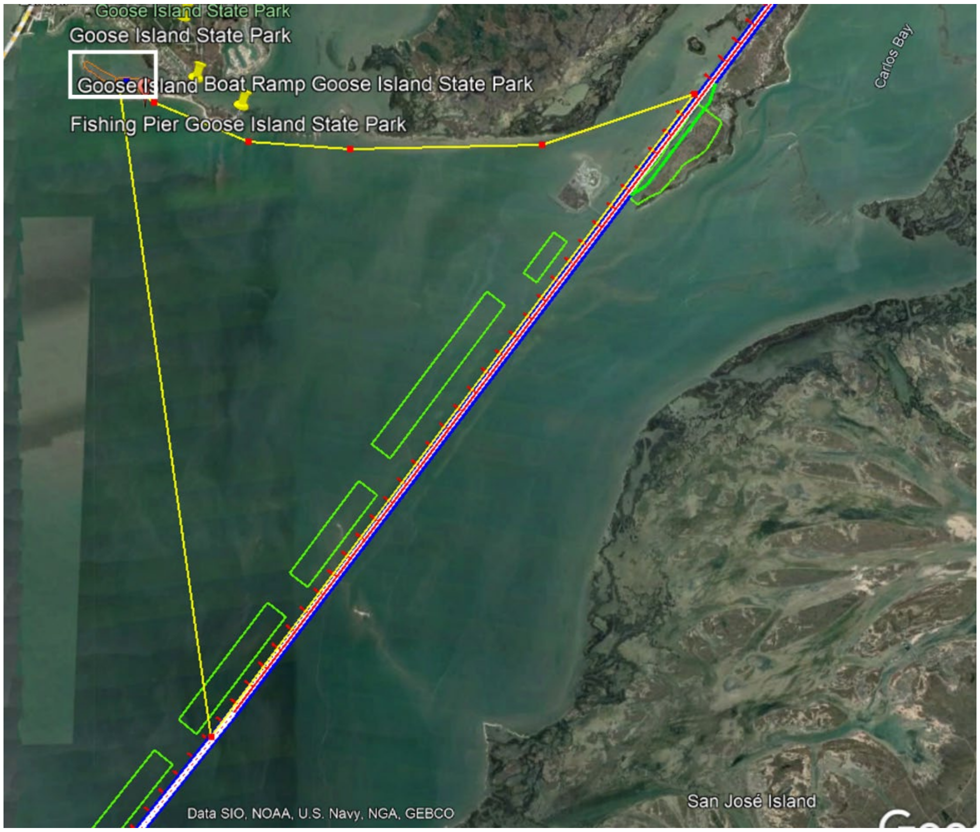

Figure 2. Map of the Action Area. Green boxes indicate existing open water placement areas, pink and blue lines show the GIWW, yellow outlines the open-water construction footprint, and the white box designates the proposed restoration site.

2.3 Proposed Action

The USACE, in partnership with the Texas General Land Office (TGLO), is proposing to beneficially use material dredged from the Matagorda Bay to Corpus Christi Bay reach in the GIWW to restore coastal saline marsh habitat in Goose Island State Park. The GIWW is at risk from eroding shorelines, powerful storms and sedimentation, lost habitat, impaired water quality, and increasing land use and development. Globally, salt marshes are declining and with that, their ecological function in providing critical habitat, carbon sequestration, and protection from coastal flooding and storm surge (Duarte et al. 2013). Along the Texas coast, salt marsh loss is predominantly caused by wave action, subsidence, sea level-rise, and insufficient sediment supply (Raven et al. 2009). Restoration of salt marsh is a technique used to protect and improve degraded habitat quality (Billah et al. 2022), of which dredged material can be used. The purpose of the Proposed Project is to restore ecological function by creating coastal saline marsh along the GIWW and to demonstrate the viability of BUDM for ecosystem restoration and develop practices that facilitate, rather than challenge, the justification of BUDM efforts. This Proposed Action will help contribute to larger ongoing efforts to improve, preserve, and sustain ecological resources along the Texas coast.

The Proposed Action is Alternative 3D, as described in the Draft Detailed Project Report and Environmental Assessment (DDPR-EA), as it includes key restoration features to restore and sustain the form and function of the coastal system in the study area (Figure 3). This project would be achieved through marsh restoration operations and containment levee construction.

2.3.1 Marsh Restoration

<u>Marsh measures</u>

Marsh restoration measures involve placement of borrow material dredged from the GIWW during regular operations and maintenance dredging into these locations. Material placed into the marsh would have similar properties to the existing material. Under the existing and projected future dredging cycles, there is sufficient suitable material available to meet all restoration needs without seeking other borrow sources.

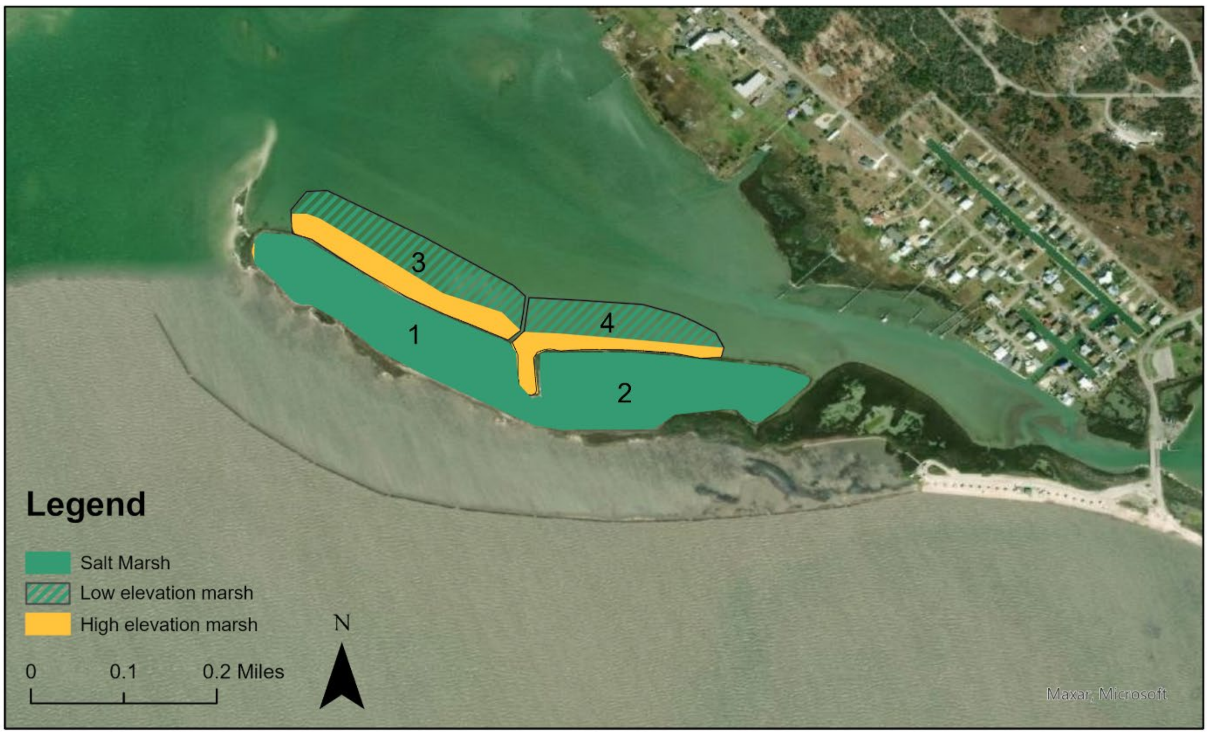

Figure 3. Alternative 3D - the proposed marsh restoration for Goose Island State Park. Salt marsh and low elevation marsh will target +0.6 to +0.8 feet NAVD88 (+1.5 to +1.7 feet MLLW) final elevation and high elevation marsh will target +1.5 to +2.0 feet NAVD88 (+2.4 to +2.9 feet MLLW)

Alternative 3D would restore and nourish 39 acres of technically significant marsh habitat at Goose Island State Park. Within the four marsh restoration units (cells 1 – 4), material dredged from the GIWW would be hydraulically pumped into open water and low-lying areas assuming a post-construction settlement elevation of +0.6 to +0.8 ft NAVD88 (+1.5 to +1.7 feet MLLW; Figure 3). Within cells 3 and 4, along the southern area, dredge material would be hydraulically pumped to construct a 3.7-acre and 2.5-acre, respectively, higher elevation marsh targeting +1.5 to +2.0 ft NAVD88 (+2.4 to +2.9 feet MLLW). It is estimated that 196,500 cubic yards (cy) of dredged material would be required to restore the 39 acres of marsh. Final project design criteria will be developed during the pre-engineering, design, and construction (PED) phase.

The vegetated areas would target 60% coverage but can be up to 70% coverage at final settlement. This allows for 30-40% open water cover for suitable salt marsh habitat. Lower elevation marsh areas are expected to be inundated with salt water more frequently and, thus, require saline tolerant vegetation that prefer hydric soils. Saltmarsh cordgrass (*Sporobolus alterniflorus*, formerly *Spartina alterniflora*) will be planted in these areas. Higher marsh areas are expected to be inundated with salt water less frequently but still require saline tolerant plants that may be in dryer soils. Saltmeadow cordgrass (*Sporobolus pumilus*, formerly *Spartina patens*) will be planted in these areas.

Sediment transport equipment would most likely include hopper or cutterhead dredges, pipelines (submerged, floating, and land), and booster pumps. Heavy machinery would be used to move sediment and facilitate construction which could include bulldozers, front-end loaders, track-hoes, marshbuggy, and backhoes. Marsh restoration would occur after levee construction is finished and could take approximately five months to complete. The start of material placement for restoration will depend on dredging cycles.

Marsh restoration activities will be broken down and divided into multiple confined cells along the proposed work area. Work will begin in an individual cell and continue until that cell is completed. Marsh-quality material will not be placed in multiple cells/areas at the same time.

Containment Levee

An earthen containment dike (7,220 linear feet) would be constructed to efficiently achieve the desired initial construction elevation. The dike would be constructed from existing material onsite, requiring 13,700 cy of sediment, and could take up to seven months to complete. Heavy equipment would be used to excavate and distribute material sourced from submerged bottoms at the site, along with rip rap and bedding stone, to form the containment levee. Borrow areas used for construction of the levee would be refilled during the placement of dredged material. Conceptual designs for the containment levee were developed during plan formulation by project engineers (Figure 4); however, the designs may be refined, and will be finalized during PED.

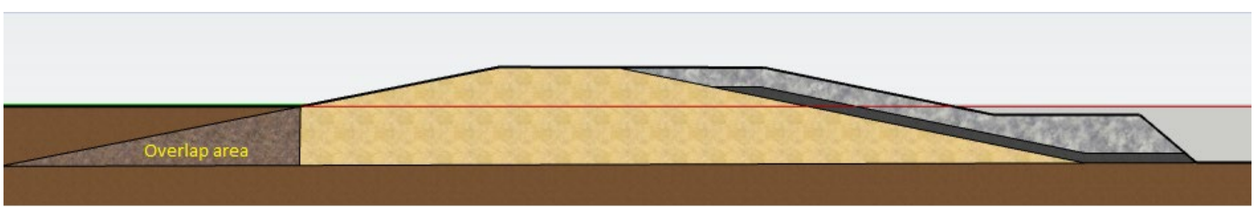

Figure 4. Containment levee cross-section.

For the containment levee construction, various support equipment would be used including crew and work boats, trucks, trailers, construction trailers, all-terrain vehicles, and floating docks.

Sediment

The sediment source location is already a Federally authorized project for operations and maintenance (O&M) dredging that is dredged with relative frequency (Figure 2). Sediment used to restore and create saline marsh would be configured with material consistent in grain size, color, and composition as the existing material at the site and free of contaminants. Sediment chemistry and elutriate data will meet the Texas Commission for Environmental Quality's (TCEQ) Ecological Benchmarks for allowable level of contaminants and be in compliance the Environmental Protection Agency's (EPA) standards for sediment quality.

Access Routes and Staging Areas

Temporary access channels to facilitate loading and unloading of personnel and equipment will be designated for construction activities. Identification of staging areas, pipeline routes, and placement of floatation docks would occur during PED. Each disturbance for access and staging would be placed outside of environmentally sensitive areas and utilize areas already disturbed when possible. All ground disturbance for access and staging areas would be temporary and fully restored to result in no permanent loss of resources.

Timing

Timing of initial construction of this project is dependent on timing of approval, duration of PED, funding cycles, and dredging cycles. It was assumed that construction would take approximately 6-12 months total to complete restoration activities. The containment levee would be constructed prior to placement of material in cells 3 and 4. Dredging and material placement would occur after the levee is constructed.

Implementation of the marsh restoration is highly dependent on dredging cycles. Currently, seasonal timing restrictions related to ESA compliance includes a seasonal window for hopper dredging use between December 1 and March 31, unless work outside this window is not possible, in which NMFS would need to approve the deviation. Hopper dredges would be used for dredging areas in the GIWW. Non-hopper dredges may be used from April to November.

2.3.2 Best Management Practices

It is assumed, at minimum, that best management practices (BMPs) identified below would apply during project construction. The assumed BMPs are rooted in widely accepted industry, state, and Federal standards for construction activities. Examples of common BMPs include, but are not limited to:

- Using of silt fencing to limit soil migration and water quality degradation.
- Refueling and maintenance of vehicles and equipment in designated areas to prevent accidental spills and potential contamination of water sources and the surrounding soils.
- Limiting idling vehicles and equipment to reduce emissions.
- Limiting ground disturbance necessary for staging areas, access routes, pipeline routes, etc. to the smallest footprint possible to safely operate during construction and restoring these areas and routes to avoid permanent loss.
- Minimizing project equipment and vehicles transiting between staging areas and the restoration site to the greatest extent practicable, including but not limited to using designated routes, confining vehicles to immediate project needs, and sequencing work to minimize the frequency and density of vehicular traffic.

BMP's that can be implemented to reduce air quality impacts include:

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate at active and inactive sites; and
- Install wind fencing and phase grading operations where appropriate; and
- Operate water trucks for stabilization of surfaces under windy conditions.

For mobile and stationary source controls of construction activities, the following BMP's would be used to further reduce air quality impacts and incorporated when developing contract specifications:

- The use of heavy machinery should be fitted with approved muffling devices that reduce emissions;
- Plan construction scheduling to minimize vehicle trips;
- Limit idling of heavy equipment;
- Maintain and tune engineers per manufacture's specifications to perform at EPA certification levels, prevent tampering, and conduct inspections to ensure these measures are followed; and
- Consider alternative fuel and energy sources (e.g., natural gas, electricity) when and where appropriate.

In addition to industry-standard BMP's, the USACE will adhere to conservation measures for threatened and endangered species, and their critical habitat, as applicable, as recommended by the USFWS and NMFS. Species-specific conservation measures are identified in Appendix A.

2.3.3 Monitoring and Reporting Plan

For this project, a monitoring and adaptive management plan (MAMP) was developed and is detailed in Appendix C of the DDPR-EA. A brief description of the monitoring activities is provided here. Pre-construction/baseline data, during construction, and post-construction monitoring will be utilized to determine restoration success. Baseline monitoring will begin during PED prior to project construction and continue during construction when possible. Monitoring will continue until the trajectory of ecological change and/or other measures of project success are determined as defined by project-specific objectives. Once ecological success has been achieved, which may occur in less than ten years post-construction, no further monitoring would be performed.

The proposed performance measures metrics, desired outcomes, and monitoring design needed to measure restoration progress include:

Marsh Elevation

One LiDAR topographic survey covering all restoration units will be collected prior to construction (completed as a PED task for engineering) and recollected three times post-construction in year 1, 3, and 6. LiDAR data will be used to assess overall marsh elevation throughout the restoration unit. This technique will be used to establish whether the marsh elevation post-construction if sufficient for a healthy marsh.

Area Change

Near-vertical color-infrared digital aerial imagery will be acquired during pre-construction and used as a pre-construction standard for future changes in marsh changes and shoreline position. Three additional satellite and/or aerial photographic acquisitions will be conducted at year 1, 3, and 6, in conjunction with LiDAR missions. This technique will be used to establish whether the areal extent of the marsh is sufficient for a healthy marsh and/or if erosion is occurring.

Vegetation Composition

Vegetation will be sampled annually within permanent 100 m vegetation monitoring stations and/or transects established for assessing the vegetation community at each site. It was assumed that one vegetation transect per cell and elevation unit should be established (6 sites), along with one reference site for each vegetative community being assessed (2 sites), for a total of eight stations. The stations will be used to establish whether the marsh vegetation communities' post-construction is sufficient for a healthy marsh.

No mitigation or conservation banks are required/proposed for this project.

3.0 Species and Habitat Descriptions

The list of threatened, endangered, proposed for listing, or candidate species addressed in this BA was compiled from an official species listed using the USFWS IPaC tool (Appendix B). NMFS listed species are also described below.

3.1 Consultation History

Coordination with the USFWS, NMFS, Texas Parks and Wildlife Department (TPWD), Texas Commission on Environmental Quality (TCEQ), National Oceanic and Atmospheric Administration (NOAA), and the TGLO 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 conditions; and review of benefit and impact analyses. The following list documents coordination with USFWS and NMFS regarding ESA and general resource agency coordination:

- November 19, 2003 – Biological Opinion (BO) issued for regular maintenance hopper dredging of navigation channels and offshore sand mining for beach restoration/nourishment activities in the U.S. Gulf of Mexico by USACE's Jacksonville, Mobile, New Orleans, and Galveston Districts and its effects on 13 species and one CH within the NMFS jurisdiction. The BO covers maintenance dredging activities within the GIWW (Consultation Number F/SER/2000/01287).
- August 2, 2022 – An initial list of threatened and endangered species was acquired from the IPaC database (Consultation Code: 2022-0070249).
- October 24, 2022 – Updated Action Area map and acquired an updated list of threatened and endangered species from IPaC database.
- January 17, 2022 – Updated list of threatened and endangered species from IPaC database.

3.2 Listed Species and Critical Habitat in Action Area

Seventeen ESA-listed, candidate, or proposed for listing species protected by USFWS and/or NMFS were listed as potentially occurring in the Action Area (Table 2). Whooping crane critical habitat occurs within the Action Area.

To assess the status of species in the Action Area and potential impacts of the action on ESA-listed species and their critical habitat, 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 digital data sources (e.g., habitat databases, record occurrences, aerial imagery). 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.

Table 2. NMFS and USFWS ESA-listed species identified as potentially occurring in the Action Area. A superscript (CH) denotes a species critical habitat in the Action Area.

Common Name	Species Name	Jurisdiction	Status
BIRDS			
Attwater's Greater Prairie Chicken	*Tympanuchus cupido attwateri*	USFWS	Endangered
Piping plover	*Charadrius melodus*	USFWS	Threatened
Rufa red knot	*Calidris canutus rufa*	USFWS	Threatened
Eastern black rail	*Laterallus jamaicensis jamaicensis*	USFWS	Threatened
Whooping crane [CH]	*Grus americana*	USFWS	Endangered
Northern aplomado falcon	*Falco femoralis septentrionalis*	USFWS	Endangered
MAMMALS			
West Indian Manatee	*Trichechus manatus*	USFWS	Threatened
Sperm whale	*Physeter macrocephalus*	NMFS	Endangered
Rice's whale	*Balaenoptera ricei*	NMFS	Endangered
REPTILES			
Loggerhead sea turtle	*Caretta caretta*	USFWS/NMFS	Threatened
Green sea turtle	*Chelonia mydas*	USFWS/NMFS	Threatened
Atlantic hawksbill sea turtle	*Eretmochelys imbricata*	USFWS/NMFS	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	USFWS/NMFS	Endangered
Kemp's Ridley sea turtle	*Lepidochelys kempii*	USFWS/NMFS	Endangered
INSECTS			
Monarch butterfly	*Danaus plexippus*	USFWS	Candidate
FISH			
Oceanic whitetip shark	*Carcharhinus longimanus*	NMFS	Threatened
Giant manta ray	*Mobula birostris*	NMFS	Threatened

3.2.1 Species Eliminated from the Analysis

During the review, it was found that seven federally listed species would not be affected by the proposed action and, thus, were eliminated from further consideration because no suitable habitat exists, or the Action Area is outside of their known range(s). Because each of these species have no potential to occur in the Action Area, only a brief description of the species range and habitat was provided to document consideration (Table 3). Applicable recovery plans and 5-year review reports were relied upon for range and habitat descriptions.

Table 3. Description of species eliminated from the analysis for a *no effects* determination.

Species **Common Name** ***Scientific Name***	**Habitat Association**	**Effect Determination**	**Effects Analysis**
BIRDS			
Attwater's greater prairie chicken *Tympanuchus cupido attwateri*	Coastal prairie habitat with mid- to tall-grass diverse in grasses and flowering plants	*No effect*	Lacks suitable habitat
Northern aplomado falcon *Falco femoralis septentrionalis*	Require open grassland or savannah habitat with scattered trees or shrubs	*No effect*	Lacks suitable habitat
MAMMALS			
Sperm whale* *Physeter macrocephalus*	Prefer steep depth gradients, along the shelf break (2,300 – 3,280 feet) and deeper oceanic waters.	*No effect*	Lacks suitable habitat; outside of species known range
Rice's whale* *Balaenoptera ricei*	Restricted to a very narrow depth corridor along the shelf break in the northeastern Gulf of Mexico.	*No effect*	Outside of species known range
REPTILES			
Leatherback sea turtle *Dermochelys coriacea*	Mainly pelagic, inhabiting the open ocean. Found in coastal waters during nesting. Typically nests on beaches with a deep-water approach in Malaysia, Mexico, French Guiana, Suriname, Costa Rica, and Trinidad	*No effect*	Lacks suitable habitat; outside known range
FISH			
Oceanic whitetip shark* *Carcharhinus longimanus*	Reside in tropical and subtropical seas worldwide in the pelagic ocean, generally offshore, on the outer continental shelf, or around oceanic islands in water depths greater than 604 feet.	*No effect*	Lacks suitable habitat; outside of species known range
Giant manta ray* *Mobula birostris*	Known to occur along the east coast, within the Gulf of Mexico, and off the coast of the U.S. Virgin Islands, Puerto Rico, Hawaii, and	*No effect*	Lacks suitable habitat

Species Common Name *Scientific Name*	Habitat Association	Effect Determination	Effects Analysis
	Jarvis Island. Inhabits tropical, subtropical, and temperate water bodies and are commonly found offshore in oceanic waters and near productive coastlines. Can occur in estuarine waters near oceanic inlets		

3.2.2 Critical Habitat

Critical habitat is defined in Section 3(5)A of the ESA as a specific area(s) within a broader geographic zone that is occupied by the species, and on which is found physical and/or biological features essential to their conservation and may require special management considerations or protection (15 USC 1632A). Specific areas outside of the geographical area occupied by the species may also be included in designations of critical habitat, upon a determination that such areas are essential for their conservation.

The Action Area is within the of whooping crane critical habitat area nine – Aransas National Wildlife Refuge and vicinity, Texas (43 F.R. 20938). The final rule designating critical habitat for whooping crane was published in the Federal Register on May 15, 1978.

3.2.3 Species Accounts

Piping plover

Description, Range, and Habitat

Piping plovers are small, stocky shorebirds, typically about 7.25 inches long, with a wingspan 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 et 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, wash-over areas, mudflats, sand flats, algal flats, shoals, wrack lines, sparse vegetation, and shorelines of coastal ponds, lagoons, and ephemeral pools adjacent to salt marshes (USFWS 2009; Zonick 1997).

Piping plovers breed predominantly along the Atlantic Coast from North Carolina to eastern Canada, inland along rivers and wetlands of the northern Great Plains, and along portions of the western Great 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 (Elliot-Smith and Haig 2020). Most individuals are found on coastal beaches, sandflats, and mudflats along the Atlantic Coast and Gulf of Mexico in the winter.

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 of Mexico or Atlantic Coast, birds on Texas wintering grounds may be from any of the breeding areas (USFWS 2008).

Wintering habitat along the Texas coast can be broadly characterized as emergent tidal or wash-over areas that are unvegetated to sparsely vegetated with wet to saturated soils near water (Zonick 2000). Wintering plovers 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, wash-over 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 back beach (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 wash-over areas for feeding and roosting (USFWS 2008).

Status

USFWS listed the piping plover in 1985 as endangered in its breeding range and threatened throughout the remaining range. Piping plovers are listed as threatened in the Action Area. 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 disturbances 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 (USFWS 2008).

On the lower Texas coast, individual plovers are known to use areas about 3,000 acres in size, moving two miles or more between foraging 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 2019).

Fewer than 3,000 breeding pairs of piping plovers were detected in the U.S. and Canada in 2001 (Elliot-Smith and Haig 2020). Conservation efforts are well organized in breeding areas across North America, and special attention has more recently been focused on wintering areas. Successful cohabitation with human use of beaches is dependent on management, whereby fencing nests, restriction vehicle access, and predator control have been the most effective (Elliot-Smith and Haig 2020).

Distribution in the Action Area

Approximately 35 percent of the known global population of piping plovers' winter along the Texas Gulf Coast, where they spend 60 to 70 percent of the year from about mid-July through April. Piping plover are known to occur at Goose Island State Park (Haessly et al. 2015).

Within or near the Action Area, piping plover have been observed in groups ranging from 1-6 since 1970. There was no CH identified for piping plover in the Action Area, nor high quality habitat; however, suitable habitat is available in the vicinity of the Action Area. Piping plovers were observed in the vicinity of Goose Island State Park as recently as October 2022 (ebird.org) and are expected to continue occurring given the birds relative site fidelity.

Rufa red knot

Description, Range, and Habitat

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 Coast beaches (USFWS 2014).

The red knot breeds in the central Canadian Arctic, primarily in Nunavut Territory, Canada, but with some potential breeding habitat extending into the Northwest Territories. Breeding territories are located inland, but near arctic coasts, and foraging areas are located near nest sites in freshwater wetlands. Breeding occurs in June when favorable conditions exist, and snow-free habitat is available. Nests are found on dry, slightly elevated tundra sites, often on windswept slopes with little vegetation (Niles et al. 2008).

The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States, the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. Departure from the breeding grounds begins in mid-July and continues through August (Niles et al. 2008). Red knots tend to migrate in single-species flocks usually with more than 50 birds per flock. Red knots make one of the longest distance migrations known in the animal kingdom, traveling up to 19,000 miles annually, and may undertake long flights that span thousands of miles without stopping. Because stopovers are time-constrained, red knots require stopovers rich in easily digested food to achieve adequate weight gain (Niles et al. 2008) that fuels the next leg of migratory flight and, upon arrival in the Arctic, fuels a body transformation to breeding condition (Morrison 2006).

During both the northbound (spring) and southbound (fall) migrations, red knots use key staging and stopover areas to rest and feed. Major spring stopover areas along the Atlantic coast include Río Gallegos, Península Valdés, and San Antonio Oeste (Patagonia, Argentina); Lagoa do Peixe (eastern Brazil, State of Rio Grande do Sul); Maranhão (northern Brazil); the Virginia barrier islands (United States); and Delaware Bay (Delaware and New Jersey, United States; Cohen et al. 2009; Niles et al. 2008). Important fall stopover sites include southwest Hudson Bay (including the Nelson River delta), James Bay, the north shore of the St. Lawrence River, the Mingan Archipelago, and the Bay of Fundy in Canada; the coasts of Massachusetts and New Jersey and the mouth of the Altamaha River in Georgia, United States; the Caribbean (especially Puerto Rico and the Lesser Antilles); and the northern coast of South America from Brazil to Guyana (Schneider and Winn 2010; Niles et al. 2008). However, large and small groups of red knots, sometimes numbering in the thousands, may occur in suitable habitats all along the Atlantic and Gulf coasts from Argentina to Canada during migration (Niles et al. 2008). Red knots occur primarily along the coasts during migration; however, small numbers of red knots are reported annually across the interior United States (i.e., greater than 25 miles from the Gulf of Mexico or Atlantic Coast) during spring and fall migration.

Red knots are restricted to the ocean coasts during winter from December to February but may be present in some wintering areas as early as September or as late as May. Wintering areas for the red knot include the Atlantic coasts of Argentina and Chile (particularly the island of Tierra del Fuego that spans both countries), the north coast of Brazil (particularly in the State of Maranhão), the Northwest Gulf of Mexico from the Mexican State of Tamaulipas through Texas (particularly at Laguna Madre) to Louisiana, and the Southeast United States from Florida (particularly the central Gulf coast) to North Carolina. Smaller numbers of knots winter in the Caribbean, and along the central Gulf coast (Alabama, Mississippi), the mid-Atlantic, and the northeast United States (Niles et al. 2008).

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. The supra-tidal (above 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 knot's use of such artificial habitats. Along the Texas coast, red knots forage on beaches, oyster reefs and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides.

Status

There are six recognized subspecies of red knots (*Calidris canutus*), and in 2014, the USFWS listed the rufa subspecies (*Calidris canutus rufa*) as a threated under the ESA. 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 designated for the red knot, though it is currently proposed (86 F.R. 37410).

The rufa 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 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).

Except for localized areas, there have been no long-term systematic surveys of red knots in Texas or Louisiana. From survey work in the 1970s, Morrison and Harrington (1992) reported peak winter counts of 1,440 red knots in Texas, although numbers between December and February were typically in the range of 100 to 300 birds. Records compiled by Skagen et al. (1999) gave peak counts of 2,838 red knots along the coast of Texas between January and June from 1980 to 1996, but these figures could include spring migrants. During the Christmas Bird Count of 2017, the nearest recorded observance was Port Aransas where 71 individuals were reported. Other locations where the species was observed include: Powderhorn (53 individuals), Galveston Bay (1 individual), Mad Island Marsh—Matagorda County (4 individuals), Kennedy County Wind Turbines (18 individuals), and Flour Bluff in Corpus Christi (4 individuals).

Distribution in the Action Area

Within or near the Action Area, red knot has been observed in groups ranging from 1-6 since 2003. There was no CH identified for this species in the Action Area, nor high quality habitat; however, suitable habitat is present in the vicinity of the Action Area. Red knots were observed as recently as April 2022 (ebird.org) and are expected to continue occurring near the Action Area due to their relative site fidelity.

Eastern black rail

Description, Range, and Habitat

The eastern black rail is the most secretive of marsh birds that live in a variety of saline, brackish, and freshwater marsh habitats. It is 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. The birds primarily eat seeds, insects, and other invertebrates found in wetlands (Eddleman 1994). Foraging most likely occurs on or near the edges of stand of emerging vegetation -- both above and below the high-water line.

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. The bird's traverse through vegetation corridors on the ground and require a thick canopy of grasses, sedges, and rushes (GBRA 2022). On the Texas Gulf coast, Eastern black rails are often found in areas with Gulf Cordgrass (*Spartina spartinae*), Salt Meadow Cordgrass (*Spartina patens*), and Eastern Baccharis (*Baccharis halimifolia*; Tolliver 2017). Plant structure is considered more important than plant species composition in predicting habitat suitability (Legare and Eddleman 2001). 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 can have large areas of shallow inundation (sheet water). These wetlands can shrink and expand based on hydrologic conditions and thus provide dependable foraging habitat across the wetted areas and wetland-upland transition zones. 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).

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 for successful nesting. In addition, shallow pools that are 1-3 cm deep may be the most optimal for foraging and for chick-rearing (USFWS 2019).

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 (USFWS 2019).

3.2.3.2 Status

Eastern black rail was federally listed as threatened in 2020 and no CH was designated. Between 2010 and 2017, Texas and Florida were shown to be strongholds for wild populations, though an overall widespread reduction in utilized sites across coastal habitats was observed (USFWS 2022b).

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 (e.g., fire ants, feral pigs, nutria, mongoose, and exotic reptiles) introductions (USFWS 2022b).

3.2.3.3 Distribution in the Action Area

Historically (prior to 2011), 89% of black rail observations resided in Texas, Florida, South Carolina, and North Carolina (Watts 2016). It was estimated that Texas had 100 to 500 breeding pairs, though with low confidence (Watts 2016). The Central Texas coast, which includes Aransas County, has significant black rail history in Aransas National Wildlife Refuge (2 miles east of the Action Area) where breeding pairs were detected for many years. Reports of black rails date back to 1985 in this refuge; however, no birds have been reported since 2008 (Watts 2016).

Based on a dynamic occupancy analysis, eastern black rails have low occupancy probabilities in the Southeast Coastal Plain, which includes the Action Area (USFWS 2018). The species distribution is patchy and localized but is poorly understood given the large proportion of habitat that has not been assessed in the Central Texas coastal region.

The Action Area consists of saline marsh, a preferred habitat for eastern black rail. The project site contains approximately two acres of marsh within the existing containment levee, while the rest is open water habitat. To the east of the containment levees, lies approximately 15 acres of saline marsh with patches of open water areas (~ 1.5 acres) with an elevation ranging from two to three feet (Figure 5). National Wetland Inventory (NWI) mapping, U.S. Geological Survey (USGS) Wetland Mapping (Enwright et al. 2015), and the Texas Ecological Mapping Systems databases were reviewed to determine habitat within these areas.

Figure 5. Project area with highlight of saline marsh to the east.

The NWI identifies four main habitat types in the Action Area – estuarine and marine deepwater, estuarine and marine wetland, freshwater emergent wetland, and freshwater pond (Figure 6). The Action Area is predominantly estuarine and marine deepwater because of the buffer included for all in-water work to transport the dredged material. Goose Island State Park is estuarine/marine wetland and deepwater (Figure 7).

The Texas Ecological Mapping System data showed the Action Area consisted of open water, salty prairie, salt and brackish high and low tidal marsh, sea ox-eye daisy flats, and urban low and high intensity areas (Figure 8). The Action Area is predominantly open water, thus, the other habitats listed occur at Goose Island State Park within the vicinity of the project area (Figure 9).

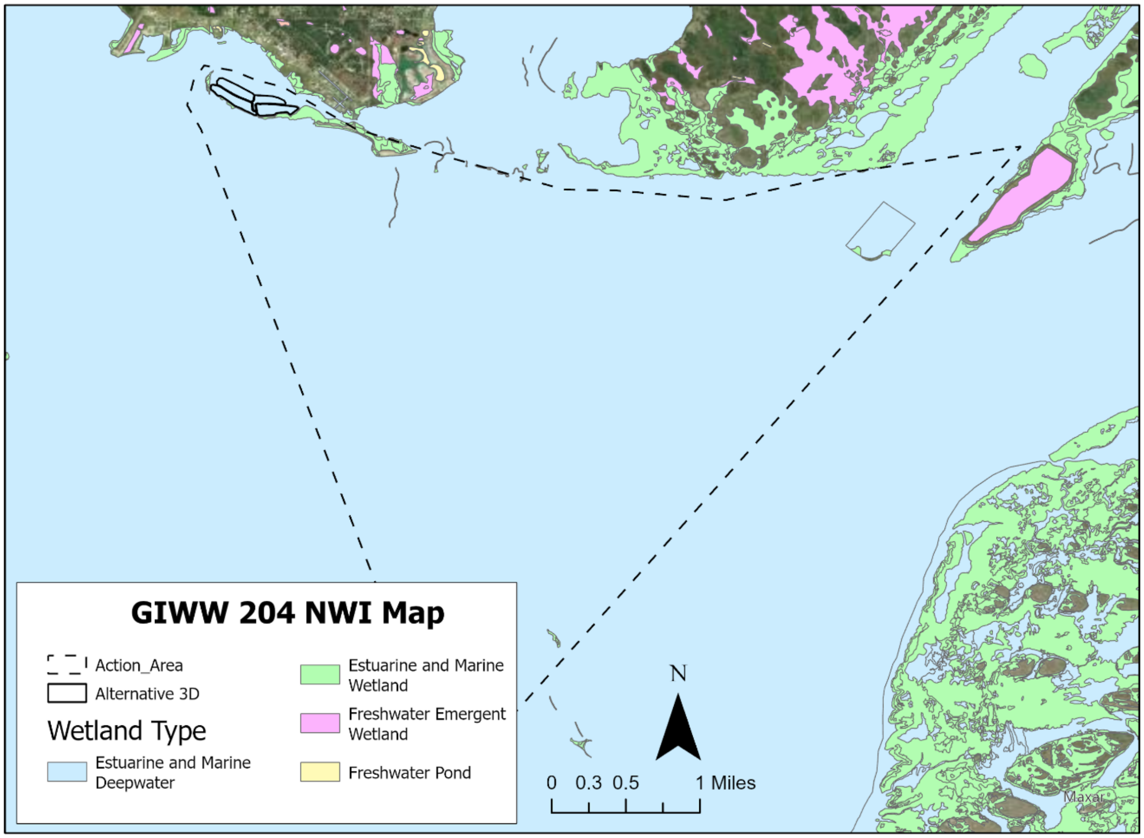

Figure 6. NWI Map of the Action Area. Wetland types data sourced from USFWS and NWI Online Da Portal

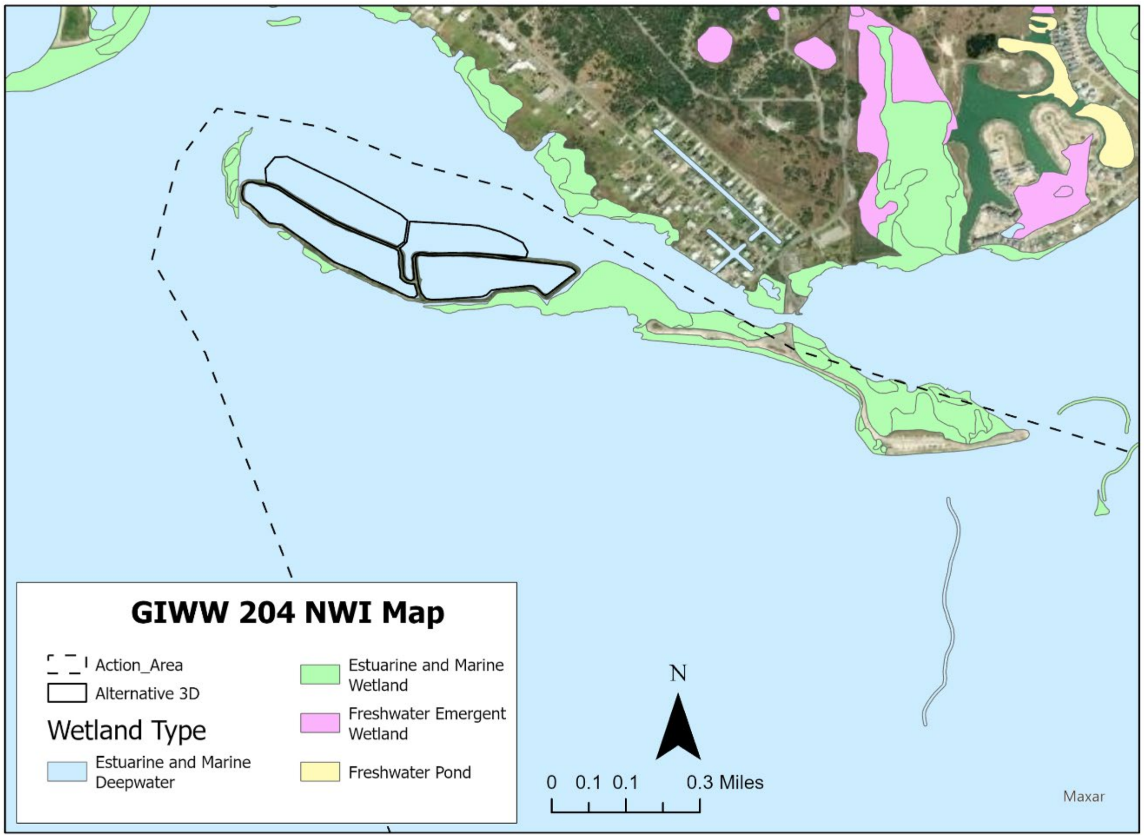

Figure 7. NWI Map of the project area. Wetland type data sourced from USFWS and NWI Online Data Portal

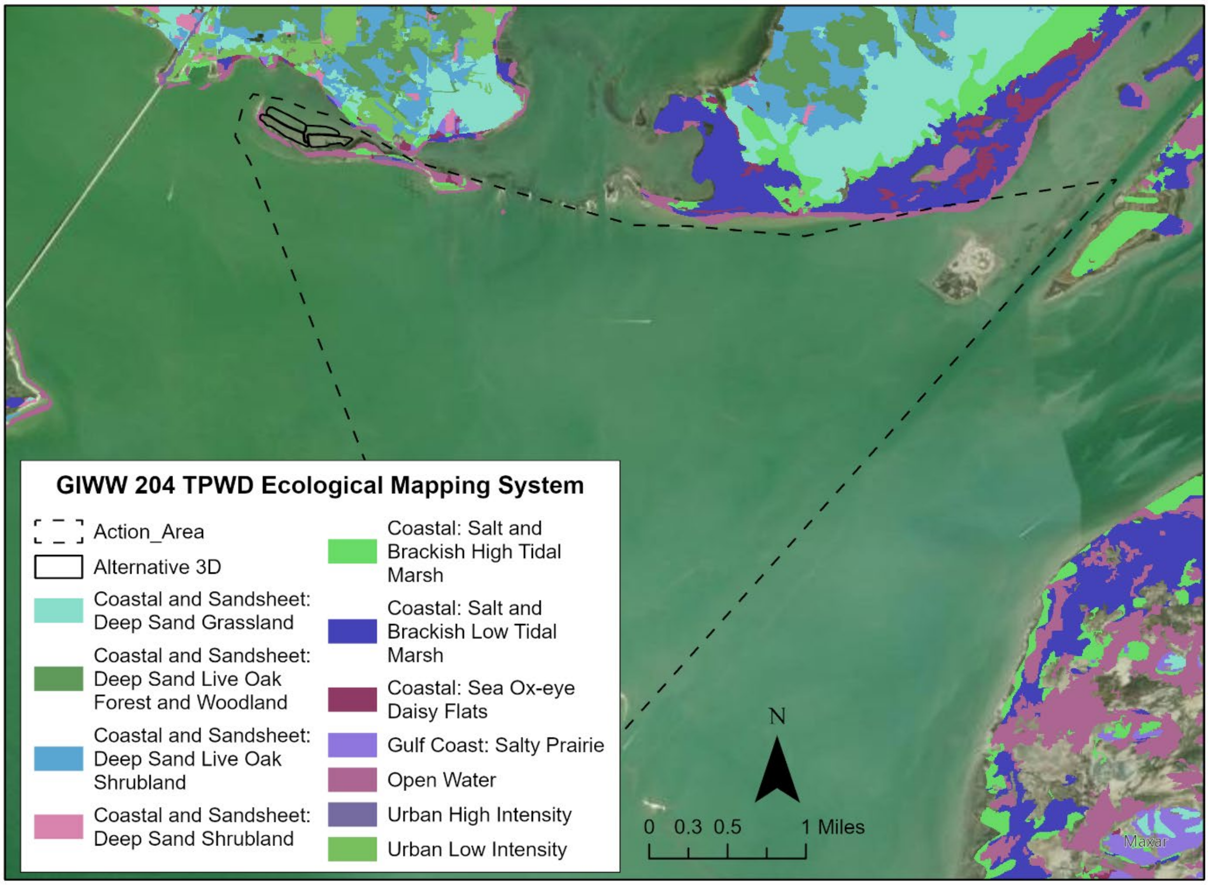

Figure 8. TPWD Ecological Mapping System habitat identification of the Action Area

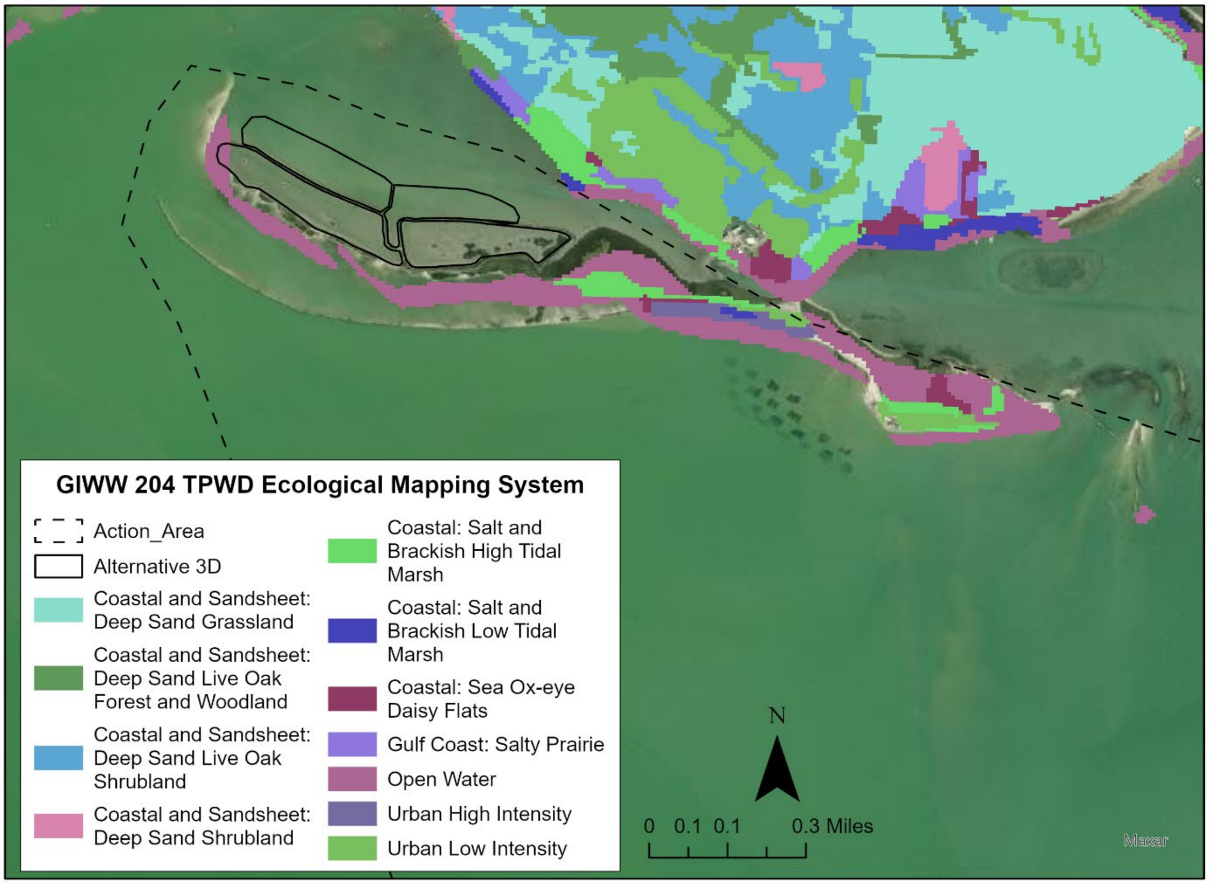

Figure 9. TPWD Ecological Mapping System habitat identification of the project area

Due to the lack of known observations of eastern black rail, it is highly unlikely this species is distributed in the Action Area; however, suitable habitat exists throughout.

<u>Whooping crane</u>

Description, Range, and Habitat

The Whooping crane is the tallest North American bird with males approaching five feet 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 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 National Wildlife Refuge (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 (Travsky and Beauvais 2004).

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 plant 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; Travsky and Beauvais 2004; CWS and USFWS 2007).

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.

Status

The Whooping crane was federally listed as endangered in 1967. 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; Travsky and Beauvais 2004; CWS and USFWS 2007).

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 ESA of 1973, 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.

Distribution in the Action Area

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 (Lewis 1995; Campbell 2003; CWS and USFWS 2007).

Whooping cranes are known to winter in the Aransas National Wildlife Refuge, located two miles east of the state park. The Action Area has included a buffer for in-water work that runs adjacent to the southern reach of the National Wildlife Refuge. This species has been observed in the state park, ranging from 1-35 birds, as early as 1977. The most recent observation of whooping cranes in Goose Island State Park was March 2022, with four birds observed (ebird.org).

The Action Area includes open water habitat within the of whooping crane CH area nine – Aransas National Wildlife Refuge and vicinity, Texas (43 F.R. 20938).

West Indian Manatee

Description, Range, and Habitat

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 (USFWS 2022c). Manatees live in marine, brackish, and freshwater systems in coastal and riverine areas throughout their range, with preference for areas near shore featuring underwater vegetation like seagrass and eelgrass (USFWS 2022c). They feed along grass bed margins with access to deep water channels, where they flee when threatened. Manatees often use secluded canals, creeks, embayment's, and lagoons, particularly near the mouths of coastal rivers and sloughs, for feeding, resting, cavorting, mating, and calving. In estuarine and brackish areas, natural and artificial fresh water sources are sought by manatees (MMC 1986).

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. Most artificial refuges are created by warm-water outfalls from power plants or paper mills (Reid and Rathbun 1986; Reid et al. 1995). 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 warmwater 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 (MMC 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 3 to 6 feet (O'Shea et al. 1995). 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.

Status

USFWS listed the West Indian manatee as endangered in 1967 and later received protection under ESA in 1973. In 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. CH for the Florida manatee subspecies (*Trichechus manatus latirostris*) was designated in 1976 (USFWS 2022c).

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. The range-wide population is estimated to be at least 13,000 manatees, with >6,500 in the southeastern U.S. and Puerto Rico. A significant increase in manatee populations have been observed over that last 25 years (USFWS 2022c).

The major threats to manatee populations include collisions with watercraft, water control structures and navigational locks, habitat loss and fragmentation from coastal development, lack of available warm-water refuges, and natural events such as red tides or cold weather events (USFWS 2001).

Distribution in the Action Area

The West Indian manatee historically inhabited the Laguna Madre, the Gulf coast, and tidally influenced portions of rivers. It is currently, however, rare in Texas waters and the most recent sightings are likely individuals migrating or wandering from Mexican waters. Historical records from Texas waters include Cow Bayou, Sabine Lake, Copano Bay, the Bolivar Peninsula, and the mouth of the Rio Grande (Würsig 2017). There have been a couple of sightings near the project area, as recently as 2021, in Corpus Christi Bay and near Aransas Pass. Intermittent sightings have occurred as far back as 1995 occurring in Buffalo Bayou. In general, when sightings have occurred, the bay and other areas had a higher incidence of water hyacinth from rain and flooding and was thought to be the reason the individuals were attracted to the area. The closest sighting was in a canal in Redfish Bay in 2021, approximately 16 miles southwest of the Action Area.

Loggerhead sea turtle

Description, Range, and Habitat

The loggerhead sea turtle is a medium to large turtle. Adults are reddish-brown in color and generally 31 to 45 inches in shell length with the record set at more than 48 inches. Loggerheads weigh between 170 and 350 pounds with records set at greater than 500 pounds. Loggerhead turtles are essentially carnivores, feeding primarily on sea urchins, sponges, squid, basket stars, crabs, horseshoe crabs, shrimp, and a variety of mollusks. Adults are predominantly bottom feeders, although they will also eat jellyfish and mangrove leaves obtained while swimming and resting near the sea surface. Presence of fish species, such as croaker in stomachs of stranded individuals may indicate feeding on the by-catch of shrimp trawling (Landry 1986). Young feed on prey concentrated at the surface, such as gastropods, fragments of crustaceans, and sargassum.

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic from Nova Scotia to Argentina, Gulf of Mexico, Pacific and Indian oceans (although it is rare in eastern and central Pacific), and the Mediterranean (Iverson 1986). This species may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, and the mouths of large rivers. Loggerhead sea turtles are considered turtles of shallow water.

Juvenile loggerheads are thought to utilize bays and estuaries for feeding, while adults prefer water less than 165 feet deep (Nelson 1986). Adults occupy various habitats from turbid bays to clear waters of coral reefs. Sub-adults occur mainly in nearshore and estuarine waters, while hatchlings move directly to the sea after hatching, and often float in masses of sargassum. They remain associated with sargassum for as long as 3 to 5 years (NFMS and USFWS 1991a).

In the continental U.S., loggerheads nest along the Atlantic coast from Florida to as far north as New Jersey (Musick 1979) and sporadically along the Gulf Coast. In recent years, a few have nested on barrier islands along the Texas coast. Nesting usually occurs on open sandy beaches above the high-tide mark and seaward of well-developed dunes. They nest primarily on high-energy beaches on barrier islands adjacent to continental land masses in warm-temperate and subtropical regions. Steeply sloped beaches with gradually sloped offshore approaches are favored. In Florida, nesting on urban beaches was strongly correlated with the presence of tall objects (trees or buildings), which apparently shield the beach from city lights (Salmon et al. 1995).

Status

USFWS listed the loggerhead sea turtle as threatened throughout its range in 1978. Although the loggerhead is the most abundant sea turtle species in U.S. coastal waters (NMFS 2006), the decline of the species, like that of most sea turtles is the result of overexploitation, inadvertent mortality associated with fishing and trawling activities, and natural predation. The most significant threats to its population are coastal development, commercial fisheries, and pollution (NMFS 2006).

Distribution in the Action Area

The loggerhead is the most abundant turtle in Texas marine waters, preferring shallow inner continental shelf waters, and occurring only very infrequently in the bays. It often occurs near offshore oil rig platforms, reefs, and jetties. Loggerheads are probably present year-round but are most noticeable in the spring when a favored food item, the Portuguese man-of-war (*Physalia physalis*), is abundant. Loggerheads constitute a major portion of the dead or moribund turtles washed ashore (stranded) on the Texas coast each year.

Several nests have been recorded along the Texas coast; however, nesting is uncommon. So far this year, five loggerhead nests have been confirmed on the Texas coast in Brazoria county, North and South Padre Islands, and Boca Chica Beach, the closest ones (2 nests) occurring approximately 40 miles south of the Action Area. Between 2014 and 2022 between 0 and 9 nests were recorded each year on the Texas Coast, with the closest occurring on Matagorda Peninsula (~ 7.5 miles northeast) in 2014 (TIRN 2022).

Goose Island State Park will not support nesting loggerhead sea turtles because of the lack of suitable habitat; however, this species could be present in the bay of the Action Area.

Green sea turtle

Description, Range, and Habitat

Green turtles are the largest of all the hard-shelled sea turtles but have a comparatively small head. Adults are unique among sea turtles in that they are herbivorous, feeding primarily on seagrasses and algae. While juveniles consume some invertebrates including mollusks and crustaceans, they are also known to feed on sponges, jellyfish, seagrasses, macroalgae, and other marine plants (Mortimer 1982).

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

The green turtle primarily utilized shallow habitats such as lagoons, bays, inlets, shoals, estuaries, and other areas with an abundance of marine algae and seagrasses. Hatchlings often float in masses of sea plants (e.g., rafts of sargassum) in convergence zones. Coral reefs and rocky outcrops near feeding pastures often are used as resting areas. Terrestrial habitat is typically limited to nesting activities (Balazs 1980) that occur during the summer from June to September. They prefer high energy beaches with deep sand, which may be coarse to fine, with little organic content. Most green sea turtles' nest in Florida and in Mexico, while nests in Texas are rare (Shaver and Amos 1988). More recently, green turtle nests were documented in Texas, of which all but one was from Padre Island National Seashore. In 2012, six green turtle nests were reported from Padres Island National Seashore and two from South Padre Island.

Status

The green sea turtle was listed in 1978, as threatened except for in Florida and the Pacific Coast of Mexico (including the Gulf of California) where it was listed as endangered. In 1998, the National Marine Fisheries Service (NMFS) designated CH to include the coastal waters around Culebra Island, Puerto Rico. In 2016, NMFS and USFWS revised the listing to identify 11 green sea turtle distinct population segments (DPS) worldwide. The proposed DPS would list the North Atlantic DPS, for the Action Area, as threatened.

The principal cause of the historical, worldwide decline of the green turtle is long-term harvest of eggs and adults on nesting beaches and juveniles and adults on feeding grounds. These harvests continue in some areas of the world and compromise efforts to recover the species. Other threats include incidental capture in fishing gear, primarily gillnets, but also in trawls, traps and pots, longlines, and dredges, as well as nesting habitat loss and disturbance from recreational use of beaches, development, erosion, and vegetation changes. Green turtles are also threatened, in some areas of the world especially in Hawaii and Florida, by a disease known as fibropapillomatosis, or "tumor" infections.

Distribution in the Action Area

Green sea turtles occasionally occur along the Texas coast and juveniles can be found in inshore waters and are most frequently observed along the South Texas coast around South

Padre Island and Padre Island National Seashore, approximately 43 miles south of the project area. So far this year, 34 green sea turtle nests have been confirmed on the Texas coast, with the closest occurring at Mustang Island, 31 miles south of the Action Area. Between 2015 and 2022, anywhere from 0 to 34 green turtle nests were recorded on the Texas coast, predominantly along Padre Island (TIRN 2022).

Goose Island State Park will not support nesting green sea turtles because of the lack of suitable habitat; however, this species could be present in the surrounding bays of the Action Area.

<u>Hawksbill sea turtle</u>

Description, Range, and Habitat

The hawksbill sea turtle is a small to medium-sized marine turtle with an elongated oval shell with overlapping scutes on the carapace, a relatively small head with a distinctive hawk-like beak, and flippers with two claws. An adult may reach up to 3 feet in length and weigh up to 300 pounds, although adults more commonly average about 2.5 feet in length and typically weigh around 176 pounds. While the species is omnivorous, it prefers invertebrates, especially encrusting organisms, such as sponges, tunicates, bryozoans, mollusks, corals, barnacles, and sea urchins. Pelagic species consume jellyfish and fish, and plant material such as algae, sea grasses, and mangroves (Mortimer 1982). The young are reported to be somewhat more herbivorous than adults (Ernst and Barbour 1972).

The hawksbill is circumtropical, occurring in tropical and subtropical seas of the Atlantic, Pacific, and Indian oceans (Witzell 1983). This species is the most tropical of all marine turtles, although it does occur in many temperate regions. The hawksbill sea turtle is widely distributed in the Caribbean Sea and western Atlantic Ocean, with representatives of at least some life history stages regularly occurring in southern Florida and the northern Gulf (especially Texas), south to Brazil (NMFS 2006).

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

Terrestrial habitat is typically limited to nesting activities. The hawksbill, which is typically a solitary nester, nests on undisturbed, deep-sand beaches, from high-energy ocean beaches to tiny pocket beaches about 10 feet wide bound by crevice of cliff walls. Typically, the sand beaches are low energy, with woody vegetation, such as sea grape (*Coccoloba uvifera*), near the waterline (NRC 1990).

In the continental US, the hawksbill largely nests in Florida where it is sporadic at best (NFWL 1980). A major nesting beach exists on Mona Island, Puerto Rico and elsewhere in the western Atlantic, hawksbills nest in small numbers along the Gulf Coast of Mexico, the West Indies, and along the Caribbean coasts of Central and Southern America (Musick 1979).

Status

The hawksbill sea turtle was federally listed as endangered in 1970 with CH designated in Puerto Rico in 1978. In 1998, NMFS designated additional CH near Isla Mona and Isla Monito, Puerto Rico, seaward to 3.9 miles.

The greatest threat to this species is harvest used to supply the market for tortoiseshell and stuffed turtle curios (Meylan and Donnelly 1999). Hawksbill shell commands high market prices: imports of the shells to Japan between 1970 and 1989 resulted in the loss of more than 670,000 turtles. The hawksbill is also used to manufacture leather oil, oil, perfume, and cosmetics (NMFS 2006). Other threats include destruction of breeding locations by beach development, incidental take in lobster and Caribbean reef fish fisheries, pollution by petroleum products (especially oil tanker discharges), entanglement in persistent marine debris, and predation on eggs and hatchlings (Meylan 1992).

Distribution in the Action Area

Texas is the only state outside of Florida where hawkbills are sighted with any regularity. Most of these sightings involve post hatchlings and juveniles and are primarily associated with stone jetties. These small turtles are believed to originate from nesting beaches in Mexico (NMFS 2006). On June 13, 1998, the first hawksbill nest was recorded on the Texas coast near Padre Island National Seashore. This nest remains the only documented hawksbill nest on the Texas coast (Shaver 2006, NPS 2020).

Hatchling and post-hatchling hawksbill turtles are known to associate with *Sargassum* sp. rafts and could be washed ashore near the vicinity of the project area or in the open-water within the Action Area with *Sargassum.*

<u>Kemp's ridley sea turtle</u>

Description, Range, and Habitat

The Kemp's ridley sea turtle is the smallest of the sea turtles, with adults reaching about 2 feet in length and weighing up to 100 pounds. The species has a triangular-shaped head and a slightly hooked beak with large crushing surfaces. The turtle's diet consists mainly of swimming crabs, but may also include fish, jellyfish, sea stars, snails, bivalves, shrimp, sea urchins, an array of mollusks, and occasional marine plants (NMFS et al. 2011).

Kemp's ridleys inhabit shallow coastal and estuarine waters, usually over sand or mud bottoms. Models indicate that the most suitable habitats are less than 32 feet in bottom depth with sea surface temperatures between 71.6°F and 89.6°F (Coyne et al. 2000). Kemp's ridleys utilize seagrass beds, mud bottom, and live bottom substrates as important developmental habitats (Schmid and Barichivich 2006). Post-nesting Kemp's ridleys travel along coastal corridors that are generally shallower than 164 feet in bottom depth (Schmid and Barichivich 2006). Females lay their eggs on coastal beaches where they incubate eggs in sandy nests.

After embryonic development, the hatchlings emerge and swim offshore into deeper, ocean water where they feed and grow until returning at a larger size to nearshore coastal habitats. This life history is characterized by three basic ecosystem zones: (1) terrestrial zone (supralittoral) – the nesting beach where both oviposition and embryonic development occur; (2) neritic zone – the nearshore (including bays and sounds) marine environment (from the surface to the sea floor) where water depths do not exceed 200 meters, including the continental shelf;

and (3) oceanic zone – the vast open ocean environment (from the surface to the sea floor) where water depths are greater than 650 feet (200 meters) (NMFS et al. 2011).

Kemp's ridleys nest on beaches from April to July. Nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in Tamaulipas, Mexico. Nesting also occurs in Veracruz and a few historical records exist for Campeche, Mexico (Marquez 1994). Nesting also regularly occurs in Texas and infrequently in a few other U.S. states. However, historic nesting records in the U.S. are limited to south Texas (Hildebrand 1963). Several scatted isolated nesting attempts have occurred from North Carolina to Colombia.

Kemp's ridley occurs in Texas in small numbers and in many cases may well be in transit between crustacean-rich feeding areas in the northern Gulf of Mexico and breeding grounds in Mexico. It has nested sporadically in Texas over the last 50 years. The number of nests has increased over the last couple of decades (NPS 2013; TIRN 2022). The majority of Kemp's ridley nests recorded in Texas were at the Padre Island National Seashore (Shaver 2006).

Status

Kemp's ridley sea turtle was listed as endangered throughout its range in 1970. Populations of the species have declined since 1947, when an estimated 42,000 females nested in one day (Hildebrand 1963), to a total nesting population of approximately 1,000 in the mid-1980s. The decline of the species was primarily due to human activities including collection of eggs, fishing for juveniles and adults, killing adults for meat and other products, and direct take for indigenous use.

Threats affecting Kemp's ridley are often specific to life stages and the habitats where they occur. Shoreline threats (nesting beach) to the species include illegal harvest, beach cleaning, human presence during recreation or construction, recreational beach use, beach vehicular driving, construction activities such as beach nourishment, shoreline stabilization, and development, energy exploration, development and removal, ecosystem alterations such as beach erosion, vegetation composition changes, and invasive species, pollution from oil spills, exposure to toxins and chemicals from illegal dumping and garbage, and light, predation, and disease (NMFS et al. 2011).

In open water, sea turtles caught in commercial and recreational fisheries are often injured or killed. Of all commercial and recreational fisheries in the U.S., shrimp trawling has had the greatest effect on the status of sea turtle populations, followed by dredges, longlines, nets, and traps/pots. Entanglement in fishing gear can lead to abrasions, restrictions, tissue necrosis, and drowning. Turtles are also susceptible to illegal harvest and boat strikes while in the water (NMFS et al. 2011).

Distribution in the Action Area

Texas coasts are important foraging and inter-nesting habitats for the species. Satellite-tracking indicated that nesting Kemp's ridley turtles remain in near-shore waters of the upper Texas coast during their 3.5 month-long nesting season (April through mid-July; Seney and Landry 2008). So far this year, 284 Kemp's ridley sea turtles have nested on Texas beaches, of which 167 were within 50 miles of the Action Areas (4 on Matagorda Peninsula [7.5 miles northeast], 15 on Mustang Island [27 miles south], and 148 at North Padres Island and Padre Island National Seashore [43 miles south]), and 78 were within 135 miles south at South Padre Island (TIRN 2022). The majority of Kemp's ridley nesting occurs along Padre Island; however, the turtles consistently nested at Mustang Island and Matagorda Island or Peninsula since 2019, with an area record of 2017 at the peninsula (7 nests; TIRN 2022).

Of all the sea turtles potentially present within the Action Area, Kemp's ridley has the highest potential for occurrence based on habitat requirements, nesting records, and research. Given the habitat in the Action Area is a coastal marine marsh, it is improbable that this species would be found nesting, because of the lack of suitable nesting habitat. However, Kemp's ridley turtles may forage, rest, or move in and near the Action Area, throughout the bays in the surrounding estuaries.

<u>Monarch butterfly</u>

Description, Range, and Habitat

Monarch butterflies are marked by orange and black coloration and classic one spots along the peripheral of their wings. Monarchs are a globally distributed butterfly throughout 90 countries, islands, and island groups. Monarch butterflies migrate up to 2,500 miles each year, from as far north as Canada, across the U.S. to congregate at forested overwintering sites in mountainous areas of central Mexico and coastal California. The North American populations (eastern and western) represent unique genetic and ecological diversity, embodying the ancestral lineage and maintaining the current and historical core of this species (USFWS 2020). North American monarchs are the only populations with long-distance migratory ability. The eastern population is the largest, by number of individuals and range, while the western population is distributed in as much as 30% of the geographic range in North America. The availability, distribution, and quality of milkweed is essential to monarch reproduction and survival; loss of which is a key driver in monarch declines (USFWS 2020 and citations therein).

Status

Over the last two decades, monarch populations in North America have declined, prompting the USFWS to initiate steps to conserve them throughout their range. The primary threats to the migratory populations of monarchs are changes in breeding, migratory, and overwintering habitat, exposure to insecticides, and climate change (e.g., drought). Important habitats have been converted for agricultural use and urban development. In Mexico, logging and thinning has reduced the extent of overwintering sites, while unsuitable management in California has damaged overwintering groves in this range (USFWS 2020). The probability of extinction was estimated to range from 48 to 99% for the North American migrating populations, varying with current and projected future conditions.

Distribution in the Action Area

Monarch butterflies are known to migrate through Goose Island State Park and nearby Aransas National Wildlife Refuge. Their presence can last for a few days or overnight, largely dependent on food availability and weather. Monarchs typically migrate across the Texas coast from the end of October through mid-November (Ebert 2018).

4.0 Environmental Baseline

The Action Area currently consists of two earthen containment levees that encompass 23 acres of open-water and scattered saline marsh. Using 2022 aerial imagery from Google Earth, it was estimated that approximately 2 acres of saline marsh exists within the interior of the containment levee cells. The marsh is concentrated in the eastern cell and is covered by saltmarsh cordgrass, predominantly. Submerged aquatic vegetation (SAV) may occur within the containment cells, albeit at very low quantities, due in part, to sedimentation and smothering as described by local resource experts. A stone breakwater (5,400 feet long) was constructed south (~ 675 feet away) of the containment levees in 2008 to reduce erosive forces (Figure 10).

Figure 10. Existing conditions at the proposed site.

The predominant wetland habitats in the Action Area are saline marsh and estuarine open water. The amalgamation of sea level change, subsidence, erosion, and reduced sediment supplies have resulted in a significant loss of wetlands and coastal habitats in the region. Over the past several decades, Goose Island State Park has undergone physical deterioration, losing nearly 25 acres of marsh between 1969 and 2002. Erosion and submergence have continued since 2002 leading to more land loss; this loss led to the construction of the containment levees and breakwater. The previous restoration efforts have been successful in reducing the erosive forces, and thus, degradation of the marsh cells. Some marsh accretion has begun along the north-eastern edge of the breakwater.

Saline marsh is a critical habitat for terrestrial and aquatic organisms in the Action Area, in which restoring the marsh would provide essential habitat to a wide range of organisms and contribute to regional efforts of enhancing ecological sustainability.

5.0 Effects on Species and Habitat

The following section provides the findings of USACE and the effect determinations for each species and their critical habitat, if applicable. Effect determinations were made following the definitions in the ESA:

- ***No effect*** – the proposed action will not affect a federally-listed species or critical habitat.
- ***May affect, but not likely to adversely affect*** – the project may affect listed species and/or critical habitat; however, the effects are expected to be discountable, insignificant, or completely beneficial; or
- ***Likely to adversely affect*** – adverse effects to listed species and/or critical habitat may occur as a direct result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or completely beneficial.

The analysis separates the effects of the action into beneficial, direct, and indirect, followed by the effects determination. Section 5.8 discusses the cumulative effects of the proposed action as defined in the ESA.

- ***Beneficial Effect*** – contemporaneous positive effects without any adverse effects to the species.
- ***Indirect Effect*** – those effects that are caused by or will result from the proposed action and are later in time but are still reasonably certain to occur (50 CFR §402.02).
- ***Cumulative Effects*** – those effects of future State or private activities, not involving current or future federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation (50 CFR §402.02).

The effects on a protected species and the habitat used by the species, as described above, were considered when determining the extent of impacts from proposed construction activities. The most likely potential impacts to federally listed species in the Action Area are temporary disturbance and displacement during construction of the containment levee and placement of material within the restoration units. Planned measures to reduce the impacts to these species are provided in Appendix A. These will help to reduce the potential for negative effects to protected species.

5.1 Piping plover and Rufa red knot

Both species have similar foraging and roosting behaviors and share similar coastal habitats in the Action Area, thus, the effects of the action on the two species is expected to be similar and will be discussed together.

5.1.1 Indirect Effects

<u>Equipment and Artificial Lighting</u>

The use of heavy machinery or equipment during construction of the containment levee and placement of material for marsh restoration may disturb piping plover and rufa red knot by increasing noise levels near foraging and roosting habitat. Birds may be temporarily displaced from foraging, loafing, and roosting locations to other areas within or adjacent to the Action Area. It is anticipated that once the disturbance ceases, piping plovers and red knots would return to using the area. Temporary adverse impacts are anticipated to be insignificant and discountable, particularly because most construction activities are proposed to occur outside of preferred habitat for both species. Staging areas and construction easements may be in or adjacent to suitable habitat for the birds, otherwise most activities will occur in the water or in saline marsh habitat.

Should construction activities occur during dawn or dusk, then lighting will be required. Work lights may disturb roosting piping plovers and red knots, which may result in displacing birds to other locations adjacent to the Action Area. The timing and duration of this disturbance would be temporary and occur infrequently, as lights would only be used when proposed activities must occur at night.

Conservation measures would be implemented to further avoid any negative effects to piping plover and red knots (Appendix A).

5.1.2 Effects Determination – "May affect, not likely to adversely affect"

Piping plover and rufa red knot could occur adjacent to the Action Area, likely in equipment staging areas or construction easements. The USACE has determined the proposed action ***may affect, but is not likely to adversely affect*** piping plover and rufa red knot because the temporary adverse impacts are anticipated to be insignificant and discountable, especially since conservation measures will be incorporated into the plan, and preferred habitat does not occur within the Action Area.

5.2 Eastern black rail

5.2.1 Beneficial Effects

The proposed action intends to create 39 acres of saline marsh, with varying elevations, that is regarded as preferred habitat by eastern black rails. The habitat could provide adequate nesting, foraging, roosting, and shelter (to evade predation) to this species that may be critical in expanding their distributions throughout the Southeast Coastal Plain region. The marsh is being designed to withstand the effects of sea level rise to delay the likelihood of degradation.

5.2.2 Direct Effects

Equipment and Artificial Lighting

The use of heavy machinery or equipment during construction of the containment levee and placement of material for marsh restoration may disturb piping plover and rufa red knot by increasing noise levels near foraging and roosting habitat. Birds may be temporarily displaced from foraging, loafing, and roosting locations to other areas within or adjacent to the Action Area. It is anticipated that once the disturbance ceases, piping plovers and red knots would return to using the area. Temporary adverse impacts are anticipated to be insignificant and discountable, particularly because most construction activities are proposed to occur outside of preferred habitat for both species. Staging areas and construction easements may be in or adjacent to suitable habitat for the birds, otherwise most activities will occur in the water or in saline marsh habitat.

Should construction activities occur during dawn or dusk, then lighting will be required. Work lights may disturb roosting piping plovers and red knots, which may result in displacing birds to other locations adjacent to the Action Area. The timing and duration of this disturbance would be temporary and occur infrequently, as lights would only be used when proposed activities must occur at night.

Conservation measures would be implemented to further avoid any negative effects to piping plover and red knots (Appendix A).

Food supply

Eastern black rails forage in highly productive wetland ecosystems on a variety of aquatic and terrestrial invertebrates, insects, and seeds by pecking or gleaning individual items (USFWS 2019). Currently, the project area is predicated by open water with less than 10% total coverage of emergent vegetated areas. The open-water habitat is not conducive for black rail habitation presently. Restoration of the interior marsh with increased vegetated areas will provide suitable foraging habitat for eastern black rails. However, while dredge material is settling, and marsh is establishing, available food sources will temporarily be disrupted.

Infaunal benthic communities typically recover and/or establish within one to three years of placing dredged material; thus, the effects on potential food sources for eastern black rails would be temporary. Because of the available foraging habitat in adjacent areas, and lack of black rail counts in the Action Area, these effects are discountable.

5.2.3 Indirect Effects

Short-term, indirect effects on this species if present during marsh restoration activities could include disturbance from construction and human activities. Should black rails be present in adjacent areas during construction, they may be temporarily displaced to nearby areas for foraging and roosting due to nuisance noises from in-water/placement operations.

5.2.4 Effects Determination – "May affect, not likely to adversely affect"

Preferred habitat of the eastern black rail occurs in the Action Area, though no records of black rail have been reported for this specific area to date. Marsh restoration activities would temporarily impact the area during placement of dredge material and construction of the containment levees. Currently, Goose Island State Park is mostly open-water habitat that is unsuitable for eastern black rails; however, implementation of the proposed project will directly benefit black rails by creating 39 acres of suitable habitat that should establish within three to five years. The proposed project includes conservation measures, as described in Appendix A, that would be used to lessen or avoid impacts to eastern black rails.

Based on the effects described in this section and implementation of the conservation measures described in Appendix A, the USACE determined the proposed action ***may affect, but is not likely to adversely affect*** threatened eastern black rails.

5.3 Whooping crane

5.3.1 Beneficial Effects

Implementation of the proposed action will contribute to recovery of the species through marsh restoration and protection from future development. The International Recovery Plan lists protecting wintering habitat to accommodate expanding crane populations as a recovery action (CWS and USFWS 2007). By restoring the marsh habitat, at least two identified recovery actions would be addressed (1.5.3.6 – better manage deposition of dredge material; 1.5.5 – create wetland habitat). In general, marsh restoration actions would be beneficial to the whooping crane through increasing quality foraging habitat. In the long-term, restoration of the marsh could serve as a wintering site to populations occurring in the vicinity of the state park (i.e., Aransas National Wildlife Refuge).

5.3.2 Direct Effects

Equipment and Artificial Lighting

To the best extent practicable, construction would be avoided from October 1 through April 15 when the cranes are most likely to be present in the Action Area. If construction must occur during this time because of available dredging windows, the direct impacts to whooping cranes include noise disturbance during foraging activities or habitat avoidance while construction equipment is operating. These impacts are temporary and would cease after construction is complete. It is highly unlikely that mortality of any individuals would occur during construction because the birds are able to avoid the construction area.

Food supply

While dredge material is settling, and marsh is establishing, available food sources at Goose Island State Park will temporarily be disrupted. Whooping cranes are omnivorous and probe the soil subsurface, soil surfaces, or vegetation for small invertebrates, insects, grains, fish, and plants (CWS and USFWS 2007). Infaunal benthic communities typically recover and/or establish within one to three years of placing dredged material; thus, the effects on potential food sources for whooping cranes would be temporary. Currently, the restoration areas are mostly open-water and are not likely used frequently by whooping cranes for foraging. Because of the available foraging habitat in the Aransas National Wildlife Refuge, and the region, these indirect effects are discountable. Over the long-term, creation of new saline marsh would increase the available foraging habitat for whooping cranes in the Action Area.

5.3.3 Indirect Effects

Short-term, indirect effects on this species if present during marsh restoration activities could include disturbance from construction and human activities. Should whooping cranes be present in adjacent areas during construction, they may be temporarily displaced to nearby areas for foraging due to nuisance noises from in-water/placement operations.

5.3.4 Critical Habitat

Construction activities would occur outside of designated critical habitat for whooping cranes.

5.3.5 Effects Determination – "May affect, not likely to adversely affect"

Whooping cranes could occur in the Action Area, particularly if construction activities occur during their wintering period. USACE has determined the proposed action ***may affect, but is not likely to adversely affect*** whooping cranes because the temporary adverse impacts are anticipated to be insignificant and discountable, especially since conservation measures will be incorporated into the plan, and the overall beneficial impacts would far outweigh any negative impacts. The proposed action ***is not likely to adversely modify*** critical habitat for whooping cranes as all construction activities are proposed to occur outside of critical habitat for the species. The closest construction activities will be in-water actions, just as transport of dredge material via pipeline, which will not occur within the designated CH.

5.4 West Indian manatee

5.4.1 Beneficial Effects

The project includes restoring 23 acres of marsh and building an additional 16 acres of saline marsh, which are designed to improve water quality. Construction activities are not anticipated to affect any established seagrass beds that may occur in the Action Area. Improved water quality may in fact promote new growth of submerged aquatic vegetation which could provide additional foraging resources for West Indian manatees.

5.4.2 Direct Effects

Physical Obstruction and Entrapment

In the rare instance that a manatee occurs in the Action Area, in-water work during in-water work during placement of pipelines, operation of watercraft to move material or equipment, 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, pumps, barriers, placement equipment, support watercraft, or other in-water construction activities. Although this is unlikely due to the rare occurrence of West Indian manatee in the Action Area, conservation measures would be incorporated to avoid harassment and take of manatee (Appendix A).

5.4.3 Effects Determination – "May affect, not likely to adversely affect"

The Action Area waters are too cold during winter months and contain small patches of submerged or emergent aquatic vegetation required by the manatee, limiting it to rare stray or transient occurrences. Manatees are rare in the Action Area and conservation measures would be implemented (Appendix A); however, because manatees do occur in the region, the proposed action ***may affect, but not likely adversely affect*** the West Indian manatee.

5.5 Sea turtles

5.5.1 Direct Effects

Equipment and Artificial Lighting

The use of heavy machinery or equipment during construction of the containment levee and placement of material for marsh restoration may disturb sea turtles by increasing noise levels and turbidity.

Turtles may be temporarily displaced from swimming in the Action Area to other areas within or adjacent to the Action Area. It is anticipated that once the disturbance ceases, sea turtles could return to using the area. Temporary adverse impacts are anticipated to be insignificant and discountable, particularly because construction activities will not occur on beaches where sea turtles are more likely to be present. However, in-water work activities could temporarily disrupt swimming sea turtles that are foraging or transiting to nesting locations.

Should construction activities occur during dawn or dusk, then lighting will be required. Work lights can confuse sea turtles possibly leading to injury or mortality. This impact could be reduced by using the minimum amount of light necessary through reduced wattage, shielding, lowering, and/or use of low-pressure sodium lights during project construction. The timing and duration of this disturbance would be temporary and occur infrequently, as lights would only be used when proposed activities must occur at night.

Conservation measures would be implemented to further avoid any negative effects to sea turtles (Appendix A).

Macrofaunal Community

Construction of the containment levees and placement of dredge material would have a minor and temporary impact on the macroinfaunal community within the proposed work area during construction activities. Once levees are constructed, the area within the footprint of the levee(s) would not be available for recolonization by benthic organisms immediately. During construction, turbidity and sedimentation levels would be elevated within the immediate vicinity of construction. These would be temporary and would return to normal once construction is completed.

Physical Obstruction and Entrapment

In-water work during placement of pipelines, operation of watercraft to move material or equipment, could impact sea turtles. 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, pumps, barriers, placement equipment, support watercraft, or other in-water construction activities. Although this is unlikely to occur due to the transient nature of sea turtles in the Action Area, conservation measures would be incorporated to avoid harassment and take of sea turtles (Appendix A).

5.5.2 Effects Determination – "May affect, not likely to adversely affect"

Sea turtles may transit through open water areas in the Action Area; thus, conservation measures would be implemented (Appendix A). The USACE determined the proposed action ***may affect, but not likely adversely affect*** sea turtles because the temporary adverse impacts are anticipated to be insignificant and discountable. As the project does not propose any construction activities in preferred habitat for sea turtle species, their presence in the project area is unlikely.

5.6 Monarch butterfly

5.6.1 Direct Effects

<u>Equipment Use</u>

The use of heavy machinery or equipment during construction of the containment levee and placement of material for marsh restoration may disturb monarch butterflies by increasing noise levels and crushing vegetation.

Butterflies may be temporarily displaced from the Action Area to avoid construction equipment. Saline marshes do not harbor preferred plants for monarch butterflies, or critical vegetation (e.g., milkweed) needed for their continued existence; however, nectar flowers could be disturbed that the butterflies use for foraging. Most plants used by monarchs require freshwater and have very low salt tolerance; thus, any impacts associated with crushed vegetation is expected to be insignificant and discountable. Some inland plants could be disturbed on access routes and in staging areas, though, this will be avoided to the greatest extent practicable and movement will be restricted to bare dirt when possible.

5.6.2 Effects Determination – "May affect, not likely to adversely affect"

Monarchs may transit through the Action Area during their annual migration. Construction activities ***may affect, but are not likely to adversely affect*** monarch butterflies because they are typically present in Goose Island State Park for a narrow window (end of October through mid-November). It is expected that adverse impacts would cease upon completion of construction activities.

6.0 Conclusion and Effects Determination

With the conservation measures outlined in Appendix A in place to reduce the potential for negative effects to protected species, Table 3 presents the USACE's effect determinations for the proposed action on federally listed, or proposed for listing, species and their critical habitat. Submittal of this BA by the USACE, Galveston District to the USFWS and NMFS will initiate the Section 7 review process under the ESA.

Table 4. Effects determination for ESA-species identified as occurring or potentially occurring in the Action Area and their critical habitat. A superscript (CH) denotes a species critical habitat in the Action Area. NLAA = not likely to adversely affect; LAA = likely to adversely affect; NLAM = not likely to adversely modify critical habitat.

Common Name	Species Name	Jurisdiction	Effect Determination
BIRDS			
Attwater's Greater Prairie Chicken	*Tympanuchus cupido attwateri*	USFWS	*No effect*
Piping plover	*Charadrius melodus*	USFWS	*NLAA*
Rufa red knot	*Calidris canutus rufa*	USFWS	*NLAA*
Eastern black rail	*Laterallus jamaicensis jamaicensis*	USFWS	*NLAA*
Whooping crane ^{CH}	*Grus americana*	USFWS	*NLAA; NLAM*
Northern aplomado falcon	*Falco femoralis septentrionalis*	USFWS	*No effect*
MAMMALS			
West Indian Manatee	*Trichechus manatus*	USFWS	*NLAA*
Sperm whale	*Physeter macrocephalus*	NMFS	*No effect*
Rice's whale	*Balaenoptera ricei*	NMFS	*No effect*
REPTILES			
Loggerhead sea turtle	*Caretta caretta*	USFWS/NMFS	*NLAA*
Green sea turtle	*Chelonia mydas*	USFWS/NMFS	*NLAA*
Atlantic hawksbill sea turtle	*Eretmochelys imbricata*	USFWS/NMFS	*NLAA*
Leatherback sea turtle	*Dermochelys coriacea*	USFWS/NMFS	*No effect*
Kemp's Ridley sea turtle	*Lepidochelys kempii*	USFWS/NMFS	*NLAA*
INSECTS			
Monarch butterfly	*Danaus plexippus*	USFWS	*NLAA*
FISH			
Oceanic whitetip shark	*Carcharhinus longimanus*	NMFS	*No effect*
Giant manta ray	*Mobula birostris*	NMFS	*NLAA*

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Appendix A – Conservation Measures

Conservation Measures

5.1 Species Training and Monitoring

Measures that apply to species-specific training for biological monitors that will be present during construction activities include:

- All personnel (contractors, workers, etc.) will attend training sessions prior to the initiation of, or their participation in, project work activities.
- Training will include: 1) recognition of piping plover, rufa red knot, eastern black rail, whooping crane, West Indian manatee, and sea turtles, their habitat, and sign; 2) impact avoidance and minimization measures; 3) reporting criteria; 4) contact information for rescue agencies in the area; and 5) penalties of violating the ESA.
- Training will include a half-day session coordinated with the USFWS on bird and marine mammal identification. Documentation of this training, including a list of attendees will be submitted to the USFWS prior to start of sediment placement and as new members are trained.
- A minimum of one qualified biological monitor will be assigned to each active work area. The biological monitor will inspect the active work areas prior to the start of work every day and continuously throughout the day.
- Biological monitor's qualifications will be submitted to USFWS prior to start of the project.
- USACE will provide the USFWS with the name of a single point of contact (POC) responsible for communicating with the crew and biological monitor(s) and reporting on endangered species issues during project construction.

5.2 Piping plovers and Rufa red knots

The following conservation measures would be implemented to minimize the potential for adverse effect to piping plover and red knot:

- For any work occurring during the wintering season (July 15 through May 15), wildlife monitor(s) will inspect the active work areas prior to the start of work daily and continuously throughout the day.
- Construction works 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 with a 75-foot 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.

5.3 Eastern black rail

Implementation of the following conservation measures and best management practices will likely minimize potential adverse effects to Eastern Black Rail and provide additional protection to existing suitable habitat.

- If the USACE does not assume Eastern Black rail occupancy, an assessment (e.g., surveys) must be conducted of all project habitats to determine presence or absence of Eastern Black rail within the project area. Survey recommendations will be given on a project-by-project basis; please coordinate with the Texas Coastal Ecological Service's Field Office.

- Avoid disturbance activities in or adjacent to Eastern Black rail suitable habitat (dense herbaceous groundcover with intermittently flooded soils, near shallow water up to 6.0 cm; FR p. 63767, 63798, 63800).
- A biological monitor qualified to identify Eastern Black rail (has completed training requirements previously identified) and with stop work authority will be on site while construction is in progress. The biological monitor will stop construction work immediately upon discovery of any Eastern Black Rail (alive injured or dead). The Texas Coastal Ecological Service's Office should be contacted immediately at 281-286-8282.
- The biological monitor will ensure a sufficiently slow pace of all equipment moving through potential suitable habitat to allow birds to escape ahead of equipment or dredge material placement activities. This secretive species will run to escape oncoming disturbance and are not likely to fly to avoid collisions with equipment or materials being deposited within the project area.
- Workers, temporary or permanent, should be educated on the importance and protection allocated to this species, including but not limited to not collecting feathers or eggs, not disturbing nests, and not touching or harassing this species.
- Efforts to mitigate noise and vibration will be implemented within and adjacent to Eastern Black rail suitable habitat including planning and performing work outside of peak breeding call time (i.e., one hour before and after dawn and one hour before and after dusk).
- Project activity will be limited to daylight hours to the maximum extent possible. If nighttime work is required, aim lighting at work zone and turn off when not needed. All permanent lighting should be pointed away from potential Eastern Black rail suitable habitat, down shielded, and follow the International Dark-Sky Association (https://www.darksky.org/) or Bird City Texas (htttps://tpwd.texas.gov/wildlife/birding/bird-city-texas) guidelines.
- Prohibit any vegetation clearing in Eastern Black rail suitable habitat.

5.4 Whooping crane

- A biological monitor will be present when any work is being done in suitable wetland habitat if the work is performed during the winter season (October 1 through April 15).
- Prior to the start of work each day, the project are 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.
- Any equipment used in construction equal to or higher than 15 feet (~4.6 m) 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.
- 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 337-536-9596.

5.5 West Indian Manatees

The following conservation measures would be implemented to minimize the potential for adverse effects to manatees:

- Qualified biologists trained to identify manatees (has completed training requirements previously identified), with stop work authority, will monitor for the presence of manatee during phases which involve open water work. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s) and notifying the biological monitor if identified in the project area.
- Before activities occur in open water areas, a 50-foot radius of the work area should be delineated. If a manatee(s) is observed within the 50-foot radius, the biological monitor shall halt all in-water operations, including vessels. Activities shall 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.
- If a manatee is sighted within 100 yards of the active work zone, vessels will operate at no wake/idle speeds. All personnel associated with the project shall be instructed about the presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees.
- 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.
- Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project.
- Temporary signs that have already been approved for this use by the USFWS must be used. One sign which reads "Caution: Boaters" must be posted. A second sign measuring at least 8.5" 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.
- If siltation or turbidity barriers are used, they will be made of material in which manatees cannot become entangled, should be properly secured, and regularly monitored to avoid entrapment or entanglement. Barrier should not impede manatee movement.
- Any manatee sightings will be immediately reported to the U.S. Fish and Wildlife Service Houston Ecological Services Office. Any collision with or injury to a manatee shall be reported immediately to the Texas Marine Mammal Stranding Network Hotline at 888-9-MAMMAL and the Texas Coastal Ecological Services Field Office at 281-286-8282, extension 26504.

No additional monitoring would be required pre- or post-construction, due to the extremely low potential for the species to occur in the action area.

5.6 Sea turtles

Under GRBO, the following reasonable and prudent measures/terms and conditions were incorporated into the final BA:

- use of temporal dredging windows, when possible;

- intake and overflow screening;
- use of sea turtle deflector drag heads;
- observer reporting requirements; and
- sea turtle relocation/abundance trawling.

These measures would be incorporated during any dredging activities that would occur in the GHC and for which dredged material could be beneficially used for this project. Each of these have largely been incorporated in USACE regulatory and civil works projects throughout the Gulf of Mexico for more than a decade.

5.7 Construction Site, Access, and Equipment

The following measures apply to construction access and equipment usage during marsh restoration and in-water construction activities:

- Project equipment and vehicles transiting between the staging area and restoration site will be minimized to the extent practicable, including but not limited to using designated routes and confining vehicle access to the immediate needs of the project.
- The contractor will coordinate and sequence work to minimize the frequency and density of vehicular traffic within and near the restoration unit(s) and limit driving to the greatest extent practicable.
- Use of construction lighting at night shall be minimized, directed toward the construction activity area, and shielded from view outside of the project area to the maximum extent practicable.

5.8 Marsh-Quality Sand and Placement

Measures that apply to marsh-quality sand placement during restoration activities include:

- Sand placed in the marsh will be locally sourced and of marsh-quality; consistent in grain size, color, and composition of the existing marsh; and free of hazardous contaminants and deleterious material.
- Sand will be placed and maintained in a manner to minimize scarping.
- Fill sand will be graded to the correct orientation and slope, and all escarpments/ruts leveled during restoration activities.

Appendix B – USFWS IPaC Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
Phone: (281) 286-8282 Fax: (281) 488-5882

In Reply Refer To: January 17, 2023
Project Code: 2022-0070249
Project Name: GIWW CAP 204

Subject: 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, Corpus Christi, and Alamo, Texas, have combined administratively to form the Texas Coastal Ecological Services Field Office. All project related correspondence should be sent to the field office address listed below responsible for the county in which your project occurs:

Project Leader; U.S. Fish and Wildlife Service; 17629 El Camino Real Ste. 211; Houston, Texas 77058
Angelina, *Austin*, *Brazoria*, *Brazos*, *Chambers, Colorado, Fayette, Fort Bend, Freestone, Galveston, Grimes, Hardin, Harris, Houston, Jasper, Jefferson, Leon, Liberty, Limestone, Madison, Matagorda, Montgomery, Newton, Orange, Polk, Robertson, Sabine, San Augustine, San Jacinto, Trinity, Tyler, Walker, Waller, and Wharton.*

Assistant Field Supervisor, U.S. Fish and Wildlife Service; 4444 Corona Drive, Ste 215; Corpus Christi, Texas 78411
Aransas, Atascosa, Bee, Brooks, Calhoun, De Witt, Dimmit, Duval, Frio, Goliad, Gonzales, Hidalgo, Jackson, Jim Hogg, Jim Wells, Karnes, Kenedy, Kleberg, La Salle, Lavaca, Live Oak, Maverick, McMullen, Nueces, Refugio, San Patricio, Victoria, and Wilson.

U.S. Fish and Wildlife Service; Santa Ana National Wildlife Refuge; Attn: Texas Ecological Services Sub-Office; 3325 Green Jay Road, Alamo, Texas 78516
Cameron, Hidalgo, Starr, Webb, Willacy, and Zapata.

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. 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. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/media/endangered-species-consultation-handbook.

Non-Federal entities may consult under Sections 9 and 10 of the Act. Section 9 and Federal regulations prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined (50 CFR § 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR § 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Should the proposed project have the potential to take listed species, the Service recommends that the applicant develop a Habitat Conservation Plan and obtain a section 10(a)(1)(B) permit. The Habitat Conservation Planning Handbook is available at: https://www.fws.gov/media/habitat-conservation-planning-and-incidental take-permit-processing-handbook.

Migratory Birds:
In addition to responsibilities to protect threatened and endangered species under the Act, there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts visit: https://www.fws.gov/program/migratory-birds.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable National Environmental Policy Act (NEPA) documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Migratory Birds
- Marine Mammals
- Wetlands

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 whether any 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:

Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
(281) 286-8282

Project Summary

Project Code: 2022-0070249
Project Name: GIWW CAP 204
Project Type: Restoration / Enhancement - Wetland
Project Description: Goose Island State Park BU project to restore marsh habitat; Action area to include transport of dredge material and placement at the state park.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@28.09792575,-96.96674604390124,14z

Counties: Aransas County, Texas

Endangered Species Act Species

There is a total of 13 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 office if 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.

Mammals

NAME	STATUS
West Indian Manatee *Trichechus manatus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. ***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	Threatened

Birds

NAME	STATUS
Attwater's Greater Prairie-chicken *Tympanuchus cupido attwateri* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7259	Endangered
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 population No 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, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap 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. 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. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

Reptiles

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: North Atlantic DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle *Eretmochelys imbricata* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. 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. Species profile: https://ecos.fws.gov/ecp/species/5523	Endangered
Leatherback Sea Turtle *Dermochelys coriacea* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. 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. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1110	Threatened

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

Critical habitats

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

NAME	STATUS
Whooping Crane *Grus americana* https://ecos.fws.gov/ecp/species/758#crithab	Final

Migratory Birds

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

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

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
American Oystercatcher *Haematopus palliatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Jul 31
Black Scoter *Melanitta nigra* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Black-legged Kittiwake *Rissa tridactyla* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Brown Pelican *Pelecanus occidentalis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Jan 15 to Sep 30
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Common Loon *gavia immer* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/4464	Breeds Apr 15 to Oct 31
Dickcissel *Spiza americana* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 5 to Aug 31
Gull-billed Tern *Gelochelidon nilotica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9501	Breeds May 1 to Jul 31
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

NAME	BREEDING SEASON
King Rail *Rallus elegans* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5511	Breeds elsewhere
Long-tailed Duck *Clangula hyemalis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/7238	Breeds elsewhere
Magnificent Frigatebird *Fregata magnificens* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Mountain Plover *Charadrius montanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3638	Breeds elsewhere
Painted Bunting *Passerina ciris* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 25 to Aug 15
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Red-breasted Merganser *Mergus serrator* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere

NAME	BREEDING SEASON
Reddish Egret *Egretta rufescens* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7617	Breeds Mar 1 to Sep 15
Ring-billed Gull *Larus delawarensis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Royal Tern *Thalasseus maximus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Apr 15 to Aug 31
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Sandwich Tern *Thalasseus sandvicensis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 25 to Aug 31
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Sooty Tern *Onychoprion fuscatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Mar 10 to Jul 31
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds elsewhere
Surf Scoter *Melanitta perspicillata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Swallow-tailed Kite *Elanoides forficatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30

NAME	BREEDING SEASON
White-winged Scoter *Melanitta fusca* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wilson's Plover *Charadrius wilsonia* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Aug 20

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

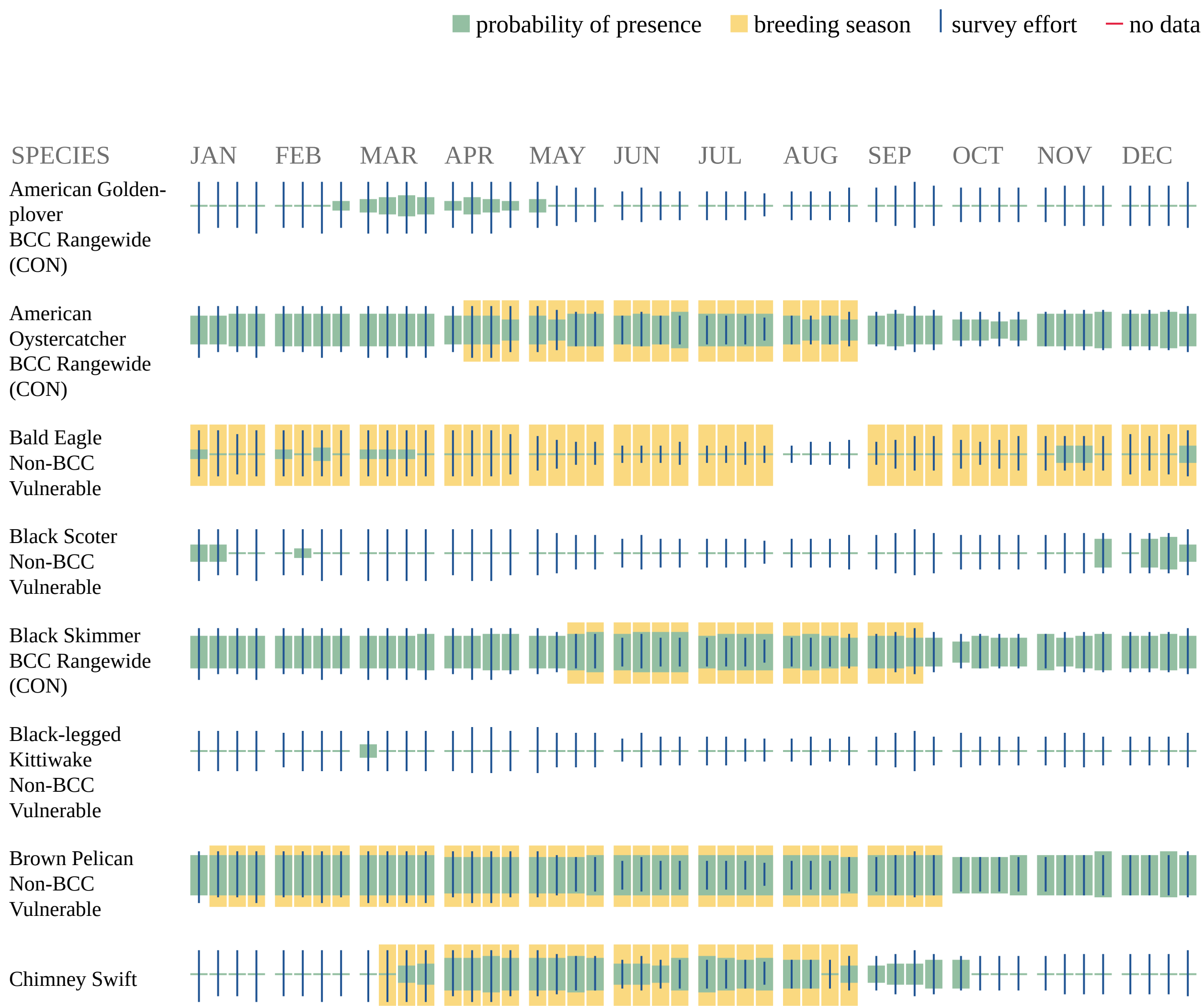
Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



BCC Rangewide
(CON)

Common Loon
Non-BCC
Vulnerable

Dickcissel
BCC - BCR

Gull-billed Tern
BCC Rangewide
(CON)

Hudsonian Godwit
BCC Rangewide
(CON)

SPECIES

King Rail
BCC Rangewide
(CON)

Lesser Yellowlegs
BCC Rangewide
(CON)

Long-billed Curlew
BCC - BCR

Long-tailed Duck
Non-BCC
Vulnerable

Magnificent
Frigatebird
BCC - BCR

Marbled Godwit
BCC Rangewide
(CON)

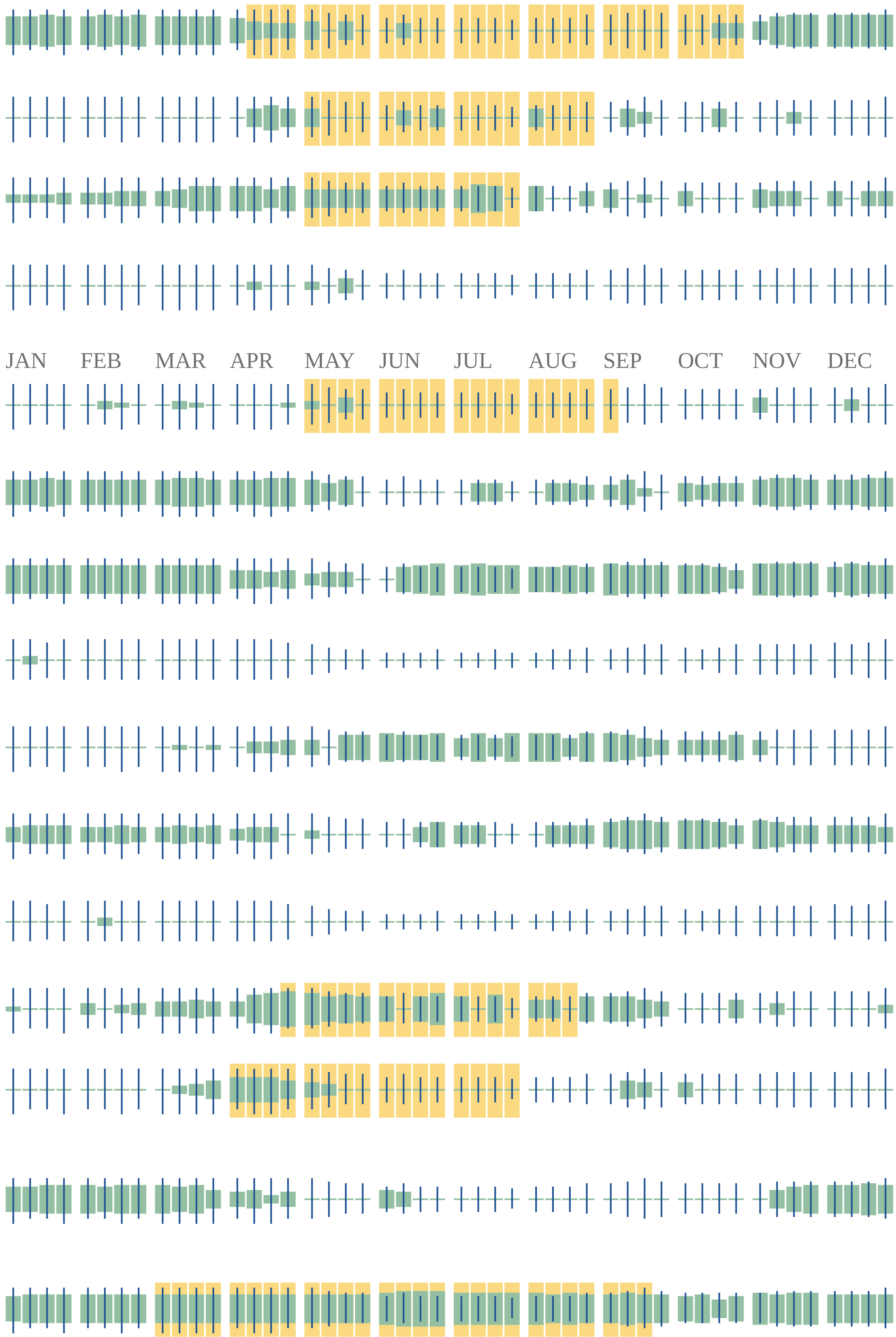
Mountain Plover
BCC Rangewide
(CON)

Painted Bunting
BCC - BCR

Prothonotary
Warbler
BCC Rangewide
(CON)

Red-breasted
Merganser
Non-BCC
Vulnerable

Reddish Egret



Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Migratory Birds FAQ

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

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

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

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

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

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

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

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

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

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

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

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

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

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

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no

data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Marine Mammals

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

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

The Marine Mammal Protection Act prohibits the take of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

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

NAME

West Indian Manatee *Trichechus manatus*

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

Wetlands

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

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

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

ESTUARINE AND MARINE WETLAND

- E2USP
- E2USN
- E2EM1N
- E2EM1P
- E2RF2M
- E2SS3P
- E2USM

ESTUARINE AND MARINE DEEPWATER

- E1UBLx
- E1RF2L
- E1UBLh
- E1UBL

IPaC User Contact Information

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State: TX
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Email raven.blakeway@usace.army.mil
Phone: 4097909058

Appendix C-6 Clean Water Act Compliance

Clean Water Act Compliance

for

Aquatic Ecosystem Restoration for GIWW

Aransas County, Texas

Water Quality Certification Request

Section 404(b)(1) Guidelines

TCEQ Tier II Analysis

Pre-Filing Record

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

January 20, 2023

Mr. Peter Schaefer
Texas Commission on Environmental Quality
Water Quality Assessment Section, MC 150
P.O. Box 13087
Austin, Texas 78711-3087

Dear Mr. Schaefer,

The U.S. Army Corps of Engineers Galveston District (USACE), in partnership with the Texas General Land Office, is conducting the Aquatic Ecosystem Restoration for the Gulf Intracoastal Waterway (GIWW) – Beneficial Use of Dredged Material (BUDM) continuing authorities' study as authorized by Section 204 of the Water Resources Development Act of 2016. The study aims to recommend a viable site for employing the BUDM along the GIWW to restore ecologically suitable marsh habitat that has been degraded, converted, or lost along the navigation resource.

A Draft Detailed Project Report and Environmental Assessment (DDPR-EA) has been prepared to present the findings and recommendations and disclose the potential impacts on the human and natural environment if the Tentatively Selected Plan (TSP) is implemented. The TSP, Alternative 3D, involves placing dredged material during operations and maintenance dredging, an authorized Federal action, at Goose Island State Park in Aransas County, TX to build 39 acres of low and high elevation saline marsh. The material would by hydraulically dredged and pumped to the park through a series of submerged or floating pipelines, then shaped into the marsh using heavy equipment (e.g., bulldozers). A containment levee would be constructed by excavating existing material onsite.

The USACE requests a water quality certification (WQC) for the TSP. Impacts on surface waters are addressed in the enclosed Section 404(b)(1) analysis, the TCEQ Tier II Certification Questionnaire and Alternative Analysis Checklist, and in the DDPR-EA, which can be viewed on the Galveston website at:

https://www.swg.usace.army.mil/Business-With-Us/Planning-Environmental-Branch/Documents-for-Public-Review/

Your office accepted a pre-filing meeting request on December 2, 2022 (Enclosure). Additionally, a Joint Public Notice was published on January 18, 2023, which began a 30-day public review period. Upon completing the comment period, any comments received will be forwarded to your office.

If you have any questions or need additional information to conduct your review, please contact Dr. Raven Blakeway, Biologist, Environmental Branch, Regional Planning and Environmental Center, at 409-790-9058 or Raven.Blakeway@usace.army.mil.

Sincerely,

Jeffery F. Pinsky
Chief, Environmental Branch
Regional Planning and Environmental Center

Enclosure (3)

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

Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway
Goose Island State Park
Aransas County, TX

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	

Reference: various sections of Chapter 4 of the Draft Detailed Project Report and Environmental Assessment (DDPR-EA) and Appendix C.

2. Technical Evaluation Factors (Subparts C-F)	**Not Applicable**	**Not Significa nt**	**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 an explanation below.

List Appropriate References: The biological characteristics of the future with and future without project scenarios are presented in DDPR-EA and Appendix C.

There were no significant effects anticipated for the factors listed.

During dredging and construction activities, localized effects on water quality are expected, e.g., increased turbidity and total suspended sediments, organic enrichment, reduced dissolved oxygen, elevated carbon dioxide levels, water temperature changes, and decreased light penetration. During dredging and construction, localized water quality perturbations can adversely affect biota, particularly primary producers, suspension/filter feeders, and visual feeders. Any such direct negative effects on water quality and indirect negative impacts on biota would be temporary and localized. Following dredging and construction activities, water quality in the localized impact area would return to pre-construction conditions.

Dredging and placement of dredged material would smother and terminate immobile benthic organisms and cause mobile benthos to abandon the borrow and beneficial use areas. Functional recovery of benthic fauna is expected to occur within 1-3 years[1] at the borrow and beneficial use sites.

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[1] De La Cruz, S.E.W., Woo, I., Hall, L., Flanagan, A., Mittelstaedt, H. 2020. Impacts of periodic dredging on macroinvertebrate prey availability for benthic foraging fishes in central San Francisco Bay, California: U.S. Geological Survey Open-File Report 2020-1086. https://doi.org/10.3133/ofr20201086

Salt marshes are one of the most valuable and productive ecosystems in the world, forming the interface between marine and terrestrial environments[2]. Salt marshes provided critical nursery, spawning, migration, and foraging habitat for aquatic organisms. Estuarine marshes are typically sheltered, low-energy shoreline areas conducive for the establishment of benthic algae below or adjacent to emergent vegetation. Flooding and salinity influence the species and distribution of emergent vegetation (Visser et al. 2019). Avifauna in salt marshes is predominated by waterfowl, wading birds, shorebirds, gulls, and terns that forage, and may breed amongst the vegetated habitats. A variety of mammals also reside in coastal marshes, particularly in saline marshes that are influenced by tides (Visser et al. 2019).

The beneficial use of dredged material for marsh restoration would increase suitable habitat for aquatic organisms and improve foraging habitat for waterfowl, migrating birds, shorebirds, and mammals, resulting in no net loss. The material would be consolidated to 39 acres at Goose Island State Park; 23 acres is owned by Texas Parks and Wildlife Department, while the remaining 16 acres would build marsh on submerged lands owned by the Texas General Land Office. Containment levees would be used to contain sediment discharge to reduce impacts to surrounding water quality. A current containment levee, built in 2008, would be used to retain sediment for 23 acres, and a new containment levee will be constructed to encompass the additional 16 acres of marsh. Bulldozers or heavy equipment would shape dredged material once in the restoration units. Upon construction completion, the work area would be restored to pre-construction conditions. Marsh restoration is expected to have a higher ecological value than open water because of its benefits to terrestrial and aquatic organisms.

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 the significant introduction of contaminants from industries, municipalities, or other sources	X
7) Known existence of substantial material deposits of substances that 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**

[2] Visser, J.M., Midway, S., Baltz, D.M., Sasser, C.E. 2019. Ecosystem Structure of Tidal Saline Marshes, in Perillo, G.M.E., Wolanski, E., Cahoo, D.R., Hopkinson, C.S. (Eds). *Coastal Wetlands*, second edition. Elsevier. 519-538.

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	

Sediment dredged from the Gulf Intracoastal Waterway (GIWW) would be beneficially used to complete marsh restoration. Sediment placed in the marsh would be configured with material consistent in grain size, color, and composition as the existing sediment. Sediments and elutriate from the GIWW have been evaluated for contaminants, which have indicated the material was clean and did not require treatment.

In 2017, the U.S. Army Corps of Engineers completed a contaminant assessment report for GIWW in compliance with EPA Ocean Dumping Regulations (40 CFR Part 227 Subpart B). Two sediment samples exceeded the effects range low (ERL) benchmark values for Lead and Mercury; however, no effects range medium (ERM) or human health protective concentration levels (PCL) benchmark values were exceeded for any of the samples. Water and elutriate samples resulted in no acute Texas acute water quality standards (TWQS) were exceeded in the concentrations of compounds detected in any of the water samples. There were no exceedances of ERM, TWQS, or PCL benchmark values as set forth by the Texas Commission on Environmental Quality.

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 the placement site	X	
2) Current velocity, direction, and variability at the 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)		
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:

1) Would utilize the best available practical techniques and BMPs during dredging and construction activities to avoid and minimize potential temporary and long-term adverse impacts. Such as maintaining a work area that remains aesthetically attractive and free

of floating or piled debris and trash, storing fuels and other hazardous materials in locations that would not introduce to surface waters if spilled, and using silt curtains when appropriate to minimize the movement of sediments, etc.

2) The movement of heavy equipment and support vehicles would utilize the placement of pipeline corridors to the greatest extent possible. Staging areas, access corridors, and general ground disturbance not related to restoration would use the smallest footprint possible to maintain a safe work environment.

3) Only clean fill material (dredged material or stone) free of contaminants would be placed in the restoration area. Placed dredged material will be of such composition that will not adversely affect the receiving waters; biological, chemical, or physical properties.

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:		
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: **Raven Blakeway** Position: **Biologist,** 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	
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	______________________________ Jeffrey F. Pinsky Chief, Environmental Branch Regional Planning and Environmental Center

NOTES:

* A negative, significant, or unknown response indicates that the permit application may not comply with the Section 404(b)(1) Guidelines.

Negative responses to three or more of the compliance criteria at the preliminary stage indicate that the proposed projects may not be evaluated using this "short form" procedure.

Use care in assessing pertinent portions of the technical information of items 2a-e before completing the final review of compliance.

A negative response to one of the compliance criteria at the final stage indicates that the proposed project does not comply with the Guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision making process, the "short form" evaluation process is inappropriate.

SUPPORTING DOCUMENTATION

Introduction

The U.S. Army Corps of Engineers, Galveston District (USACE), in partnership with the Texas General Land Office (TGLO), have undertaken the Aquatic Ecosystem Restoration for the Gulf Intracoastal Waterway (GIWW) study, proposing to beneficially use material dredged during routine maintenance dredging operations from the Matagorda Bay to Corpus Christi Bay reach in the GIWW to restore coastal saline marsh habitat in Goose Island State Park, Aransas County, Texas (referred to as the Proposed Action). The study is authorized under Section 204 of the Water Resources Development Act of 1992, as amended, and would be administered under the USACE Continuing Authorities Program (CAP). The goals and objectives for this study are to 1) re-establish ecological integrity, including plant and animals that resemble native communities to foster natural diversity; 2) design the restoration to be a resilient and self-sustaining system that can adapt to changing dynamics; and 3) improve sediment and nutrient inputs into the restoration area.

Goose Island State Park is located at the end of Lamar Peninsula, north of Rockport, Texas between St. Charles, and Aransas Bays (Figure 1). The proposed project area includes 23 acres within the boundaries of the state park, which is currently composed of two semi-contained cells constructed from containment levees, with primarily open water and small, scattered islands of salt marsh (Figure 1). Historically, Goose Island was much larger; however, decades of tidal erosion, rising sea levels, subsidence, and altered sediment supplies have reduced the area to its current footprint. Containment levees and an offshore breakwater were constructed in 2008 during a previous attempt to restore the island encompassed in the existing cells. The previous restoration attempt did not result in creating a functional marsh elevation, likely due to inadequate quantities of fill material. Since 2008, no additional restoration attempts have been made at this location. This coastal habitat is utilized by commercially, recreationally, and ecologically important Gulf of Mexico finfish, shellfish, migratory birds, threatened and endangered species, and waterfowl that depend on the resources.

This 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, the major components of the plan have been identified and evaluated; however, there is a level of uncertainty expected size and composition of the recommended plan (i.e., TSP). As such, the final dimensions of the TSP may change in the next planning phase, which could alter the habitat affected. However, because the intent of this Proposed Action is ecosystem restoration it is anticipated that any design changes proposed in the next phase will result in equal or lesser environmental impacts.

Figure 1. Map of the region with the project location, Goose Island State Park, in the inlay

Proposed Action

The Proposed Action is Alternative 3D, as described in the Draft Detailed Project Report and Environmental Assessment (DDPR-EA), as it includes key restoration features to restore and sustain the form and function of the coastal system in the study area. This project would be achieved through marsh restoration operations and containment levee construction.

Marsh Restoration

<u>Marsh measures</u>

Marsh restoration measures involve placement of borrow material dredged from the GIWW during regular operations and maintenance dredging into these locations. Material placed into the marsh would have similar properties to the existing material. Under the existing and projected future dredging cycles, there is sufficient suitable material available to meet all restoration needs without seeking other borrow sources.

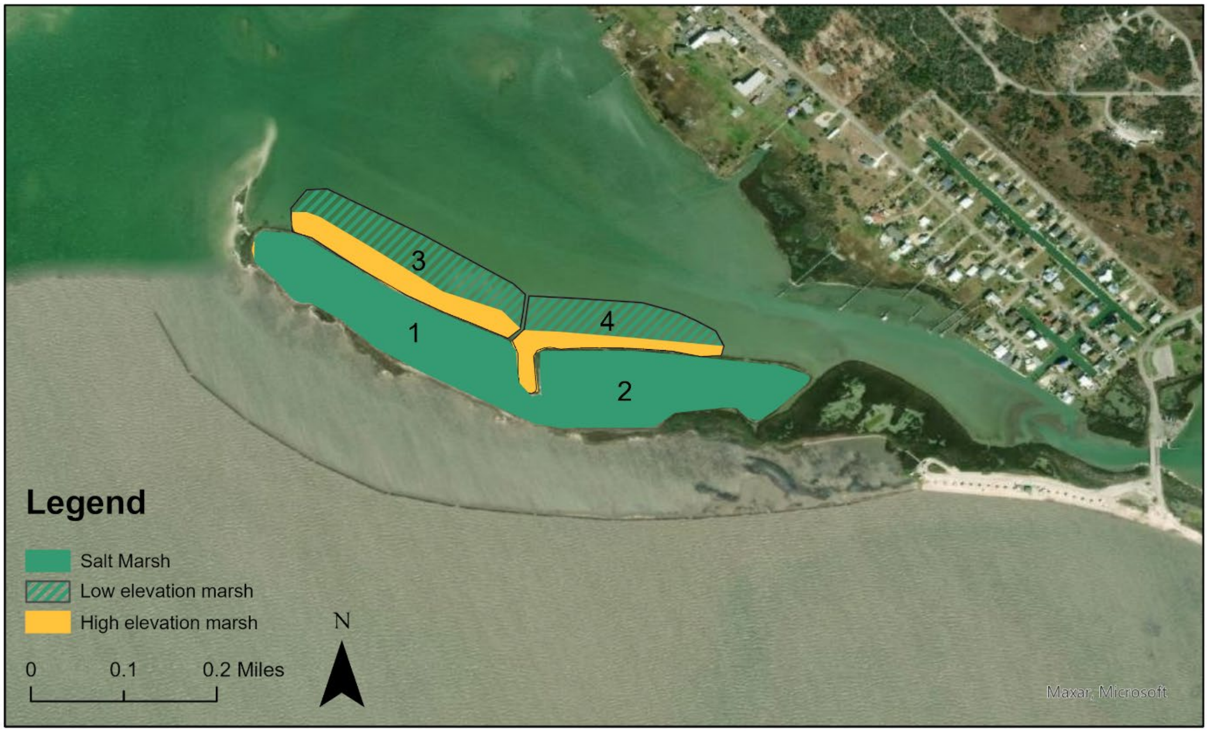

Figure 2. Alternative 3D - the proposed marsh restoration for Goose Island State Park. Salt marsh and low elevation marsh will target +0.6 to +0.8-feet NAVD88 (+1.5 to +1.7-feet MLLW) final elevation and high elevation marsh will target +1.5 to +2.0-feet NAVD88 (+2.4 to +2.9-feet MLLW)

Alternative 3D would restore and nourish 39 acres of technically significant marsh habitat at Goose Island State Park. Within the four marsh restoration units (cells 1 – 4), material dredged from the GIWW would be hydraulically pumped into open water and low-lying areas assuming a post-construction settlement elevation of +0.6 to +0.8-ft NAVD88 (+1.5 to +1.7-feet MLLW; Figure 3). Within cells 3 and 4, along the southern area, dredge material would be hydraulically pumped to construct a 3.7-acre and 2.5-acre, respectively, higher elevation marsh targeting +1.5 to +2.0-ft NAVD88 (+2.4 to +2.9-feet MLLW). It is estimated that 196,500 cubic yards (cy) of dredged material would be required to restore the 39 acres of marsh. Final project design criteria will be developed during the pre-engineering, design, and construction (PED) phase.

The vegetated areas would target 60% coverage but can be up to 70% coverage at final settlement. This allows for 30-40% open water cover for suitable salt marsh habitat. Lower elevation marsh areas are expected to be inundated with salt water more frequently and, thus, require saline tolerant vegetation that prefer hydric soils. Saltmarsh cordgrass (*Sporobolus alterniflorus*, formerly *Spartina alterniflora*) will be planted in these areas. Higher marsh areas are expected to be inundated with salt water less frequently but still require saline tolerant plants that may be in dryer soils. Saltmeadow cordgrass (*Sporobolus pumilus*, formerly *Spartina patens*) will be planted in these areas.

Sediment transport equipment would most likely include hopper or cutterhead dredges, pipelines (submerged, floating, and land), and booster pumps. Heavy machinery would be used to move sediment and facilitate construction which could include bulldozers, front-end loaders, track-hoes, marshbuggy, and backhoes. Marsh restoration would occur after levee construction is finished and could take approximately five months to complete. The start of material placement for restoration will depend on dredging cycles.

Marsh restoration activities will be broken down and divided into multiple confined cells along the proposed work area. Work will begin in an individual cell and continue until that cell is completed. Marsh-quality material will not be placed in multiple cells/areas at the same time.

Containment Levee

An earthen containment dike (10,220 linear feet) would be constructed to efficiently achieve the desired initial construction elevation. The dike would be constructed from existing material onsite, requiring 36,000 cy of sediment, and could take up to seven months to complete. Heavy equipment would be used to excavate and distribute material sourced from submerged bottoms at the site to form the containment levee. Borrow areas used for construction of the levee would be refilled during the placement of dredged material. Conceptual designs for the containment levee were developed during plan formulation by project engineers (Figure 4); however, the designs may be refined, and will be finalized during PED.

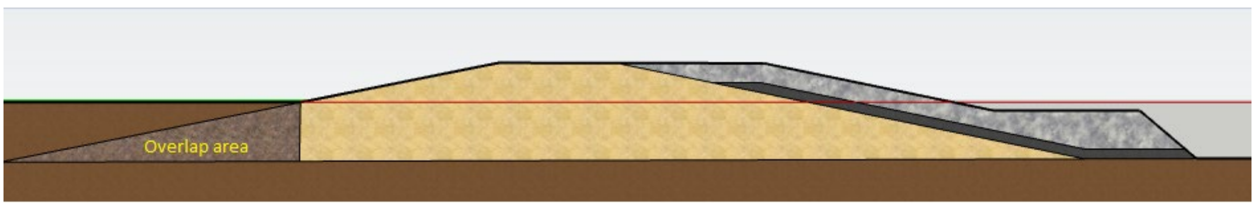

Figure 3. Containment levee cross-section.

For the containment levee construction, various support equipment would be used including crew and work boats, trucks, trailers, construction trailers, all-terrain vehicles, and floating docks.

Access Routes and Staging Areas

Temporary access channels to facilitate loading and unloading of personnel and equipment will be designated for construction activities. Identification of staging areas, pipeline routes, and placement of floatation docks would occur during PED. Each disturbance for access and staging would be placed outside of environmentally sensitive areas and utilize areas already disturbed when possible. All ground disturbance for access and staging areas would be temporary and fully restored to result in no permanent loss of resources.

Timing

Timing of initial construction of this project is dependent on timing of approval, duration of PED, funding cycles, and dredging cycles. It was assumed that construction would take approximately 6-12 months total to complete restoration activities. The containment levee would be constructed prior to placement of material in cells 3 and 4. Dredging and material placement would occur after the levee is constructed.

Implementation of the marsh restoration is highly dependent on dredging cycles. Currently, seasonal timing restrictions related to ESA compliance includes a seasonal window for hopper dredging use between December 1 and March 31, unless work outside this window is not possible, in which NMFS would need to approve the deviation. Hopper dredges would be used for dredging areas in the GIWW. Non-hopper dredges may be used from April to November.

Best Management Practices

It is assumed, at minimum, that best management practices (BMPs) identified below would apply during project construction. The assumed BMPs are rooted in widely accepted industry, state, and Federal standards for construction activities. Examples of common BMPs include, but are not limited to:

- Using of silt fencing to limit soil migration and water quality degradation.
- Refueling and maintenance of vehicles and equipment in designated areas to prevent accidental spills and potential contamination of water sources and the surrounding soils.
- Limiting idling vehicles and equipment to reduce emissions.
- Limiting ground disturbance necessary for staging areas, access routes, pipeline routes, etc. to the smallest footprint possible to safely operate during construction and restoring these areas and routes to avoid permanent loss.
- Minimizing project equipment and vehicles transiting between staging areas and the restoration site to the greatest extent practicable, including but not limited to using designated routes, confining vehicles to immediate project needs, and sequencing work to minimize the frequency and density of vehicular traffic.

BMP's that can be implemented to reduce air quality impacts include:

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate at active and inactive sites; and
- Install wind fencing and phase grading operations where appropriate; and
- Operate water trucks for stabilization of surfaces under windy conditions.

For mobile and stationary source controls of construction activities, the following BMP's would be used to further reduce air quality impacts and incorporated when developing contract specifications:

- The use of heavy machinery should be fitted with approved muffling devices that reduce emissions;
- Plan construction scheduling to minimize vehicle trips;
- Limit idling of heavy equipment;
- Maintain and tune engineers per manufacture's specifications to perform at EPA certification levels, prevent tampering, and conduct inspections to ensure these measures are followed; and
- Consider alternative fuel and energy sources (e.g., natural gas, electricity) when and where appropriate.

Texas Commission on Environmental Quality
Tier II Analysis

Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway
Goose Island State Park
Aransas County, TX

401 CERTIFICATION QUESTIONNAIRE

The following questions are included on the Texas Commission on Environmental Quality (TCEQ), Tier II 401 Certification Questionnaire. The responses provided seek to show implementing the Tentatively Selected Plan (TSP) for the Aquatic Ecosystem Restoration for the Gulf Intracoastal Waterway (GIWW) section 204 continuing authorities program study will avoid adverse impacts during construction and upon completion of the project.

I. Water quality impacts

A. *Describe BMPs to control short-term and long-term* ***turbidity and suspended solids*** *in the waters being dredged and/or filled. Describe the type of sediment (sand, clay, etc.) that will be dredged or used for fill. Note: the return water from the upland placement of hydraulically dredged material will be required to meet the permit limit of 300 mg/L total suspended solids.*

Material being dredged for placement in the marsh is composed of a combination of sand, silt, and clay, consistent with existing material in the proposed project site. Implementation of the action would minimize or avoid adverse dispersal effects to the greatest extent practicable during construction. Material used for restoration would be hydraulically discharged at specific discharge points in low elevation areas. Material would then be mechanically moved into place with heavy equipment, which should reduce dispersal of material into undesirable areas.

BMPs to control short-term turbidity and suspended solids around the project area include, but are not limited to, silt fencing to limit soil migration and water quality degradation; stabilize open storage piles and disturbed areas by covering and/or applying water; install wind fencing; and operate water trucks for stabilization of surfaces under windy conditions. A containment levee, constructed of in-situ material, is being built to retain sediment while placement occurs.

In the long-term, it is anticipated that recruitment and sustainment of marsh vegetation would sufficiently hold sediments in place and not result in long-term adverse water quality impacts beyond those that exist under the existing condition as a result of natural erosional processes and tidal exchanges.

*B. Describe measures that will be used to **stabilize disturbed soil areas**, i.e., dredge material mounds, recently constructed levees or berms, and construction sites, during and after construction. Special construction techniques intended to minimize soil or sediment disruption should also be described.*

During construction of the marsh restoration sites, effluent from dewatering would be discharged into adjacent wetlands via spill box weirs. Movement of sediment during and immediately post-construction would be contained by constructing an earthen containment levee around the marsh restoration site from in-situ material located within the marsh restoration/nourishment area using a mechanical (clamshell or bucket) dredge. Borrow areas used for construction of earthen containment levees would be refilled during the placement of dredged material for marsh restoration. The containment levee would be able to maintain one foot of freeboard at all times during dredge discharge operations.

Marsh restoration would include planting native vegetation species in areas which historically demonstrated erosion problems or that monitoring indicates it is not recruiting and establishing as necessary to stabilize the surface. Additionally, silt fencing or other sediment containing barriers could be used if an area is not sufficiently protected by other means (e.g., containment levee).

*C. Describe any methods used to **test the sediments for contamination**, especially when dredging will occur in areas with a potential to be contaminated i.e., downstream of wastewater outfalls, waterbodies listed for contaminated sediments in the CWA 3030(d) list, or within an Area of Concern of a Superfund site.*

The U.S. Army Corps of Engineers (USACE) has a significant repository of water and sediment chemistry data and elutriates data that elucidate water-soluble constituents released during dredging and placement. Based on available data, there is no indication of current water or elutriate contaminant problems known from the GIWW.

In 2018, USACE completed a contaminant assessment report for the GIWW in compliance with EPA Ocean Dumping Regulations (40 CFR Part 227 Subpart B). The limited permissible concentration for liquid and suspended particulate phases was determined, indicating no toxicity or contamination to sensitive marine water column organisms.

II. Disposal of waste materials

A. Describe the methods for disposing of materials recovered from the removal or destruction of existing structures.

Not Applicable. Implementation of the action would not involve removing or destroying existing structures.

B. *Describe the methods for disposing of sewage generated during construction. If the proposed work establishes a business or a subdivision, describe the method for disposing of sewage after completing the project.*

Not applicable. No sewage would be generated during construction, and the proposed project does not involve constructing a business or subdivision.

C. *For marinas, describe plans for collecting and disposing of sewage from marine sanitation devices. Also, discuss provisions for the disposing of sewage generated from day-to-day activities.*

Not Applicable. Implementation of the action would not involve constructing or using a marina(s).

ALTERNATIVES ANALYSIS CHECKLIST

I. Alternatives

A. *How could you satisfy your needs in ways which do not affect surface water in the State?*

B. *How could the project layout onsite be designed to avoid and minimize impacts to surface water in the State?*

C. *How could the project footprint be reduced to avoid and minimize impacts to surface water in the State?*

The purpose of this action is to restore coastal marsh habitats by beneficially using dredged material (BUDM) to improve ecological function in the coastal system along the GIWW. This intent can only be achieved by conducting work within surface waters in the State, specifically wetlands. A total of six restoration units were considered for inclusion in whole or part of three alternative plans. All six restoration units were selected based on the critical need for restoration. Alternatives that were identified as not have as great of a need were screened from incorporation into the plans as the ecological benefit would not be maximized. The selection of this the proposed action was based on several factors including meeting strategic goals of the plan, cost-effectiveness analysis, feasibility, effectiveness, acceptability, etc. With incorporation of BUDM and selection of the most viable and critical units in need of restoration, there is no practicable alternative with fewer adverse effects that also provide the same level of ecological benefits.

D. *What offsite locations were considered as an alternative for the project site?*

Not Applicable. No offsite locations were considered for this project as this does not meet the purpose of the project. See response to (I) A-C above.

E. What are the consequences of not building the project (no-build alternative)?

Without action, marine influences, and other natural and human factors, such as subsidence, sea level change, navigation channels, oil and gas development, industry growth, and population increases would result in continued coastal habitat loss in the study area. Without action, the coastal vegetation resources would continue to decline through erosion, sloughing of the shoreline, and continued fragmentation and conversion of existing saline marsh to shallow open water habitats. Significant reductions of the saline marsh, under a no action condition, are anticipated because of the accelerated rate of land loss. Additionally, the salt marsh provides ancillary benefits to infrastructure and communities behind the system such as storm buffering, wave attenuation, recreation, etc. that would otherwise degrade and eventually be eliminated with the loss of the habitat.

II. Comparison of Alternatives

A. How do the costs compare for each alternative?

Alternatives went through a cost-benefit incremental cost analysis (CE/ICA). Four plans, including the no action alternative, were considered cost-effective. Only one plan, Alternative 3d, was considered the best-buy plan, i.e., there were no other plans that provided the same level of benefit for a lower cost.

B. What are the logistical (location, access, transportation, etc.) limitations for each alternative?

Additional alternatives beyond the initial array were not logistically feasible due to ownership (i.e., other federal lands, private property) and environmental (e.g., healthy accreting system) concerns with the placement of dredged material. Within the final array of alternatives, 3E was excluded for risks to critical resources (i.e., seagrass) that are present in the action area north of the existing breakwater. The size on marsh restoration units were constrained for environmental concerns (i.e., seagrass, oysters) and to avoid shoaling in the non-federal channel north of the action area.

C. What are the technological limitations for each alternative?

Not applicable. There are no technological limitations for the alternatives considered.

D. Are there other reasons why an alternative was not considered feasible?

There are no other reasons why other alternatives were not considered feasible.

E. Please provide a comparison of each alternative considered using each of the criteria above.

No alternatives beyond the initial array were considered in plan formulation involving non-surface water locations. The CE/ICA for the alternatives were given full consideration. Plans are considered cost-effective if the benefits outweigh the costs. The most beneficial strategy is that which provides the greatest benefits at the lowest costs. Of the six plans (including the no action alternative) evaluated, only four plans, were identified as cost effective, with one being the best-buy plan.

F. *Please explain how the preferred alternative is the least damaging practicable alternative.*

Temporary adverse impacts are expected with the preferred alternative; however, the long-term benefits of restoring coastal habitats outweigh any temporary effects by improving habitat quality and functionality for the project area. Best management practices (BMPs) will be followed to minimize adverse impacts and reduce damages (see the response to G below). Alternative 3D will have identical negative impacts as the No Action Alternative due to dredging activities that would already occur. However, the No Action Alternative would not use dredged material for marsh restoration, instead be deposited in open water placement areas. Because the purpose is to use dredged material for beneficial use, Alternative 3D was identified as the least damaging alternative for this action.

G. *If all impacts to jurisdictional surface water in the State cannot be avoided, please explain how the remaining impacts will be minimized?*

Impacts to State surface waters will be minimized using BMPs during dredging and construction activities. These BMPs will include, but are not limited to:

- Use of silt fencing to limit soil migration and water quality degradation.
- Refueling and maintaining vehicles and equipment in designated areas to prevent accidental spills and potential contamination of water sources and the surrounding soils.
- Limiting the idling of vehicles and equipment to reduce emissions.
- Limiting ground disturbance necessary for staging areas, access routes, pipeline routes, etc., to the smallest size required to safely operate during construction and restoring staging areas and access routes to result in no permanent loss.
- Minimizing project equipment and vehicles transiting between the staging area and restoration site to the greatest extent practicable, including but not limited to using designated routes, confining vehicle access to the immediate needs of the project, and coordinating and sequencing work to minimize the frequency and density of vehicular traffic.
- Minimizing the use of construction lighting at night and when in use, directing lighting toward the construction activity area and shielding from view outside of the project area to the maximum extent practicable.

From:	Blakeway, Raven D CIV (USA)
To:	401certs@tceq.texas.gov
Subject:	Ecosystem Restoration Gulf Intracoastal Waterway, Rockport, TX - Pre-filing Notification
Date:	Monday, November 7, 2022 10:57:00 AM
Attachments:	GIWW204_TCEQ_prefiling mtng request_7NOV2022_(002).docx

To whom it may concern,

Please accept this notification of our intent to file for a Water Quality Certification next month. The 401 State Certification Pre-Filing Meeting Request Form is attached with project map. If you need anything else or would like to schedule a meeting, please let me know.

Note: This is a Civil Works Continuing Authorities Program Study, therefore there will not be a USACE regulatory permit number assigned.

Cheers,

Raven Blakeway, PhD | Biologist
Regional Planning and Environmental Center
U.S. Army Corps of Engineers
Galveston Office
Mobile: 409-790-9058

Texas Commission on Environmental Quality
401 State Certification Pre-filing Meeting Request Form

Why is this Pre-Filing Meeting Request Required? The U.S. Environmental Protection Agency published its Clean Water Act Section 401 Certification Rule in the Federal Register on July 13, 2020. It took effect on September 11, 2020. The federal rule requires all project applicants to submit a Pre-filing Meeting Request to the state certifying authority, the Texas Commission on Environmental Quality (TCEQ), at least 30 days prior to submitting a Section 401 Water Quality Certification Request (Certification Request). The TCEQ has prepared this Pre-filing Meeting Request form to help project applicants comply with the new 401 Certification Rule requirements.

Next Steps: The TCEQ will review your request for a Pre-filing Meeting to determine whether it is necessary or appropriate for your specific project, though actually conducting a Pre-filing Meeting is optional. Completing this form will help with the TCEQ's determination. Thank you for using this form.

1. Please submit this request form and a project location map to 401Certs@tceq.texas.gov.

2. If a Pre-filing Meeting is determined to be necessary by either the applicant or the TCEQ, the meeting will be scheduled to discuss the project.

3. If you do not receive a response to your request for a pre-filing meeting, after at least 30 days, you may submit the certification request to the TCEQ if a Section 401 certification is required for your project. Projects that require state certification are 1) all individual permit U.S. Army Corps of Engineer 404 permit applications and, 2) individual conditional certifications for the return water of Nationwide Permit 16.

For more information: EPA's 401 rule: https://www.epa.gov/cwa-401/final-rule-clean-water-act-section-401-certification-rule

Texas Commission on Environmental Quality
401 State Certification Pre-filing Meeting Request Form

Project Information

Project Name: Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway
United States Army Corps of Engineers Project Number: **455266**
Project Applicant
Name: Raven Blakeway
Organization: U.S. Army Corps of Engineers, Galveston District
Phone no.: 409-790-9058
Email: raven.blakeway@usace.army.mil
Consultant
Name: --
Organization: --
Phone no.: --
Email: --
Project Location *(Note: Please attach a project location map when submitting this form)*
Address: Goose Island State Park; 202 S Palmetto St
City: Rockport, TX 78382
County: Aransas
Latitude/Longitude of project location: 28.133611; 96.984306
Brief Project Description and Scope: The proposed action involves beneficially using dredged material to restore approximately 39 acres of saline marsh habitat at Goose Island State Park along the Gulf Intracoastal Waterway (GIWW). Approximately, 200,620 cubic yards of material (clay, silt, sand) would be obtained from the GIWW, an authorized Federal project, during routine maintenance dredging operations and would not induce additional dredging beyond the Federal Standard. Restoration would be accomplished by hydraulic dredge, pipelines to the marsh, and heavy equipment (e.g., bulldozers, loaders) shaping the fill within the marsh. A containment levee would be constructed to retain sediments placed in new marsh units, built from existing material on-site. Borrow areas used for construction of earthen containment levees would be refilled during the placement of dredged material for marsh restoration. The restored marsh would be a combination of low elevation (targeting +0.6 to +0.8-feet NAVD88) and high elevation (targeting +1.5 to +2.0-feet NAVD88) areas to enhance sustainability of the system. Material will be discharged into low elevation areas in specific locations and then moved around with heavy equipment to create the intended elevations. After construction is completed, all project sites would be restored to pre-construction conditions.

Texas Commission on Environmental Quality
401 State Certification Pre-filing Meeting Request Form

Please provide the type of federal permit for which the applicant is seeking state 401 certification. Please include a federal permit number if available.

No Federal permit is required, this is a Civil Works Feasibility Study.

Jurisdictional Impacts

Fill/Excavate	Wetland (Cowardian Class), Seagrass, Oyster	Acres	Stream (linear feet)		
			intermittent	*perennial*	*tidal*
Example. Fill	Example. Palustrine Emergent Wetland (PEM)	Example. 3			
Example. Fill			Example. 300	Example. 100	
Fill	Open Water	39			

Best Management Practices (BMPs) to be implemented:

1. Best available practical techniques and BMPs would be utilized during dredging and construction activities to avoid and minimize potential temporary and long-term adverse impacts, such as maintaining a work area that remains aesthetically attractive free of floating or piled debris and trash; storing fuels and other hazardous materials in locations which would not be introduced to surface waters if spilled; using silt curtains when appropriate to minimize movement of sediments; etc.
2. Movement of heavy equipment and support vehicles would utilize placement pipeline corridors to the greatest extent practicable. Staging areas, access corridors, and general ground disturbance not related to restoration would utilize the smallest footprint possible to maintain a safe work environment.
3. Placed dredge material will be of quality and composition consistent for marsh restoration and will be free of contaminants, so that the material will not adversely affect the biological, chemical, or physical properties of the receiving waters.
4. Pipelines will be regularly inspected along the entire route to check for and fix leaks.
5. Driving, construction, and in-water activities will avoid existing environmentally sensitive locations to the greatest extent practicable. Land vehicles with stick to traffic corridors identified prior to construction.

Texas Commission on Environmental Quality
401 State Certification Pre-filing Meeting Request Form

Figure 1. Regional overview of project location.

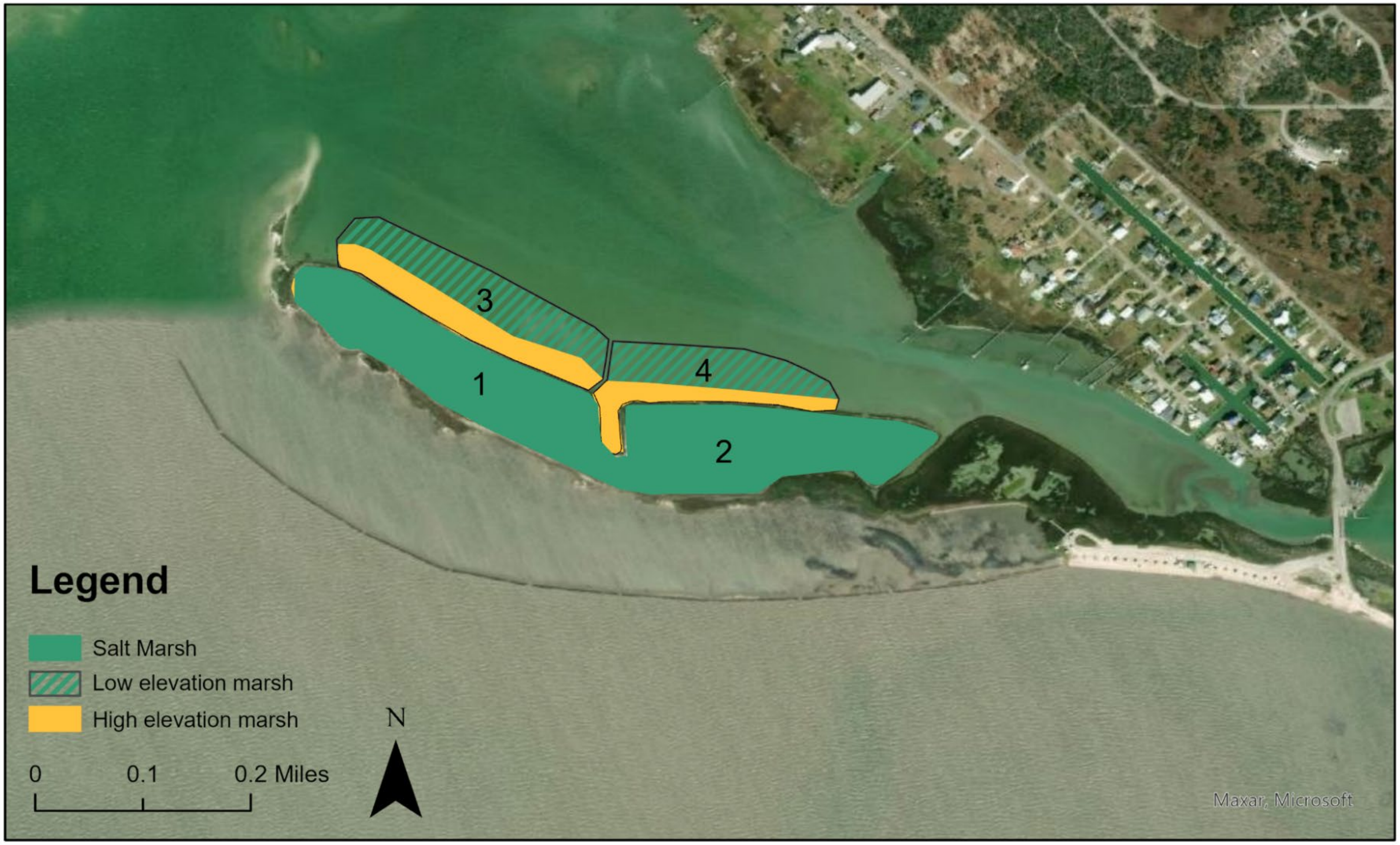

Figure 2. Tentatively selected plan – Alternative 3d

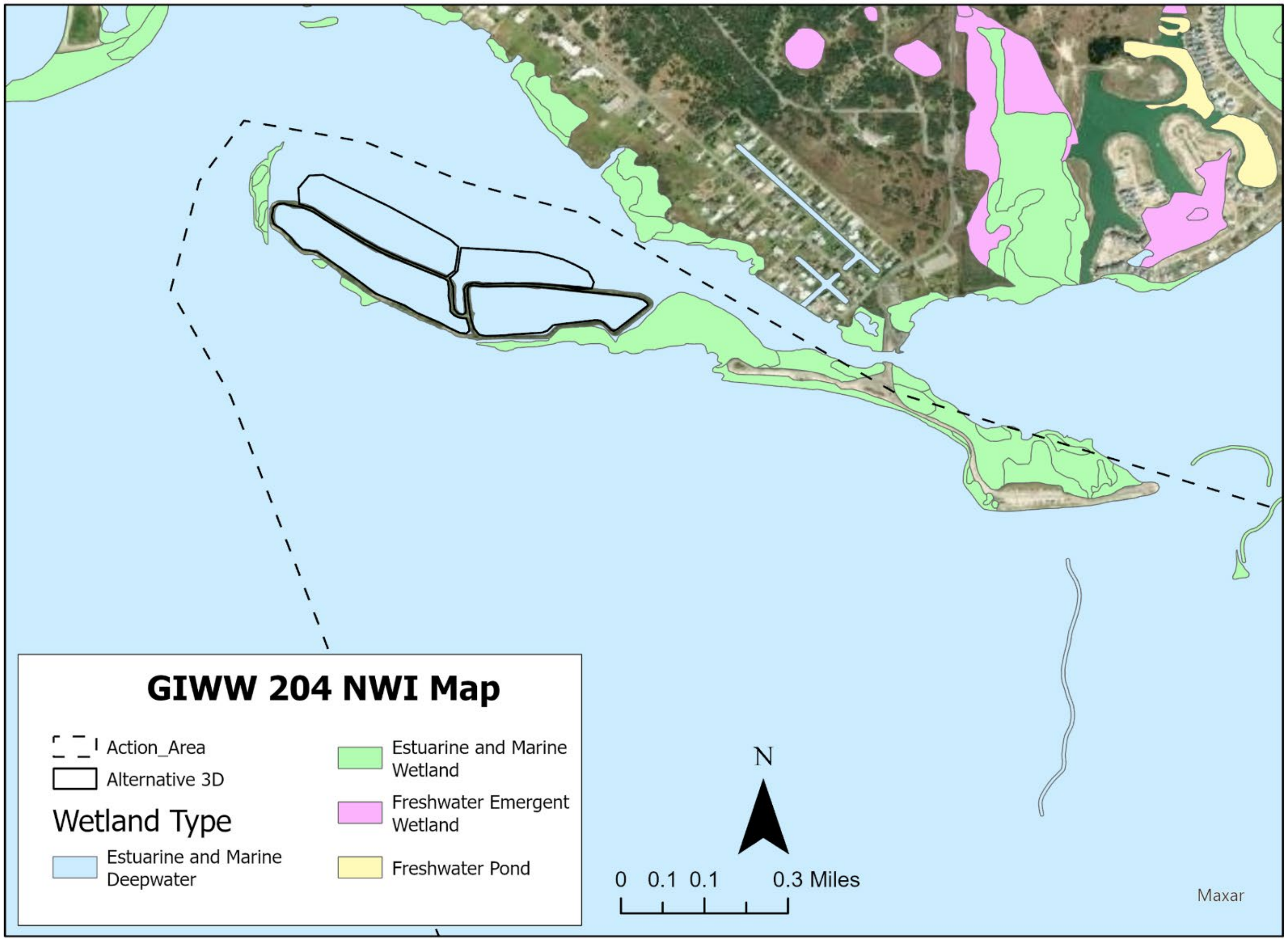

Figure 3. National Wetland Inventory Map of the project location.

Appendix C-7 Coastal Zone Management Act Compliance

Coastal Zone Management Act Compliance

for

Aquatic Ecosystem Restoration for GIWW

Aransas County, Texas

Consistency Review Request

Consistency Determination

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

January 20, 2023

Ms. Leslie Koza
Texas General Land Office
Federal Consistency Coordinator
PO Box 12873
Austin, Texas 78711-2873

Dear Ms. Koza,

The U.S. Army Corps of Engineers Galveston District (USACE), in partnership with the Texas General Land Office, is conducting the Aquatic Ecosystem Restoration for the Gulf Intracoastal Waterway (GIWW) – Beneficial Use of Dredged Material (BUDM) continuing authorities' study as authorized by Section 204 of the Water Resources Development Act of 2016. The study aims to recommend a viable site for employing the BUDM along the GIWW to restore ecologically suitable marsh habitat that has been degraded, converted, or lost along the navigation resource.

A Draft Detailed Project Report and Environmental Assessment (DDPR-EA) has been prepared to present the findings and recommendations and disclose the potential impacts on the human and natural environment if the Tentatively Selected Plan (TSP) is implemented. The TSP, Alternative 3D, involves placing dredged material during operations and maintenance dredging, an authorized Federal action, at Goose Island State Park in Aransas County, TX to build 39 acres of low and high elevation saline marsh. The material would by hydraulically dredged and pumped to the park through a series of submerged or floating pipelines, then shaped into the marsh using heavy equipment (e.g., bulldozers). A containment levee would be constructed by excavating existing material onsite. The DDPR-EA can be viewed on the Galveston District website at:

https://www.swg.usace.army.mil/Business-With-Us/Planning-Environmental-Branch/Documents-for-Public-Review/

Pursuant to the Coastal Zone Management Act of 1972 (Public Law 92-583, 15 CFR §930.34(a)), the USACE has prepared a consistency determination report for the TSP (Enclosure). The report documents no adverse impacts to the 16 Coastal Natural Resource Areas, of which nine occur in the project area. Additionally, consistency with the four enforceable policies that apply to this project has been demonstrated.

The USACE has concluded that 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. Please accept this letter and enclosed report as a formal request to initiate the consistency review process.

If you have any questions or need additional information to conduct your review, please contact Dr. Raven Blakeway, Biologist, Environmental Branch, Regional Planning and Environmental Center at 409-790-9058 or Raven.Blakeway@usace.army.mil.

Sincerely,

Jeffrey F. Pinsky
Chief, Environmental Branch
Regional Planning and Environmental Center

Enclosure (1)

Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway

Texas Coastal Management Plan Consistency Determination

Goose Island State Park
Aransas County, Texas

January 2023

Prepared by:
United States Army Corps of Engineers
Regional Planning and Environmental Center

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TABLE OF CONTENTS

INTRODUCTION

The U.S. Army Corps of Engineers, Galveston District (USACE), in partnership with the Texas General Land Office (TGLO), have undertaken the Aquatic Ecosystem Restoration for the Gulf Intracoastal Waterway (GIWW) study, proposing to beneficially use material dredged during routine maintenance dredging operations from the Matagorda Bay to Corpus Christi Bay reach in the GIWW to restore coastal saline marsh habitat in Goose Island State Park, Aransas County, Texas (referred to as the Proposed Action). The study is authorized under Section 204 of the Water Resources Development Act of 1992, as amended, and would be administered under the USACE Continuing Authorities Program (CAP). The goals and objectives for this study are to 1) re-establish ecological integrity, including plant and animals that resemble native communities to foster natural diversity; 2) design the restoration to be a resilient and self-sustaining system that can adapt to changing dynamics; and 3) improve sediment and nutrient inputs into the restoration area.

Goose Island State Park is located at the end of Lamar Peninsula, north of Rockport, Texas between St. Charles, and Aransas Bays (Figure 1). The proposed project area includes 23 acres within the boundaries of the state park, which is currently composed of two semi-contained cells constructed from containment levees, with primarily open water and small, scattered islands of salt marsh (Figure 1). Historically, Goose Island was much larger; however, decades of tidal erosion, rising sea levels, subsidence, and altered sediment supplies have reduced the area to its current footprint. Containment levees and an offshore breakwater were constructed in 2008 during a previous attempt to restore the island encompassed in the existing cells. The previous restoration attempt did not result in creating a functional marsh elevation, likely due to inadequate quantities of fill material. Since 2008, no additional restoration attempts have been made at this location. This coastal habitat is utilized by commercially, recreationally, and ecologically important Gulf of Mexico finfish, shellfish, migratory birds, threatened and endangered species, and waterfowl that depend on the resources.

This 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, the major components of the plan have been identified and evaluated; however, there is a level of uncertainty expected size and composition of the recommended plan (i.e., TSP). As such, the final dimensions of the TSP may change in the next planning phase, which could alter the habitat affected. However, because the intent of this Proposed Action is ecosystem restoration it is anticipated that any design changes proposed in the next phase will result in equal or lesser environmental impacts.

Figure 1. Map of the region with the project location, Goose Island State Park, in the inlay

Proposed Action

The Proposed Action is Alternative 3D, as described in the Draft Detailed Project Report and Environmental Assessment (DDPR-EA), as it includes key restoration features to restore and sustain the form and function of the coastal system in the study area. This project would be achieved through marsh restoration operations and containment levee construction.

Marsh Restoration

Marsh restoration measures involve placement of borrow material dredged from the GIWW during regular operations and maintenance dredging into these locations. Material placed into the marsh would have similar properties to the existing material. Under the existing and projected future dredging cycles, there is sufficient suitable material available to meet all restoration needs without seeking other borrow sources.

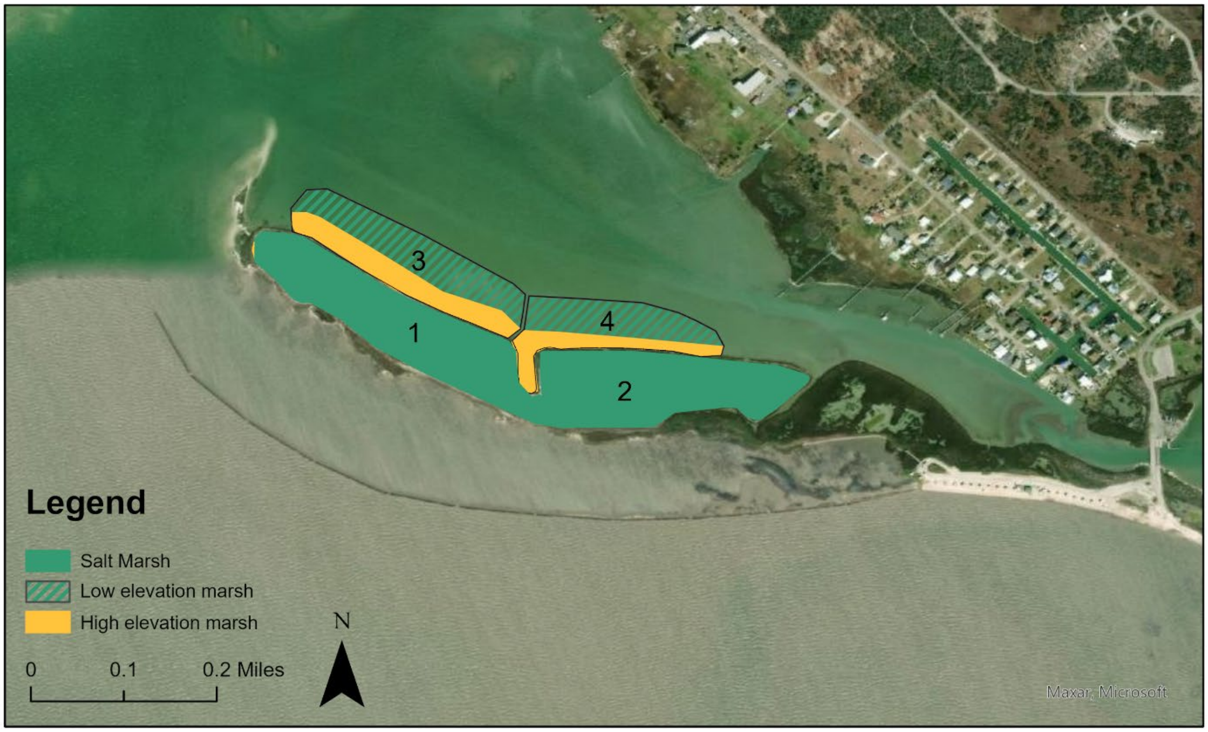

Figure 2. Alternative 3D, the proposed marsh restoration for Goose Island State Park. Salt marsh and low elevation marsh will target +0.6 to +0.8-feet NAVD88 (+1.5 to +1.7-feet MLLW) final elevation and high elevation marsh will target +1.5 to +2.0-feet NAVD88 (+2.4 to +2.9-feet MLLW)

Alternative 3D would restore and nourish 39 acres of technically significant marsh habitat at Goose Island State Park. Within the four marsh restoration units (cells 1 – 4), material dredged from the GIWW would be hydraulically pumped into open water and low-lying areas assuming a post-construction settlement elevation of +0.6 to +0.8-ft NAVD88 (+1.5 to +1.7-feet MLLW; Figure 3). Within cells 3 and 4, along the southern area, dredge material would be hydraulically pumped to construct a 3.7-acre and 2.5-acre, respectively, higher elevation marsh targeting +1.5 to +2.0-ft NAVD88 (+2.4 to +2.9-feet MLLW). It is estimated that 196,500 cubic yards (cy) of dredged material would be required to restore the 39 acres of marsh. Final project design criteria will be developed during the pre-engineering, design, and construction (PED) phase.

The vegetated areas would target 60% coverage but can be up to 70% coverage at final settlement. This allows for 30-40% open water cover for suitable salt marsh habitat. Lower elevation marsh areas are expected to be inundated with salt water more frequently and, thus, require saline tolerant vegetation that prefer hydric soils. Saltmarsh cordgrass (*Sporobolus alterniflorus*, formerly *Spartina alterniflora*) will be planted in these areas. Higher marsh areas are expected to be inundated with salt water less frequently but still require saline tolerant plants that may be in dryer soils. Saltmeadow cordgrass (*Sporobolus pumilus*, formerly *Spartina patens*) will be planted in these areas.

Sediment transport equipment would most likely include hopper or cutterhead dredges, pipelines (submerged, floating, and land), and booster pumps. Heavy machinery would be used to move sediment and facilitate construction which could include bulldozers, front-end loaders, track-hoes, marshbuggy, and backhoes. Marsh restoration would occur after levee construction is finished and could take approximately five months to complete. The start of material placement for restoration will depend on dredging cycles.

Marsh restoration activities will be broken down and divided into multiple confined cells along the proposed work area. Work will begin in an individual cell and continue until that cell is completed. Marsh-quality material will not be placed in multiple cells/areas at the same time.

Containment Levee

An earthen containment dike (7,220 linear feet) would be constructed to efficiently achieve the desired initial construction elevation. The dike would be constructed from existing material onsite, requiring 13,700 cy of sediment, and could take up to seven months to complete. Heavy equipment would be used to excavate and distribute material sourced from submerged bottoms at the site, along with rip rap and bedding stone, to form the containment levee. Borrow areas used for construction of the levee would be refilled during the placement of dredged material. Conceptual designs for the containment levee were developed during plan formulation by project engineers (Figure 3); however, the designs may be refined, and will be finalized during PED.

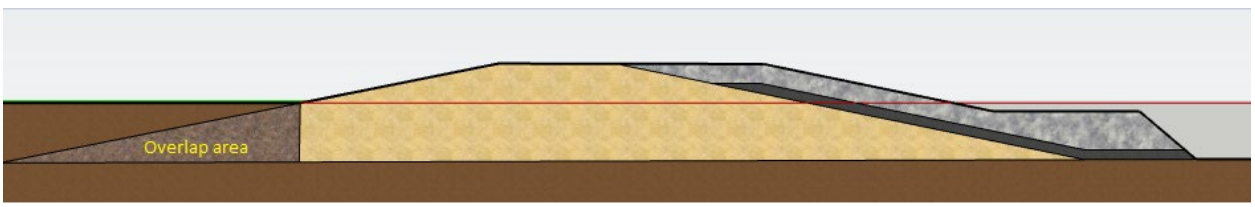

Figure 3. Containment levee cross-section.

For the containment levee construction, various support equipment would be used including crew and work boats, trucks, trailers, construction trailers, all-terrain vehicles, and floating docks.

Sediment

The sediment source location is already a Federally authorized action for operations and maintenance (O&M) dredging that is dredged with relative frequency (Figure 4). Sediment used to restore and create saline marsh would be configured with material consistent in grain size, color, and composition as the existing material at the site and free of contaminants. Sediment chemistry and elutriate data will meet the Texas Commission for Environmental Quality’s (TCEQ) Ecological Benchmarks for allowable level of contaminants and comply with the Environmental Protection Agency’s (EPA) standards for sediment quality.

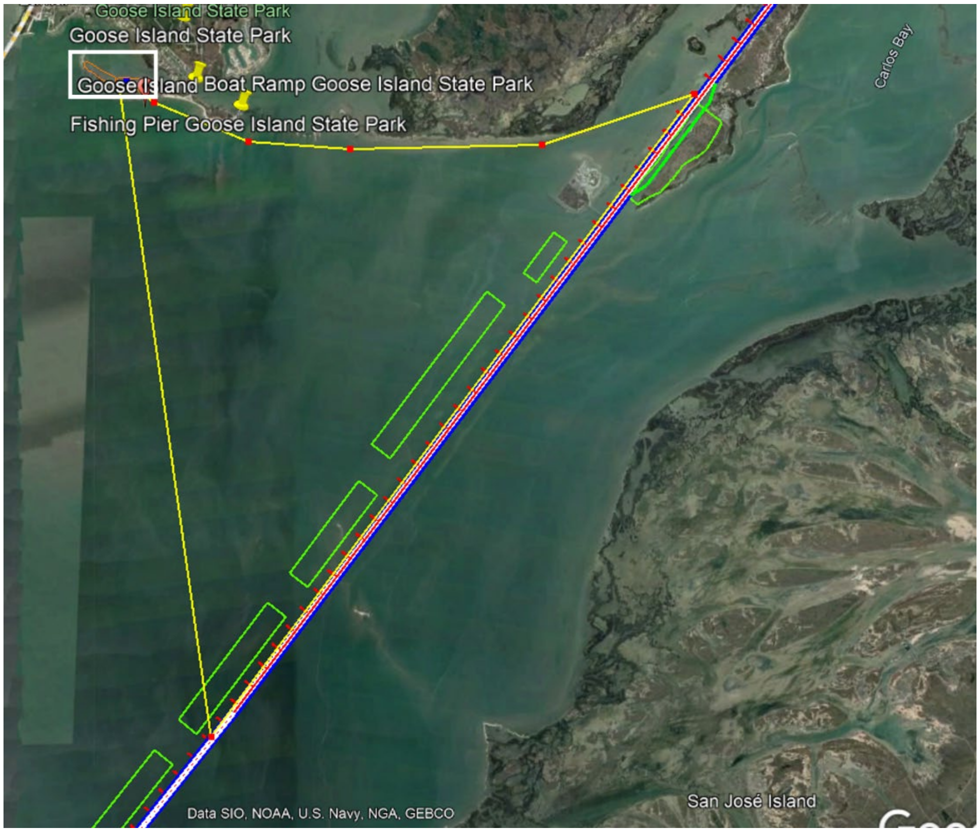

Figure 4. GIWW reaches planned for dredging (pink/blue)

Access Routes and Staging Areas
Temporary access channels to facilitate loading and unloading of personnel and equipment will be designated for construction activities. Identification of staging areas, pipeline routes, and placement of floatation docks would occur during PED. Each disturbance for access and staging would be placed outside of environmentally sensitive areas and utilize areas already disturbed when possible. All ground disturbance for access and staging areas would be temporary and fully restored to result in no permanent loss of resources.

Timing
Timing of initial construction of this project is dependent on timing of approval, duration of PED, funding cycles, and dredging cycles. It was assumed that construction would take approximately 6-12 months total to complete restoration activities. The containment levee would be constructed prior to placement of material in cells 3 and 4. Dredging and material placement would occur after the levee is constructed.

Implementation of the marsh restoration is highly dependent on dredging cycles. Currently, seasonal timing restrictions related to ESA compliance includes a seasonal window for hopper dredging use between December 1 and March 31, unless work outside this window is not possible, in which NMFS would need to approve the deviation. Hopper dredges would be used for dredging areas in the GIWW. Non-hopper dredges may be used from April to November.

Best Management Practices

It is assumed, at minimum, that best management practices (BMPs) identified below would apply during project construction. The assumed BMPs are rooted in widely accepted industry, state, and Federal standards for construction activities. Examples of common BMPs include, but are not limited to:

- Using of silt fencing to limit soil migration and water quality degradation.
- Refueling and maintenance of vehicles and equipment in designated areas to prevent accidental spills and potential contamination of water sources and the surrounding soils.
- Limiting idling vehicles and equipment to reduce emissions.
- Limiting ground disturbance necessary for staging areas, access routes, pipeline routes, etc. to the smallest footprint possible to safely operate during construction and restoring these areas and routes to avoid permanent loss.
- Minimizing project equipment and vehicles transiting between staging areas and the restoration site to the greatest extent practicable, including but not limited to using designated routes, confining vehicles to immediate project needs, and sequencing work to minimize the frequency and density of vehicular traffic.

BMP’s that can be implemented to reduce air quality impacts include:

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate at active and inactive sites; and
- Install wind fencing and phase grading operations where appropriate; and
- Operate water trucks for stabilization of surfaces under windy conditions.

For mobile and stationary source controls of construction activities, the following BMP’s would be used to further reduce air quality impacts and incorporated when developing contract specifications:

- The use of heavy machinery should be fitted with approved muffling devices that reduce emissions;
- Plan construction scheduling to minimize vehicle trips;
- Limit idling of heavy equipment;
- Maintain and tune engineers per manufacture’s specifications to perform at EPA certification levels, prevent tampering, and conduct inspections to ensure these measures are followed; and
- Consider alternative fuel and energy sources (e.g., natural gas, electricity) when and where appropriate.

CONSISTENCY WITH THE TEXAS COASTAL MANAGEMENT PROGRAM

Transportation to and placement of the dredged material in the restoration units, and construction of the earthen containment levees, will be analyzed in this document for consistency with the Texas Coastal Management Program (TCMP) policies. The dredging action is not assessed as it was evaluated in the GIWW Draft Feasibility Report and Environmental Assessment (USACE 2022). Dredging and placement activities have been identified as consistent with the policies of the TCMP. The Proposed Action would not include additional dredging needs greater than the Federal standard, and those described in the draft feasibility report (USACE 2022).

Impacts on Coastal Natural Resource Areas

Potential impacts and methods to minimize or avoid those impacts to Coastal Natural Resource Areas (CNRA's) listed in 31 Texas Administrative Code (TAC) §501.3 are addressed below. Implementation of this project would have beneficial and less than adverse impacts to nine of the 16 CNRA's. Negative impacts are expected to be localized and short-term, returning to baseline conditions after construction ceases, while beneficial impacts are localized and long-term.

Coastal Preserves

A coastal preserve is defined as any land, including a park or wildlife management area, that is owned by the state, and this is: 1) subject to Chapter 26, Parks and Wildlife Code, because it is a park, recreation area, scientific area, wildlife refuge, or historic site; and 2) designated by the Parks and Wildlife Commission as being coastal in character. Goose Island State Park consists of 321.4 acres owned and managed by the Texas Parks and Wildlife Department (TPWD) that was established on land acquired from private owners between 1931 and 1935. The mainland consists of live oak and red bay woods, tallgrass prairie, and freshwater emergent wetlands, while the coastal areas contain estuarine and marine wetlands.

The Proposed Action would occur within 23 acres of the state park boundaries. Temporary, negative impacts are expected to occur on state park property during construction activities. Staging areas and work access roads will be required for vehicles and heavy equipment transiting to the construction area. To the best extent practicable, equipment will be restricted to currently accessible dirt or paved roads; however, additional access routes may be necessary for work being completed in the restoration area. Access routes will be limited to non-vegetated areas, to the best extent practicable, but some vegetation may be disturbed during transit. It is expected that vegetation will return within one to three years of project completion.

An additional 16 acres of saline marsh is proposed directly north of the current containment levees, which will require construction of a new containment levee to retain the placed material in order to build the interior marshland. The new containment levee will be constructed similarly to the present ones, sourcing local material.

Overall, the Proposed Action is expected to maximize benefits to the state park by creating critical saline marsh habitat that will be used by commercially and recreationally important fauna. Marsh restoration will indirectly benefit the rest of the state park by offering ecosystem services such as through buffering effects of storm surge and flooding, slowing erosion of the shoreline, and improving nearshore water quality.

Coastal Waters

Coastal waters are defined as water in the open Gulf of Mexico and/or under tidal influence. Temporary and localized negative impacts on coastal waters in and around the restoration units are anticipated to occur because of dredge placement activities and construction of the containment levees, including release of suspended solids, increased turbidity, and movement of tidal sand. Turbidity is expected to increase while construction is occurring within the vicinity of the project area, the effect of which is largely dependent on local oceanographic conditions. Suspended sediment can be travel beyond the proposed project boundaries if strong currents are present that move the suspended sediment outside of the area. However, this is expected to be temporary and minimal, as the effects of turbidity would be short-term and cease upon project completion.

Open-water habitat will be reduced within the 23 acres of the current restoration area by placing dredged material to build saline marsh, targeting 40% open water and 60% emergent vegetation cover. It is acceptable for the cover to reach 30:70 open water to emergent vegetation upon final settlement, as this is still within optimal cover ratios for saline marsh habitat. Placing material will temporarily impact water quality in coastal waters in the vicinity of the placement area, outside of the containment levees, from sediment fallout from the terminus of the dredge pipeline. This will be minimized to the best extent practicable and will only cause temporary increases in turbidity locally.

Impacts are expected to be less than adverse because they are localized and temporary, only lasting while active placement and sediment shaping (i.e., levee) are ongoing. Between pump-out cycles and after construction ceases, baseline conditions would return.

Coastal Wetlands

A coastal wetland is defined by Section 11.502, Water Code, as a wetland located 1) seaward of the coastal facility designation line established by rules adopted under Chapter 40; 2) within rivers and streams, to the extend of tidal influences, as shown on the Texas Natural Resource Conservation Commission's stream segment maps, excluding the portion of the Trinity River located in Liberty County. The Proposed Action would overlap coastal wetlands with the purpose of creating more (i.e., saline marsh) within the current 23-acre footprint and an additional 16 acres to the north.

Work access roads will be required for vehicles and heavy equipment transiting to the construction area. To the best extent practicable, equipment will be restricted to currently accessible dirt or paved roads; however, additional access routes may be necessary for work being completed in the restoration area. Access routes will be limited to non-vegetated areas, to the best extent practicable, but some vegetation may be disturbed during transit. It is expected that vegetation will return within one to three years of project completion. Access routes will not be constructed on coastal wetlands.

An additional 16 acres of saline marsh is proposed directly north of the current containment levees, which will require construction of a new levees to retain the placed material in order to build the interior marshland. The new containment levee will be constructed similarly to the present ones, sourcing local material. Coastal wetlands will be avoided during construction activities. Dredging pipelines will be laid to place material for marsh creation and will target unvegetated areas, as to minimize risk to wetland habitats.

Overall, the Proposed Action is expected to maximize benefits to coastal wetlands by creating critical saline marsh habitat that will be used by commercially and recreationally important fish, birds, and mammals.

Oyster Reefs

Oyster reefs are defined as natural or artificial formations that are 1) composed of oyster shell, live oysters, and other living or dead organisms; 2) discrete, contiguous, and clearly distinguishable from scattered oyster shell or oysters; and 3) located in an intertidal or subtidal area. Small oyster reefs are present near the proposed project area; however, these areas would not be adversely impacted by project implementation because efforts will be made to avoid the reefs and BMPs will be employed to avoid or reduce any sedimentation that could drift to the reefs as a result of material placement. Long-term, creation of the salt marsh will benefit oyster reefs by improving nutrient cycling and water quality within the vicinity of the project area.

Special Hazard Areas

Special hazard areas are designated by the Administrator of the Federal Insurance Administration under the National Flood Insurance Act as having special flood, mudslide or mudflow, or flood-related erosion hazards and shown on a flood hazard boundary map or flood insurance rate map as Zone A, AO, A1-30, AE, A99, AH, VO, V1-30, VE, V, M, or E. The Proposed Action would occur in a VE flood zone. Zone VE is a coastal area considered to have a 1% or greater chance of flooding and additional hazards with storm water. These areas have a 26% chance of flooding over 30 years.

Implementation of the Proposed Action may ease flooding burdens for properties and infrastructure north of the project area by increasing habitat that would act as a barrier. Flooding is not expected to increase with construction of the new marsh areas. Neither the marsh, nor containment levees, would be expected to induce development of special hazard areas.

Submerged Land

Submerged land is defined as land 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 construction of new containment levees would occur on approximately 16 acres of State-owned submerged lands. Construction on submerged land falls would be coordinated with the TGLO. No adverse effects to submerged lands are anticipated with implementation of this project, but some negative impacts are expected.

Construction of the containment levees will disturb sediment on the bottom of the bay while bedding stone and rip rap are being placed, as well as by heavy equipment and vessels manipulating sediment to build the levee. As a result, negative impacts are expected for infaunal benthic organisms directly within the levee footprint, as material placed (i.e., stone) and moved (i.e., submerged sediment) would smother or potentially crush the fauna. Some mobile benthic organisms have the capability to move outside of the project area; however, loss of immobile organisms is unavoidable. Because the placement area is small within the scale of the Mission-Aransas Estuary, these impacts are less than adverse. Recovery of benthic communities is expected to occur within one to three years.

Overall, the project is expected to have net beneficial impacts to submerged lands by building marsh that would restore historic conditions at the site and build new marsh habitat.

Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV) is defined as rooted aquatic vegetation growing in permanently inundated areas in estuarine and marine systems. SAV includes aquatic grasses (seagrass) and attached macro-algae, that is highly valuable habitat since it provides important ecological functions; however, it is particularly vulnerable to coastal development and water quality degradation.

SAV in the form of seagrasses are found within the vicinity of the project area, though the extent of cover and locations are currently uncertain. Detailed SAV surveys would be conducted prior to any construction activities to locate seagrasses. No construction activities are proposed to occur in the areas where seagrasses are expected, as to avoid and minimize any impacts. The TPWD Seagrass Viewer (TPWD 2022) was reviewed to estimate impacts to potential SAV; however, these data were presumed unreliable as the analysis occurred in 1994, prior to the installation of the current containment levees and breakwater (c2008). Construction of these two features impacted seagrasses, but it is not understood to what extent. As this Proposed Action is ecosystem restoration, destruction or adverse modification of seagrass would trigger mitigation which would not be compliant with the USACE policy ER 1105-2-100, 3-5(b)(3).

Tidal Sand or Mud Flat

Tidal sand is defined as a silt, clay, or sand substrate, without regard to whether it is vegetated by algal mats, that occur in intertidal areas and that are regularly or intermittently exposed and flooded by tides, including tides induced by weather. Approximately 1.7 acres of tidal sand occurs at the north-western edge of the current containment levee. Construction activities are not anticipated to have any negative effects on tidal sand in the project area because no material is proposed for placement, nor should there be a need for equipment staging or transit in this area. The sandflat has been dynamic over-time, shifting between vegetated area and predominantly sand flat. It is likely the tidal flats would increase over time as more marsh area is eroded, though this is highly dependent on sediment availability in the estuary.

Water under Tidal Influence

Water under tidal influence is defined as water in this state, as defined by Section 26.001(5), Water Code, that is subject to tidal influence according to the Texas Natural Resource Conservation Commission's stream segment map, which includes coastal wetlands. The Proposed Action is located in a tidally influenced region. Temporary, localized, less than adverse impacts are expected around the project area from material placement and levee construction activities. Placement of dredge material would release suspended solids into water under tidal influence, increasing turbidity and decreasing water quality. Impacts on water quality are temporary as they would cease upon project completion. Effects to tidally influenced waters are expected to be less than adverse given the high concentration of suspended solids under normal conditions. The water near the project area is relatively shallow (less than 5 feet) and regularly is turbid from suspended sediments driven by oceanographic conditions (e.g., waves, tides, currents). Once placement and construction activities conclude, waters under tidal influence would return to pre-existing conditions.

Other CNRA's that would not be temporarily or permanently affected by project implementation because of the lack of the resources in the proposed area, as defined by §501.3, include coastal barriers, coastal historic areas, coastal shore areas, critical dune areas, critical erosion areas, gulf beaches, hard substrate reefs, and water of the open Gulf of Mexico.

Enforceable Policies

Of the 20 enforceable policies reviewed, four are applicable to this project (Table 1).

Table 1 Coastal Management Program Enforceable Policies. Bolded terms indicate enforceable policies applicable to this project and are further discussed below.

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	N/A

§ 501.29 Policies for Development in State Parks, Wildlife Management Areas or Preserves	**Yes**
§ 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.*

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

(3) *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.

(4) *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 containment levees would not be placed in any critical areas and would not modify current navigational routes; thus, the project will not have any direct or indirect effects on critical areas.

(5) *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 this study is to create critical saline marsh to restore ecological function in the region by beneficially using material dredged from a navigation channel. No new channels would be constructed or dredged, rather material would be sourced from current operations and maintenance dredging activities. No docks, piers, wharves, or other structures are proposed for construction and would not be a suitable alternative to the Proposed Action. Filling of submerged lands would occur north of the existing containment levees, through construction of a new containment levee and creation of 16 acres of saline marsh. This loss is environmentally preferred as marsh habitats provide higher productivity than submerged lands or hardened structures. Restoration of the current marsh cells and creation of new marsh habitat will not interfere with commercial navigation.

(6) 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:

(A) does not significantly interfere with public navigation;
(B) does not significantly interfere with the natural coastal processes which supply sediments to shore areas or otherwise exacerbate erosion of shore areas; and
(C) avoids and otherwise minimizes shading of critical areas and other adverse effects.

Compliance: The project does not propose to construct any piers, docks, wharves, bulkheads, jetties, groins, cabins or artificial reefs.

(7) 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:

(A) construction and maintenance of other development associated with the facility;
(B) direct release to coastal waters and critical areas of pollutants from oil or hazardous substance spills or stormwater runoff; and
(C) 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.

(8) 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 operations of pipelines, transmission lines, cables, roads, causeways, or bridges.

(9) 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: Construction of the containment levee and placement of material results in minor, temporary negative impacts to wildlife that may occur in the project area. Any temporarily displaced wildlife would have suitable habitat within the immediate vicinity available to them and will be able to avoid impacts from the project. Loss of immobile organisms within the direct footprint of the levee construction and placement is unavoidable but will be minimized to the greatest extent practicable by reducing the construction footprint.

(10) 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: Staging areas and access routes will be placed in areas to avoid disturbance to coastal wetlands. Dredging pipelines will be placed on unvegetated habitat to discharge material into marsh restoration units. No facilities will impound or affect drainage of coastal wetlands.

(11) 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: No piers, docks, wharves, bulkheads, jetties, groins, fishing cabins, or artificial reefs are being constructed in this project.

(12) 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:

(A) 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
(B) restoration activities would further degrade CNRAs.

Compliance: The containment levees and marsh restoration would not be removed, nor will the area in the direct footprint return to pre-project conditions at the end of the project life (50 years). Any negative impacts that result from constructing the levees and restoring marsh would return to pre-existing conditions upon completion of the project. Removal of the containment levee would result in degradation of the newly restored marsh and loss of habitat. The marsh is expected to have long-term beneficial impacts in the area, that would otherwise continue to undergo degradation from erosive forces. Saline marsh is critical habitat for many commercially and recreationally important fish, migrating birds, waterfowl, mammals, and invertebrates; thus, creating the new marsh will be an overall benefit to the system.

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

Compliance: Creation of the marsh will contribute to recreational opportunities in the project area.

(14) 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: Vegetation will be planted/seeded within the created marsh areas that will help reduce erosive forces overtime.

(15) 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.

(16) 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 levees and creation of marsh would not interfere with public access to use of coastal waters and preserves.

(17) 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: As this project proposes ecosystem restoration, no actions will require mitigation. Mitigation in an ecosystem restoration project is not compliant with the USACE policy ER 1105-2-100, 3-5(b)(3).

b) *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 not be affected by the recommended plan, as beaches are not found in the project area.

c) *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: Dredged material would be beneficially used to create and restore coastal saline marsh in an area that has suffered decades of habitat degradation and loss, to reduce erosive forces, restore ecological function and habitat integrity, and reduce landward flood and storm risks. Placement in each restoration unit would have localized, temporary, and less than adverse impacts on all natural resource areas listed in §501.25(a) such as coastal waters and submerged lands. Temporary impacts could include, but are not limited to, an increase in turbidity and suspended solids, burial/smothering of benthic organisms, fill on submerged lands, heavy equipment use, and restrictions to the use of specific areas during construction. These are expected to be localized and restored to normal conditions once placement activities are completed.

(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: Dredging activities would cause temporary, localized, and less than adverse impacts to surface water quality through increased turbidity and suspended solids, thereby degrading water quality. Water in and around the project area can regularly experience exceedance of the Total Suspended Solids (TSS) threshold, as defined by the Texas Commission for Environmental Quality (TCEQ; <300 milligrams per liter), under natural conditions. Based on available data and historical testing, there is no indication of current water or elutriate contaminant problems know from the dredged site in the GIWW. Previous analyses indicated no toxicity or contamination to sensitive marine water column organisms would occur and any measurable levels were within the TCEQ Environmental Benchmark.

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

Compliance: This project does not propose work in any critical areas, thus no adverse impacts are expected.

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

(A) there is a practicable alternative that would have fewer adverse effects on coastal waters, submerged lands, critical areas, coastal shore areas, and Gulf beaches, so long as that alternative does not have other significant adverse effects;
(B) all appropriate and practicable steps have not been taken to minimize adverse effects on coastal waters submerged lands, critical areas, coastal shore areas, and Gulf beaches; or
(C) significant degradation of critical areas under §501.23(a)(7)(E) of this title would result.

Compliance: The intent of this project is beneficially using dredge material for ecosystem restoration, that would otherwise be disposed of in open-water or in an upland site. No degradation of critical areas would occur with this project. The project would have net environmental benefits that would result from reintroducing sediments to the system, building critical marsh habitat, and would restore the ecological sustainability of this area. Construction activities have been minimized to the greatest extent practicable, including reducing the overall construction footprint to only what is necessary, employing BMPs, and following seasonal timing restrictions to avoid breeding/spawning and migrating fish and wildlife impacts to the greatest extent practicable.

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

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

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

(5) *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 units does not induce adverse effects. Temporary impacts associated with placement have been minimized to the greatest extent practicable by employing BMPs and minimization and conservation measures prescribed by TCEQ, the U.S. Fish and Wildlife Services, and the National Marine Fisheries Services.

(A) *locating and confining discharges to minimize smothering of organisms;*
(B) *locating and designing projects to avoid adverse disruption of water inundation patterns, water circulation, erosion and accretion processes, and other hydrodynamic processes;*
(C) *using existing or natural channels and basins instead of dredging new channels or basins, and discharging materials in areas that have been previously disturbed or used for disposal or placement of dredged material;*
(D) *limiting the dimensions of channels, basins, and disposal and placement sites to the minimum reasonably required to serve the project purpose, including allowing for reasonable overdredging of channels and basins, and taking into account the need for capacity to accommodate future expansion without causing additional adverse effects;*
(E) *discharging materials at sites where the substrate is composed of material similar to that being discharged;*
(F) *locating and designing discharges to minimize the extent of any plume and otherwise dispersion of material; and*
(G) *avoiding the impoundment or drainage of critical areas.*

Compliance: Open water impacts are minimized by placing dredge material in marshes. All dredged material requirements can be provided through existing maintenance dredging cycles, thus, no modifications to the channel are required to implement the project. The ecosystem restoration features were designed to improve ecological function of natural resources, including proper drainage and suitable substrate material for species composition, and to be resilient and sustainable under future conditions. Discharge would be confined with reinforced levees where applicable.

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

(A) *disposal or placement of dredged material in a manner that maintains physiochemical conditions at discharge sites and limits or reduces the potency and availability of pollutants;*
(B) *limiting the solid, liquid, and gaseous components of material discharged;*
(C) *adding treatment substances to the discharged material; and*
(D) *adding chemical flocculants to enhance the deposition of suspended particulates in confined disposal areas.*

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

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

(A) *use of containment levees and sediment basins designed, constructed, and maintained to resists breaches, erosion, slumping, or leaching;*
(B) *use of lined containment areas to reduce leaching where leaching of chemical constituents from the material is expected to be a problem;*
(C) *capping in-place contaminated material or, selectively discharging the most contaminated material first and then capping it with the remaining material;*
(D) *properly containing discharged material and maintaining discharge sites to prevent point and nonpoint pollution; and*
(E) *timing the discharge to minimize adverse effects from unusually high water flows, wind, wave, and tidal actions.*

Compliance: A containment berm will be constructed for the new marsh cells as part of the restoration design to limit movement of sediments within this placement area. Containment levees are present for two of the restoration units and would be utilized to maintain sediments within the unit. Marsh nourishment measures may have some temporary and local impacts by increasing turbidity; however, material to be generated from the construction activities has been tested and found to not contain harmful concentrations of pollutants. Discharges would not occur during conditions involving high water flows, waves, or tidal actions.

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

(A) *where environmentally desirable, distributing the material in a thin layer;*

(B) orienting material to minimize undesirable obstruction of the water current or circulation patterns;
(C) using silt screens or other appropriate methods to confine suspended particulates or turbidity to a small area where settling or removal can occur;
(D) using currents and circulation patterns to mix, disperse, dilute, or otherwise control the discharge;
(E) minimizing turbidity by using a diffuser system or releasing material near the bottom;
(F) selecting sites or managing discharges to confine and minimize the release of suspended particulates and turbidity and maintain light penetration for organisms; and
(G) setting limits on the amount of material to be discharged per unit of time or volume of receiving waters.

Compliance: The restoration 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 areas. Material would then be mechanically moved into place with heavy equipment, which should reduce dispersal of material into undesirable areas. Additionally, the containment berms (constructed and current) would limit movement of sediments outside of the intended placement areas. There are no sediments of concern.

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

(A) using appropriate equipment, machinery, and operating techniques for access to sites and transport of material, including those designed to reduce damage to critical areas;
(B) having personnel on site adequately trained in the avoidance and minimization techniques and requirements; and
(C) designing temporary and permanent access roads and channel spanning structures using culverts, open channels, and diversions that will pass both low and high water flows, accommodate fluctuating water levels, and maintain circulation and faunal movement.

Compliance: Dredge material placement into the restoration areas would minimize impacts to the greatest extent practicable including, but not limited to: siting pumps and pipes outside of critical areas; utilizing existing access roads and channels to move material, equipment, and personnel; and employing 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.

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

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

(B) *selecting sites or managing discharges to prevent or avoid creating habitat conducive to the development of undesirable predators or species that have a competitive edge ecologically over indigenous plants or animals;*
(C) *avoiding sites having unique habitat or other value, including habitat of endangered species;*
(D) *using planning and construction practices to institute habitat development and restoration to produce a new or modified environmental state of higher ecological value by displacement of some or all of the existing environmental characteristics;*
(E) *using techniques that have been demonstrated to be effective in 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;*
(F) *timing dredging and dredged material disposal or placement activities to avoid spawning or migration seasons and other biologically critical time periods; and*
(G) *avoiding the destruction of remnant natural sites within areas already affected by development.*

Compliance: 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. The project is intended to restore the natural form and function of the coastal system; therefore, all long-term impacts are expected to be beneficial to the overall system by increasing suitable habitat, resiliency, and sustainability.

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

(A) *selecting sites and following procedures to prevent or minimize any potential damage to the aesthetically pleasing features of the site, particularly with respect to water quality;*
(B) *selecting sites which are not valuable as natural aquatic areas;*
(C) *timing dredging and dredged material disposal or placement activities to avoid the seasons or periods when human recreational activity associated with the site is most important; and*
(D) *selecting sites that will not increase incompatible human activity or require frequent dredge or fill maintenance activity in remote fish and wildlife areas.*

Compliance: Placement of dredged material into restoration sites may temporarily, negatively impact the human environment in and around the action area by visually disturbing the scenic view with construction equipment and activity, increasing noise, reducing some recreational opportunities, and reducing public access to some restricted areas. All these impacts would only last as long as it takes for the material to be appropriately placed and for the restoration area to stabilize. Timing of construction is entirely dependent on dredging cycles; however, during PED it would be advised to avoid the peak recreational seasons (fall/summer) if at all possible. After construction is complete and vegetation has grown within the restoration sites, recreation and scenic value is expected to be enhanced through increased recreational areas and opportunities.

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

- *(A) that ensure adequate flushing and avoid stagnant pockets; or*
- *(B) that will create the fewest practicable adverse effects on CNRAs from additional infrastructure such as roads, bridges, causeways, piers, docks, wharves, transmission line crossing, and ancillary channels reasonably likely to be constructed as a result of the project; or*
- *(C) with the least practicable risk that increased vessel traffic could result in navigation hazards, spills or other forms of contamination which could adversely affect CNRAs;*
- *(D) provided that, for any dredging of new channels or basins subject to the requirements of §501.15 of this title (relating to Policy for Major Actions), data and information on minimization of secondary adverse effects need not be produced or evaluated to comply with this paragraph if such data and information is produced and evaluated in compliance with §501.15(b)(1) of this title.*

Compliance: The project does not include constructing new channels or basins, therefore §501.25(12)(A)-(D) does not apply.

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

d) *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.

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

- *(A) environmental benefits, recreational benefits, floor or storm protection benefits, erosion prevention benefits, and economic development benefits;*
- *(B) the proximity of the beneficial use site to the dredge site; and*
- *(C) the quantity and quality of the dredged material and its suitability for beneficial use.*

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

- *(A) projects designed to reduce or minimize erosion or provide shoreline protection;*
- *(B) projects designed to create or enhance public beaches or recreational areas;*

(C) projects designed to benefit the sediment budget or littoral system;
(D) projects designed to improve or maintain terrestrial or aquatic wildlife habitat;
(E) projects designed to create new terrestrial or aquatic wildlife habitat, including the construction of marshlands, coastal wetlands, or other critical areas;
(F) projects designed and demonstrated to benefit benthic communities or aquatic vegetation;
(G) projects designed to create wildlife management areas, parks, airports, or other public facilities;
(H) projects designed to cap landfills or other water disposal areas;
(I) projects designed to fill private property or upgrade agricultural land, if cost-effective public beneficial uses are not available; and
(J) projects designed to remediate past adverse impacts on the coastal zone.

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

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

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

Compliance: Placement of dredged material would be placed on submerged lands and state park lands, with real estate agreements obtained from the GLO and TPWD.

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

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

h) *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; however, sand would be dredged from submerged lands of the GIWW for use in restoration units. Dredging sand from the GIWW has already been addressed in other documents.

i) *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: The project is fully compliant with the National Flood Insurance Program, Code of Federal Regulations, and National Flood Insurance Act.

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 exist in the project area.

§501.29 Policies for Development in State Parks, Wildlife Management Areas or Preserves

Development by a person other than the Parks and Wildlife Department that requires the use or taking of any public land in such areas shall comply with Texas Parks and Wildlife Code, Chapter 26.

Compliance: The project proposes ecosystem restoration within Goose Island State Park. TPWD staff have been involved in the planning and development process and support all proposed actions. Restoration efforts are in line with the purpose, goals, and management plans of the state park. The non-federal sponsor would be responsible for securing easements and/or rights to restored lands prior to implementation.

§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 area is in attainment for TCEQ Air Quality Emissions, thus, the project is fully compliant with the Clean Air Act as documented in the DDPR-EA.

CONCLUSION

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

REFERENCES

TPWD (Texas Parks and Wildlife Department. 2022. TPWD Seagrass Viewer. Accessed on: 26 October 2022 at: https://tpwd.maps.arcgis.com/apps/webappviewer/index.html?id=af7ff35381144b97b38fe553f2e7b562

USACE. 2022. Gulf Intracoastal Waterway, Coastal Resilience Study, Texas Integrated Feasibility Report and Environmental Assessment Brazoria and Matagorda Counties.

Appendix C-8 National Historic Preservation Act Compliance

National Historic Preservation Act Compliance

for

Aquatic Ecosystem Restoration for GIWW

Aransas County, Texas

Section 106 Coordination Letters and Project Maps

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

November 15, 2022

Ms. Martina Minthorn
Tribal Historic Preservation Officer
Comanche Nation, Oklahoma
6 SW D Avenue
Lawton, OK 73502

Dear Ms. Minthorn:

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We request your concurrence with the proposed APE and our determination in compliance with Section 106 of the NHPA. If you have any questions or if you need any additional information concerning this project, please contact John A. Campbell, Archeologist, Environmental Branch, Regional Planning and Environmental Center at (409) 766-3878 or john.a.campbell@usace.army.mil.

Sincerely,

Kenneth Shingleton

Kenneth L. Shingleton, Jr.
Chief, Cultural and Environmental Program
Support Section
Regional Planning and Environmental Center

Enclosure

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

November 15, 2022

Dr. Holly Houghten
Tribal Historic Preservation Officer
Mescalero Apache Tribe of the Mescalero Reservation, New Mexico
P.O. Box 227
Mescalero, NM 88340

Dear Dr. Houghten:

The U.S. Army Corps of Engineers, Galveston District (USACE) and our non-federal sponsor, the Texas General Land Office, are proposing to use dredged material from the Gulf Intracoastal Waterway to improve existing marsh and build new marsh at Goose Island State Park in Aransas County, Texas. The Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway – Beneficial Use of Dredged Material Project is a federal undertaking and therefore subject to Section 106 of the National Historic Preservation Act of 1966, as amended. The USACE is the lead federal agency for this undertaking. We are sending this letter to consult with your office on the proposed Area of Potential Effect (APE) and recommendations for further work.

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The upland portion of the study area is a dynamic, dunal landform that has only been partially stabilized since the construction of breakwaters along the southern bank. Due to the dynamic nature of this landform, the probability for intact archeological sites to occur in this upland area is low. For the marine portions of the project area, a privately maintained navigation channel has been dredged north of the study area and the water depth across the study area is an average of two feet. The potential for encountering submerged cultural resources, such as shipwrecks, is also low. Therefore, the USACE has determined that the proposed undertaking will have no effect upon historic properties.

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Sincerely,

Kenneth Shingleton

Kenneth L. Shingleton, Jr.
Chief, Cultural and Environmental Program
Support Section
Regional Planning and Environmental Center

Enclosure

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

November 15, 2022

Mr. Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

Dear Mr. Wolfe:

The U.S. Army Corps of Engineers, Galveston District (USACE) and our non-federal sponsor, the Texas General Land Office, are proposing to use dredged material from the Gulf Intracoastal Waterway to improve existing marsh and build new marsh at Goose Island State Park in Aransas County, Texas. The Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway – Beneficial Use of Dredged Material Project is a federal undertaking and therefore subject to Section 106 of the National Historic Preservation Act of 1966, as amended. The USACE is the lead federal agency for this undertaking. We are sending this letter to consult with your office on the proposed Area of Potential Effect (APE) and recommendations for further work.

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The upland portion of the study area is a dynamic, dunal landform that has only been partially stabilized since the construction of breakwaters along the southern bank. Due to the dynamic nature of this landform, the probability for intact archeological sites to occur in this upland area is low. For the marine portions of the project area, a privately maintained navigation channel has been dredged north of the study area and the water depth across the study area is an average of two feet. The potential for encountering submerged cultural resources, such as shipwrecks, is also low. Therefore, the USACE has determined that the proposed undertaking will have no effect upon historic properties.

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Sincerely,

Kenneth Shingleton

Kenneth L. Shingleton, Jr.
Chief, Cultural and Environmental Program
Support Section
Regional Planning and Environmental Center

Enclosure

This Correspondence sent to john.a.campbell@usace.army.mil on 12-12-2022

TEXAS HISTORICAL COMMISSION
real places telling real stories

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
THC Tracking #202302524
Date: 12/12/2022
Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway â€“ Beneficial Use of Dredged Material Pr
Goose Island S.P.
Rockport,TX

Description: Corps of Engineers, Galveston District (USACE) and the Texas GLO propose using dredged material from the Gulf Intracoastal Waterway to improve existing marsh and build new marsh at Goose Is. S.P.

Dear John A. Campbell:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas.

The review staff, led by Amy Borgens, has completed its review and has made the following determinations based on the information submitted for review:

Archeology Comments

- An archeological remote-sensing survey of the underwater project area is required. You may obtain lists of archeologists in Texas through the Council of Texas Archeologists and the Register of Professional Archaeologists. Please note that other qualified archeologists not included on these lists may be used. If this work will occur on waters owned and controlled by a state agency or political subdivision of the state, a Texas Antiquities Permit must be obtained from this office prior to initiation of fieldwork. All fieldwork should meet the minimum survey standards for underwater archeology presented in the Texas Administrative Code. A report of investigations is required and should be produced in conformance with the Secretary of the Interior's Guidelines for Archaeology and Historic Preservation and submitted to this office for review. Reports for a Texas Antiquities Permit should also meet the Council of Texas Archeologists Guidelines for Cultural Resources Management Reports and the Texas Administrative Code, Chapters 26 and 28. To facilitate review and make project information available through the Texas Archeological Sites Atlas, please submit shapefiles via the Shapefile tab on eTRAC concurrently with submission of the draft report. For questions on how to submit these, please visit our video training series at: https://www.youtube.com/playlist?list=PLONbbv2pt4cog5t6mCqZVaEAx3d0MkgQC

We have the following comments: The proposed project area is in state tracts (ST) 66 and 67. The Texas Historical Commissionâ€™s Resource Management Codes (RMC) for these tracts, hosted in the Texas General Land Officeâ€™s online Coastal Resource Management Viewer (https://cgis.glo.texas.gov/rmc/index.html), is MK and indicates this area has a high potential to contain submerged cultural resources.

Additionally, the 5-mile positional accuracy of THC Shipwreck No. 2479 (Lizzie Baron, 1864), which is .18 miles from the proposed project, indicates it may be within the area of potential affect (APE) and potentially impacted by project activities. Historic maps and records show the APE is adjacent the Texas Republic-era townsite of Lamar and the APE may host unrecorded vessel losses and other submerged cultural resources associated with its use; the APE itself would constitute part of the townâ€™s historic waterway access and appears to be off its historic waterfront. No underwater cultural resources surveys have been conducted in the project area.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: amy.borgens@thc.texas.gov.

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

for Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

cc: Jerry.L.Androy@usace.army.mil

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

November 15, 2022

Ms. Lauren Norman-Brown
Tribal Historic Preservation Officer
Tonkawa Tribe of Indians of Oklahoma
1 Rush Buffalo Road
Tonkawa, OK 74653

Dear Ms. Norman-Brown:

The U.S. Army Corps of Engineers, Galveston District (USACE) and our non-federal sponsor, the Texas General Land Office, are proposing to use dredged material from the Gulf Intracoastal Waterway to improve existing marsh and build new marsh at Goose Island State Park in Aransas County, Texas. The Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway – Beneficial Use of Dredged Material Project is a federal undertaking and therefore subject to Section 106 of the National Historic Preservation Act of 1966, as amended. The USACE is the lead federal agency for this undertaking. We are sending this letter to consult with your office on the proposed Area of Potential Effect (APE) and recommendations for further work.

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Sincerely,

Kenneth Shingleton

Kenneth L. Shingleton, Jr.
Chief, Cultural and Environmental Program
Support Section
Regional Planning and Environmental Center

Enclosure

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

November 15, 2022

Mr. Gary McAdams
Tribal Historic Preservation Officer
Wichita and Affiliated Tribes
P.O. Box 729
Anadarko, OK 73005

Dear Mr. McAdams:

The U.S. Army Corps of Engineers, Galveston District (USACE) and our non-federal sponsor, the Texas General Land Office, are proposing to use dredged material from the Gulf Intracoastal Waterway to improve existing marsh and build new marsh at Goose Island State Park in Aransas County, Texas. The Aquatic Ecosystem Restoration for Gulf Intracoastal Waterway – Beneficial Use of Dredged Material Project is a federal undertaking and therefore subject to Section 106 of the National Historic Preservation Act of 1966, as amended. The USACE is the lead federal agency for this undertaking. We are sending this letter to consult with your office on the proposed Area of Potential Effect (APE) and recommendations for further work.

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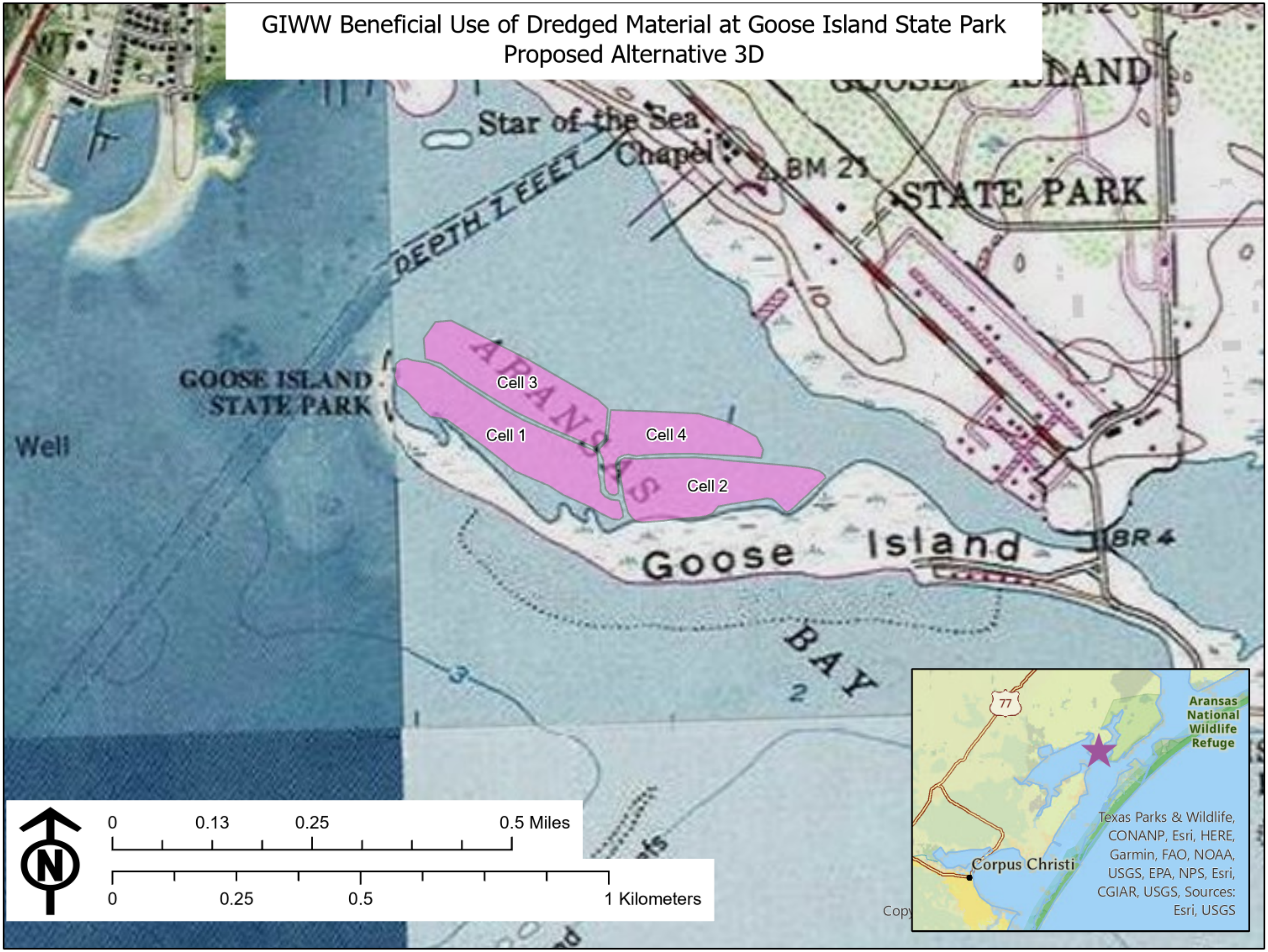
Sincerely,

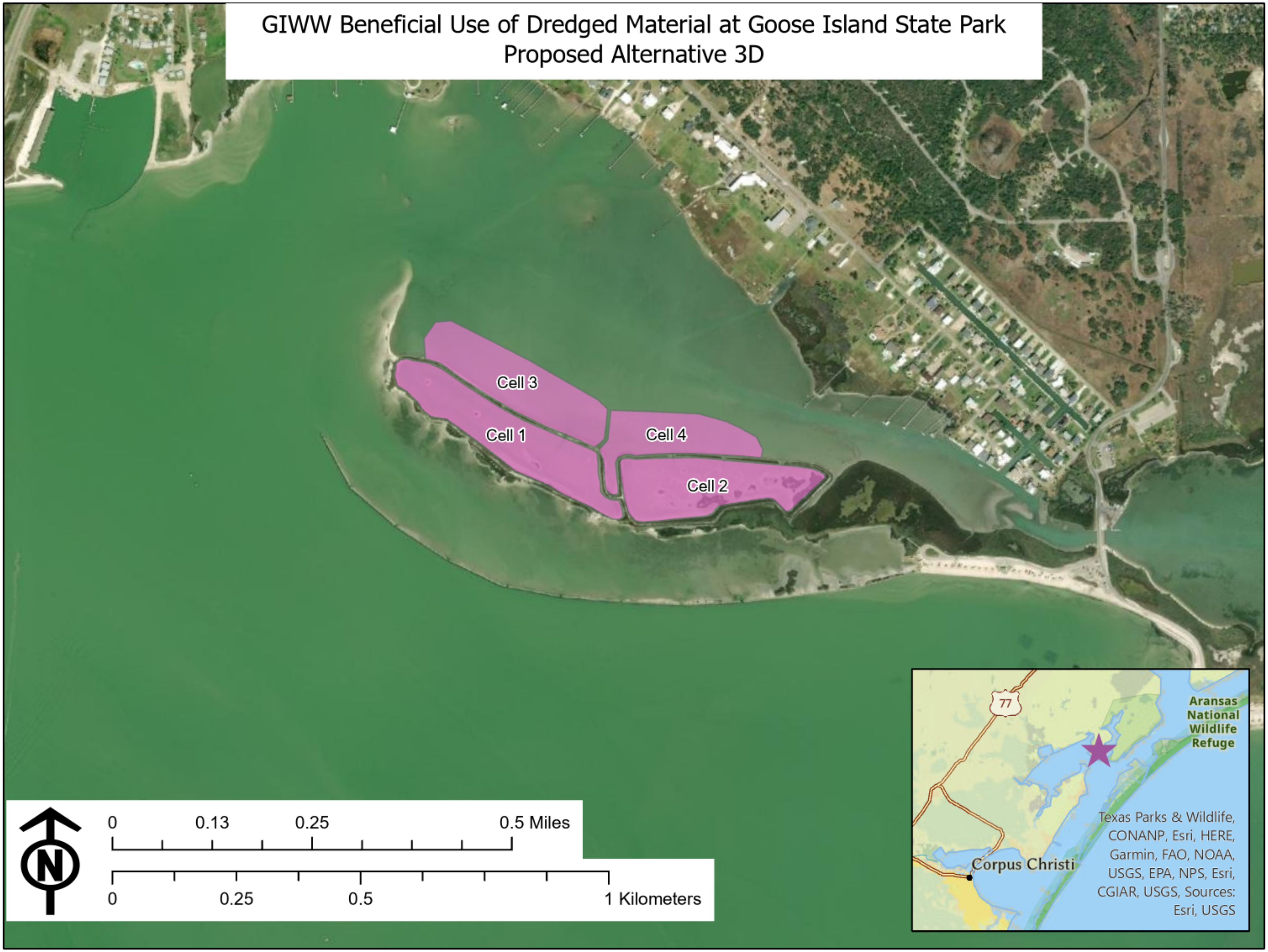
Kenneth Shingleton

Kenneth L. Shingleton, Jr.
Chief, Cultural and Environmental Program
Support Section
Regional Planning and Environmental Center

Enclosure

GIWW Beneficial Use of Dredged Material at Goose Island State Park
Proposed Alternative 3D




GIWW Beneficial Use of Dredged Material at Goose Island State Park
Proposed Alternative 3D
Cell 3
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Aransas National Wildlife Refuge
Corpus Christi
Texas Parks & Wildlife, CONANP, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, Esri, CGIAR, USGS, Sources: Esri, USGS

GIWW Beneficial Use of Dredged Material at Goose Island State Park
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