Managing Wetlands Migration Corridors and Natural Floodways Program

RESTORE Council Proposal Document

General Information

Title:
Managing Wetlands Migration Corridors and Natural Floodways Program

Project Abstract:
The Managing Wetlands Migration Corridors and Natural Floodways Program seeks to address estuarine wetland loss by preserving corridors for wetland migration and restoring wetlands that will have a path to migrate as sea level rises. Coastal wetlands are vital for supporting wildlife, recreational activities, commercial fisheries, flood control, and water quality. This program supports the RESTORE Council's primary goal of habitat restoration and conservation, with secondary benefits including improved water quality, quantity, and community resilience. In Texas, coastal habitats and communities are increasingly vulnerable to storm surge damage, especially when combined with heavy precipitation. Periodic and long-term inundation of estuarine habitats can profoundly alter the hydrology of these systems, undermining their resilience and ability to support diverse wildlife and ecosystem functions. With a proposed budget of $46.8M, the program will fund project activities such as land acquisition, habitat management, hydrologic restoration, agricultural and forest management, stormwater management, erosion control, sediment placement and shoreline protection. It will also fund planning, implementation, and monitoring to measure success. Priority will be given to projects that are well-vetted and scalable to achieve significant long-term benefits such as habitat protection, wildlife habitat enhancement, flood storage, and water quality improvement.

FPL Category: Cat1: Planning/ Cat2: Implementation

Activity Type: Program

Program: N/A

Co-sponsoring Agency(ies):
TX

Is this a construction project?:
No

RESTORE Act Priority Criteria:
(II) Large-scale projects and programs that are projected to substantially contribute to restoring and protecting the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast ecosystem.
(III) Projects contained in existing Gulf Coast State comprehensive plans for the restoration and protection of natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast region.

Priority Criteria Justification:
This is a large-scale program that aims to conserve the future quantity, quality, and diversity of Texas wetlands under changing environmental conditions. Projects will provide long-term benefits to wetland functions and values, such as flood storage, wildlife habitat, and water quality improvement. In Texas, nearly $96.8 M has been invested to improve our understanding of how coastal wetlands function and to restore and protect them (DWH project tracker). Additional work is needed, however, to continue addressing the status and future trends of these critical environments.

Coastal wetlands, which include estuarine marsh, freshwater marsh, and tidal flats, are a valuable resource and are the focus of place-based, regional, state, and Gulf-wide plans. The needs for wetland conservation and restoration occur in a variety of physical and ecological settings in coastal Texas. This program aims to support a variety of wetland projects that demonstrate the greatest need and effectiveness for bolstering present day and future wetlands. Wetland initiatives in Texas can be found in the following documents:

- The Texas Coastal Resiliency Master Plan (Texas General Land Office, 2023)
  Deepwater Horizon Oil Spill Natural Resource Damage Assessment Texas Trustee Implementation Group Draft Restoration Plan/Environmental Assessment #2: Restoration of Wetlands, Coastal, and Nearshore Habitats; Nutrient Reduction; Oysters; Sea Turtles; and Birds (Texas Trustee Implementation Group 2022) .
- Texas Coastal Management Program: Section 309 Assessment and Strategies Report 2021-2025 (Texas General Land Office 2020)
- Carancahua Bay and Cedar Bayou Watershed protection plans
- Arroyo Colorado Habitat Restoration Plan (Flores et al. 2017)
- Two Gulf Coast Join Ventures Conservation Plans (little blue heron & mottled duck) (GCJV 2024).
- Laguna Atascosa National Wildlife Refuge Comprehensive Restoration Plan (USFWS, 2010)
- Proposal for Expanding Conservation for Aransas National Wildlife Refuge (USFWS 2022)
- Texas Coastal Prairie Initiative (Coastal Prairie Conservancy 2025)

Project Duration (in years): 7

Goals

Primary Comprehensive Plan Goal:
Restore and Conserve Habitat

Primary Comprehensive Plan Objective:
Restore , Enhance, and Protect Habitats

Secondary Comprehensive Plan Objectives:
Restore, Improve, and Protect Water Resources

Secondary Comprehensive Plan Goals:
Restore Water Quality and Quantity
Enhance Community Resilience

PF Restoration Technique(s):
Create, restore, and enhance coastal wetlands, islands, shorelines and headlands: Protect natural shorelines
Create, restore, and enhance coastal wetlands, islands, shorelines and headlands: Sediment placement
Protect and conserve coastal, estuarine, and riparian habitats: Habitat management and stewardship
Protect and conserve coastal, estuarine, and riparian habitats: Land acquisition
Reduce excess nutrients and other pollutants to watersheds: Agriculture and forest management
Reduce excess nutrients and other pollutants to watersheds: Erosion and sediment control
Reduce excess nutrients and other pollutants to watersheds: Stormwater management
Restore hydrology and natural processes: Restore hydrologic connectivity

Location

Location:
The location of this program activity is within the Texas Coastal Zone, in areas with high potential for coastal wetland protection (Figure 1). This includes coastal and estuarine areas within Texas' RESTORE eligible counties including Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Harris, Jackson, Jefferson, Kenedy, Kleberg, Matagorda, Nueces, Orange, Refugio, San Patricio, Victoria, and Willacy (Figure 1).

HUC8 Watershed(s):
Texas-Gulf Region(Neches) - Neches(Lower Neches)
Texas-Gulf Region(Neches) - Neches(Pine Island Bayou)
Texas-Gulf Region(Trinity) - Lower Trinity(Lower Trinity)

Texas-Gulf Region(Galveston Bay-San Jacinto) - San Jacinto(West Fork San Jacinto)
Texas-Gulf Region(Galveston Bay-San Jacinto) - San Jacinto(Spring)
Texas-Gulf Region(Galveston Bay-San Jacinto) - San Jacinto(East Fork San Jacinto)
Texas-Gulf Region(Galveston Bay-San Jacinto) - San Jacinto(Buffalo-San Jacinto)
Texas-Gulf Region(Galveston Bay-San Jacinto) - Galveston Bay-Sabine Lake(East Galveston Bay)
Texas-Gulf Region(Galveston Bay-San Jacinto) - Galveston Bay-Sabine Lake(North Galveston Bay)
Texas-Gulf Region(Galveston Bay-San Jacinto) - Galveston Bay-Sabine Lake(West Galveston Bay)
Texas-Gulf Region(Galveston Bay-San Jacinto) - Galveston Bay-Sabine Lake(Austin-Oyster)
Texas-Gulf Region(Lower Brazos) - Lower Brazos(Lower Brazos)
Texas-Gulf Region(Lower Colorado-San Bernard Coastal) - Lower Colorado(Lower Colorado)
Texas-Gulf Region(Lower Colorado-San Bernard Coastal) - San Bernard Coastal(San Bernard)
Texas-Gulf Region(Lower Colorado-San Bernard Coastal) - San Bernard Coastal(East Matagorda Bay)
Texas-Gulf Region(Central Texas Coastal) - Lavaca(Navidad)
Texas-Gulf Region(Central Texas Coastal) - Guadalupe(Lower Guadalupe)
Texas-Gulf Region(Central Texas Coastal) - San Antonio(Lower San Antonio)
Texas-Gulf Region(Central Texas Coastal) - Central Texas Coastal(East Matagorda Bay)
Texas-Gulf Region(Central Texas Coastal) - Central Texas Coastal(West Matagorda Bay)
Texas-Gulf Region(Central Texas Coastal) - Central Texas Coastal(East San Antonio Bay)
Texas-Gulf Region(Central Texas Coastal) - Central Texas Coastal(West San Antonio Bay)
Texas-Gulf Region(Central Texas Coastal) - Central Texas Coastal(Aransas Bay)
Texas-Gulf Region(Central Texas Coastal) - Central Texas Coastal(Mission)
Texas-Gulf Region(Central Texas Coastal) - Central Texas Coastal(Aransas)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Nueces(Lower Nueces)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(North Corpus Christi Bay)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(South Corpus Christi Bay)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(Palo Blanco)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(South Laguna Madre)
Texas-Gulf Region(Galveston Bay-San Jacinto) - Galveston Bay-Sabine Lake(Sabine Lake)
Texas-Gulf Region(Central Texas Coastal) - Lavaca(Lavaca)
Texas-Gulf Region(Sabine) - Sabine(Lower Sabine)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(North Laguna Madre)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(San Fernando)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(Baffin Bay)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(Central

Laguna Madre)

State(s):
Texas

County/Parish(es):
TX - Aransas
TX - Brazoria
TX - Calhoun
TX - Cameron
TX - Chambers
TX - Galveston
TX - Harris
TX - Jackson
TX - Jefferson
TX - Kenedy
TX - Kleberg
TX - Matagorda
TX - Nueces
TX - Orange
TX - Refugio
TX - San Patricio
TX - Victoria
TX - Willacy

Congressional District(s):
TX - 18
TX - 22
TX - 27
TX - 14
TX - 36
TX - 34
TX - 7
TX - 9
TX - 8
TX - 38

Narratives

Introduction and Overview:
The Managing Wetlands Migration Corridors and Natural Floodways Program aims to address estuarine wetland loss by preserving corridors for wetland migration and restoring wetlands that will have a path to migrate as sea level rises. The program primarily supports the RESTORE Council's

goal of restoring and conserving habitat, and secondary benefits of this program address the Council's goals of restoring water quality and enhancing community resilience. The program will be managed by the Texas Commission on Environmental Quality and will provide funds to support projects that meet program priorities. The program's priority framework focuses on the following: creating, restoring, and enhancing coastal wetlands, islands, shorelines, and headlands; protecting and conserving coastal, estuarine, and riparian habitats; restoring hydrology and natural processes; and reducing excess nutrients and other pollutants from entering coastal waters. Techniques that will be considered for this program include the following: land acquisition; habitat management and stewardship; restoring hydrologic connectivity; restoring natural salinity regimes; agricultural and forest management; stormwater management; and erosion and sediment control.

Around the Gulf, climate-related disasters can have lasting ecological, social, and economic effects (Cahoon 2006; Geaghan 2011; Hamel et al. 2018). In Texas, coastal habitats and communities are increasingly vulnerable to storm surge damage, especially when combined with heavy precipitation (Maymandi, Hummel, and Zhang, 2022; Valle-Levinson, Olabarrieta, and Heilman, 2020). Periodic and long-term inundation of estuarine habitats can profoundly alter the hydrology of these systems. Historical sea level rise trends along Texas bays, as documented by NOAA's Tides and Currents website, vary by location. In Cameron County, Port Isabel exhibits a rate of 4.32 mm/year, while Port Mansfield records 3.69 mm/year. The central coast, represented by Rockport, experiences a higher rate of 5.66 mm/year, and the upper coast at Eagle Point shows the most pronounced trend at 12.93 mm/year (NOAA Center for Operational Oceanographic Products and Services, 2025). This shift in water levels is altering the dynamics of wetland habitats, affecting their hydrology, which is critical for maintaining the ecological functions of these environments (Passeri et al., 2016). The anticipated changes will challenge the ability of wetlands to sustain their current biodiversity, flood control capacity, and water quality improvement functions (Tomscha et al., 2019; Mitsch, Bernal, and Hernandez 2015; de Groot, Brander, and Max Finlayson, 2018).

Coastal wetlands are crucial habitats that support diverse wildlife, recreational activities, and commercial fisheries, while also providing flood control and improving water quality. Although emergent estuarine wetlands constitute less than 5% of total wetlands in the U.S. (Dahl, T.E., 2000), they are experiencing some of the most significant declines in areal extent compared to other wetland types (Dahl, 2000; Stedman and Dahl, 2008). The primary causes of estuarine emergent wetland loss include land conversion, erosion, and environmental changes, with the majority of losses attributed to conversion to open water (Dahl and Stedman, 2013).

In Texas, coastal areas contain approximately 435.4 sq. mi. of estuarine emergent wetlands and 857.97 sq. mi. of palustrine emergent wetlands. A total of 58.27 sq. mi. of coastal wetlands were lost between 1996 and 2010 (Texas General Land Office, 2020). A landscape change analysis performed for the Texas Coastal Resiliency Master Plan (TCRMP) utilized the SLAMM wetland model to project the future of wetlands in coastal Texas (AECOM, 2023). The output is shown in the map and graphs in Figure 2. The map illustrates wetland change caused by an intermediate sea level rise scenario and highlights current salt and brackish wetlands, as well as future conditions (assuming wetland migration corridors are preserved). Additionally, the map identifies key areas for land conservation that will support future estuarine wetland habitats (Texas General Land Office, 2023). Some of these zones of potential wetland conservation intersect with current coastal prairies. Coastal prairies are open expanses of coastal uplands with continuous grassy vegetation located immediately inland of coastal marshes along the Gulf of America shoreline. Historically, the land surrounding the bays and estuaries of the Texas coast was predominantly coastal prairie, characterized by relatively flat terrain. Coastal prairies once covered over 6.5 million acres (2.63 million hectares) of Texas land, but they now occupy only 65,000 acres (26,300 hectares), less than one percent of the original extent. Protecting coastal prairies not only conserves current habitats but also ensures that estuarine habitats can migrate and adapt in the future (Texas General Land Office, 2020). Another assessment by the Bureau of Economic Geology found that shoreline movement in Texas bays is predominantly erosional, with long-term average retreat rates ranging from -0.49 m/yr in San Antonio Bay to -1.05 m/yr in the Galveston Bay system (Paine, Caudle, and Andrews, 2016; Caudle and Paine, 2024). Shoreline types such as deltaic marshes, back-barrier marshes, and tidal flats are particularly vulnerable to sea level rise and wave action, contributing to significant land-loss rates across the region.

To support the Texas Restore FLP 4 planning process, a content analysis of 119 planning and restoration documents, including those from local, state, and federal entities as well as NGOs, was performed by the Harte Research Institute. These documents included various area management plans, state environmental program plans, conservation plans for different species, and restoration project documents either funded or in need of funding. This analysis identified altered, degraded, or lost habitat as a primary issue of concern. Further, wetlands, in particular saline or estuarine wetlands, were identified as habitats of high concern. This information, in addition to other habitat trend information, was used to create an initial list of potential programs for Texas. On July 2023, the programs were presented for discussion to two Texas working groups, comprising government agencies and NGOs, that advise the Texas RESTORE process. Following the presentation, a survey was administered to the working group. The survey responses for the wetland programs acknowledged wetlands as a high priority due to their importance for wildlife and commercial fisheries. It was recommended that the program include active wetland restoration and the protection of future wetland migration areas, as acquisition alone may not sufficiently counter threats such as ditching, draining, and filling. The inclusion of upland coastal prairie and forested habitats was advised as they can improve water quality through natural vegetation communities. Additionally, leveraging opportunities with NRDA, the Army Corps of Engineers, and other agencies for wetland restoration, including the beneficial use of dredge material, was suggested. Further suggestions included wind tidal flats restoration and support for Natural and Nature Based Features for filtering and conveying floodwaters.

This program is designed to conserve and protect current and future wetland habitat under changing environmental conditions The program targets fresh and saltwater wetlands including tidal flats, coastal prairie habitat, and adjacent buffer areas that may serve as wetland migration corridors. Considerations will be extended to wetlands that support the natural conveyance, storage and filtering of flood water, with the potential to protect or enhance water quality. An additional benefit of this program will be to reduce flood risk in neighboring communities and increase the use of green infrastructure to improve resilience and ecological benefits. The program will utilize funds to support projects that meet the program goals with techniques such as land acquisition, habitat management and stewardship, restoring hydrologic connection, agriculture and forest management, stormwater management, erosion and sediment control, sediment placement, and protection of natural shorelines.

Example projects for consideration are outlined in current planning documents such as the Texas Coastal Resiliency Master Plan (TCRMP) (Texas General Land Office 2022). The TCRMP proposes an estimated $1.87 billion in 121 proposed Tier 1 coastal resilience projects, spanning 10 priority statewide actions. These projects reflect careful consideration of the complex characteristics of the Texas coastal zone by the Texas General Land Office (TGLO) and the Plan’s Technical Advisory Committee (TAC), which includes coastal planners, community leaders, scientists, engineers, and other stakeholders. The potential project budgets for wetlands vary from $250K to $60M (Table 1). Further, previous DWH funding for Texas (DWH Project Tracker) has supported projects in Mad Island, Dollar Bay, Bahia Grande, Swan Lake, JD Murphee WMA, Matagorda Bay, Nueces Delta, Brazoria NWR, and Galveston Island (among a few others). This program will consider the outcomes of those prior projects and the potential to fund additional phases where applicable. Considerations will be taken to leverage ongoing work and opportunities to make the most impact on coastal wetland restoration. Table 1 is a list of TCRMP Tier 1 projects that potentially meet this program’s goals. While these examples provide evidence of funding needs in Texas, funding for this program will be open to proposals and is not limited to those listed. Fundable projects must demonstrate rigorous planning, feasibility, and support by the public and conservation community, as well as the applicant's experience and demonstrated ability to conduct and manage these types of projects.

Proposed Methods :

This program will implement a project selection process that evaluates the need for the project, its potential to benefit wetland habitat, the feasibility of the design and location, and the applicant's (and team's) demonstrated ability to implement and successfully construct the project. In addition, project applicants will be required to submit project success metrics, example of which are presented in this program section titled “Metrics and Measures of Success”.

This program aims to preserve current and future estuarine habitat, by developing a framework to prioritize the selection of projects that support the program’s goals. It is encouraged that projects utilize available analysis and initiatives to support the need for their project. A variety of resources are available to support the planning of wetland conservation and restoration projects, highlighting the need to address vulnerable areas and prioritize action. Tools like the “Shoreline Change Map” (Bureau of Economic Geology, 2024) and the NOAA Sea Level Rise Viewer (NOAA Office for Coastal Management, 2024) provide valuable data on shoreline movement, flood risks, wetland migration, and areas susceptible to inundation. The NERRS Landscape-Scale Study of Marsh Resilience (Stevens et al., 2023) offers GIS-based analyses of marsh vulnerability and adaptive capacity at the watershed scale, while the Coastal Resilience Master Plan (TGLO, 2023) models wetland changes, flood hazards, and potential wetland loss to guide strategic conservation efforts. Implementation methods are described below.

Land acquisition involves purchasing land from willing sellers or obtaining conservation easements from landowners to secure the long-term preservation of natural habitats. Purchased lands are permanently owned by a government agency, conservation organization, or land trust, while conservation easements allow the owner to retain property ownership with voluntary restrictions for conservation (RESTORE Council 2023). Both approaches help preserve native biodiversity and ecosystem functions. Land acquisition projects must show alignment with the program goals. Once an area has been targeted for acquisition the following general steps will be required: (1) Complete due diligence including appraisal, environmental assessment, survey, and title search to ensure that the purchase costs are consistent with market values, that the property is not contaminated, property boundaries are known, and that the tracts' titles are free and clear of objectionable encumbrances; (2) Secure the land or easement with a purchase contract; and (3) Convey the property for long-term management. It may also be necessary to engage specialists such as surveyors and environmental engineers to address any complexities during the transaction (Land Trust Alliance 2024).

Habitat management and stewardship can be carried out on public lands, newly acquired properties, or private lands through voluntary agreements. These efforts involve collaborating with landowners, including agricultural and forest producers, to enhance and preserve the ecological value of their land. Stewardship focuses on the responsible use and protection of natural resources through sustainable practices (RESTORE Council, 2023). Examples of habitat management and stewardship activities that apply to this program include controlling invasive species, planting native vegetation, managing forests and coastal prairies, conserving riparian buffers, removing debris, restoring hydrology, controlling erosion, and developing habitat management plans.

Restoration of wetland functions may require restoring hydrologic connection. Restoring natural hydrology involves re-establishing or mimicking disrupted hydrologic connections, often obstructed by infrastructure like roads and levees that block essential surface flows. Solutions include installing or enlarging culverts and gates to restore flow, degrading spoil banks to allow water movement, and addressing disruptions caused by logging roads and drainage ditches (RESTORE Council, 2023).

Projects may incorporate sediment placement and natural shoreline protection where appropriate. Sediment placement aids in wetland restoration by depositing sediment into shallow water habitats to elevate them to levels that support native vegetation or re-establish the natural shoreline. This approach may utilize the beneficial use of dredged material. The beneficial use of dredged material involves repurposing sediment that would otherwise be disposed of and placing it in a manner that benefits society and the natural environment, such as for habitat restoration and development (US EPA 2007). Project planning activities may involve an assessment of the feasibility of using dredged material, obtaining the appropriate permits, and creating construction designs. Project implementation would involve coordination and construction of the designed project. Shoreline protection techniques reduce wave energy and currents, promoting sediment deposition, and providing shelter for wetland plants and shoreline habitats. Examples of shoreline protection include the construction of offshore or nearshore breakwaters, reefs, or living shorelines to reduce erosion.

Lastly, this program would support activity that enhances secondary benefits of a wetland protection and conservation project leading to the reduction of excess nutrients and other pollutants in the watershed. These include agriculture and forest management, stormwater management, and erosion and sediment control. Riparian and wetland vegetation buffers, along with farmland-to-wetland conversion, can reduce excess nutrients, sediment, and pollutants in runoff, improving water quality and ecosystem health. Forest management activities, such as reforestation and invasive species removal, further enhance water storage, filtration, and habitat for native species while reducing flood risks. Stormwater management approaches address domestic and municipal stormwater. This program will focus on techniques that incorporate stormwater wetlands to protect water quality and enhance community resilience. Lastly, erosion and sediment control protect water quality by limiting the transport and deposition of sediments that transport pollutants such as pesticides, nutrients, metals, and other contaminants. This program will consider the use of vegetation buffers for water quality improvement.

Monitoring and metrics of success will be tailored to the project being implemented. Metrics will be selected on a project-by-project basis to ensure they align with the unique objectives and desired outcomes of each initiative, providing a customized framework for evaluating success. Potential metrics considered are listed below and feature metrics related to habitat restoration, land acquisition, shoreline protection, water quality and community resilience.

Environmental Benefits:

The program will fund projects with the highest potential for long-term benefits to wetland functions and values, such as flood storage, wildlife habitat, water quality improvements, support fisheries, and carbon sequestration (Barbier et al. 2011; Engle 2011; Yoskowitz et al. 2017). The program has the potential for significant environmental benefits by protecting, conserving, and restoring diverse coastal wetland habitats, including estuarine wetlands and adjacent upland areas. These habitats are essential for supporting numerous species, including shorebirds, waterfowl, waterbirds, finfish, shrimp, blue crabs, and sea turtles. Additionally, maintaining these complex ecosystems is crucial for ensuring their resilience and longevity in the face of rising sea levels, thereby safeguarding biodiversity and the overall health of coastal environments. Lastly, wetlands and other natural coastal features play a crucial role in protecting communities from flooding and coastal storms and can be important for enhancing community resilience (Arkema et al., 2013; Spalding et al., 2014; Sutton-Grier et al., 2015).

Metrics:

Metric Title: HR013 : Wetland restoration - Acres restored

Target: 0.99

Narrative: The program will consider the following as it applies to individual project goals: as the number of acres restored, cubic volume or mass of sediment deposited, and the number of vegetation plugs.

Metric Title: RES003 : Community Resilience - # of residential, commercial, and public facilities benefiting

Target: 0.99

Narrative: The program will consider the following as it applies to individual project goals: residential, commercial, and public facilities benefiting from the project once the community resilience project is implemented. These are considered additional benefits of habitat restoration and conservation.

Metric Title: HR009 : Restoring hydrology - Acres with restored hydrology

Target: 0.99

Narrative: The program will consider the following as it applies to individual project goals: number of acres with restored hydrology. This can include wetlands and upland buffer/transition habitats.

Metric Title: HM001 : Nutrient reduction - Lbs. N avoided or removed

Target: 0.99

Narrative: The program will consider the following as it applies to individual project goals: nitrogen removed from the system (in lbs) or prevented from entering the system (in lbs/year). These are considered additional benefits of habitat restoration and conservation.
4

Metric Title: HM003 : Nutrient reduction - Lbs. P avoided or removed

Target: 0.99

Narrative: The program will consider the following as it applies to individual project goals: Enter the total amount of phosphorus removed from the system (in lbs) or prevented from entering the system (in lbs/year). These are considered additional benefits of habitat restoration and conservation.

Metric Title: HM004 : Sediment reduction - Lbs. sediment avoided or removed

Target: 0.99

Narrative: The program will consider the following as it applies to individual project goals: number of acres restored. Habitat included in this metric has been restored to original (or target) habitat and ecosystem function.

Metric Title: HR010 : Riparian restoration - Acres restored

Target: 0.99

Narrative: The program will consider the following as it applies to individual project goals: number of acres of riparian habitat restored to improve water quality.

Metric Title: PRM011: Planning - Number of E&D plans developed

Target: 0.99

Narrative: Number of E&D plans developed

Metric Title: HR014 : Habitat restoration - Acres of coastal habitat prevented from eroding

Target: 0.99

Narrative: Land change rate (acres/year) at the conclusion of monitoring, i.e., the ratio of (land to water)/time.

Metric Title: HR002 : Shoreline restoration - Miles of shoreline stabilized and restored

Target: 0.99

Narrative: Miles of shoreline protection installed. This should be selected and reported for coastal habitat shoreline restoration projects that protect against erosion.

Metric Title: HC001 : Conservation easements - Acres protected under easement

Target: 0.99

Narrative: Number of acres protected under long-term easement (permanent or >30- yr). Acres protected under easement should always be brought under improved management.

Metric Title: HC002 : Conservation easements - Miles of shoreline under long-term easement

Target: 0.99

Narrative: Miles under long-term easement (permanent or >30yr). This includes miles of shoreline in coastal streams or open coast (i.e., beaches). Miles protected under easement should always be brought under improved management

Metric Title: HC003 : Land acquisition - Acres acquired in fee

Target: 0.99

Narrative: Number of acres acquired in fee. Acres acquired in fee should always be brought under improved management.

Metric Title: HC004 : Land acquisition - Miles of shoreline acquired

Target: 0.99

Narrative: In miles acquired. This includes miles of shoreline in coastal streams or open coast (i.e., beaches). Miles acquired in fee should always be brought under improved management.

Metric Title: HR004 : Habitat restoration - Acres restored

Target: 0.99

Narrative: Number of acres restored. Habitat included in this metric has been restored to original (or target) habitat and ecosystem function. This metric should be used for habitats that span outside (or occur beyond) habitats captured by other metrics, such as upland forests.

Metric Title: OEB001 : Other Environmental Benefits - # metric tons of greenhouse gas emissions reduced

Target: 0.99

Narrative: Other environmental benefits - Number of metric tons of greenhouse gas emissions reduced

Risk and Uncertainties:

Wetland restoration faces several challenges and risks that could hinder its success. One significant factor is sediment availability, which is critical for the long-term sustainability of coastal wetlands (Liu et al., 2007). Additionally, wetlands are vulnerable to various pressures, including drainage, nutrient enrichment, invasive species, and urban and agricultural encroachment, which have led to significant global wetland losses (Familkhalili et al. 2023). Climatic events, such as hurricanes, extreme storms, and prolonged droughts, also pose significant risks to restoration activities. These events can lead to increased erosion, sediment displacement, and habitat destruction, directly impacting the construction, effectiveness, and longevity of restoration projects (Zabin et al., 2022). Other environmental changes further complicate restoration efforts by altering hydrological regimes, impacting water availability, and necessitating habitat-specific management strategies to address regionally variable stressors (Erwin, 2009). Particularly, periodic and long-term inundation of estuarine habitats can profoundly alter the hydrology of these systems, (Hayhoe et al., 2018; Sweet et al., 2022) undermining their resilience and ability to support diverse wildlife and ecosystem functions. Historical sea level rise trends along Texas bays vary by location, with rates ranging from 3.69 mm/year in Port Mansfield to 12.93 mm/year at Eagle Point (NOAA CO-OPS, 2025).These trends contribute to potential effects on coastal areas including submergence and erosion, saltwater intrusion, and a decline/change in coastal wetlands (Gornitz, 1991; Nicholls and Cazenave, 2010; Mitchell, Herman, and Hershner, 2020). These challenges emphasize the need for project planning, prioritization, and adaptive management to ensure the effectiveness of wetland restoration in sustaining ecosystem services and supporting biodiversity. Monitoring for each project will be based on project goals and potential for uncertainty depending on location, project activity, and timeline.

For projects involving land acquisition, a primary risk and uncertainty involves finding willing sellers of land that meet program objectives. Land prices are uncertain as well and may cause the program to find other properties if environmental objectives are not achievable with smaller purchases. For projects that use beneficial use of dredge material, potential risks include the availability, source, and timing of materials present is one of the largest uncertainties in implementing the program. Many ports and channels have maintenance dredging permits specifying the amount of material to be dredged to maintain access. However, the implementation and timing of maintenance dredging depends on various factors, such as budget availability. Another potential delay to the implementation of a project can result from the planning, engineering, and permitting process for a beneficial use project often taking between three to six years (Parson and Swafford, 2012).

Monitoring and Adaptive Management:

Given the uncertainties in restoration, the principles of adaptive management are potentially useful in both planning and managing restoration projects to increase the probability of success. Adaptive management is a method to systematically assess and improve the performance of restored systems and contribute to restoration technology (Thom, 2000). In essence, adaptive management involves synthesizing existing knowledge, exploring alternative actions, making explicit predictions of their outcomes, implementing actions, monitoring to determine whether outcomes match those predicted, and using these results to adjust future plans (Murray and Marmorek, 2003).

In implementing adaptive management, this program will use a goal-oriented approach by engaging established working groups in the development of criteria to select priority projects and utilize monitoring to assess needs and performance. Adaptive management is important considering the risks and uncertainties mentioned above, in particular those that may lessen the effectiveness, delay, or prevent project implementation (e.g., storms, drought, permitting issues). Due to these and other potential challenges, the program allocates 10% of the total budget for contingencies, providing a buffer for adaptive management.

Data Management:

Data management for this program is designed to promote transparency in the project selection *process. Information used in decision-making, such as supporting plans, program budgets, and past project performance reports, will also be accessible to guide potential project decisions. Once projects are selected, geotechnical and engineering data, along with construction specifications, will be made available. Furthermore, data related to post-project implementation will be collected and shared publicly. This includes information on project performance, such as potential metrics previously mentioned.*

The Texas Commission on Environmental Quality (TCEQ) and the Gulf of Mexico Research Initiative Information and Data Cooperative (GRIIDC) will collaborate with data producers to ensure data is shared after key activities conclude. GRIIDC, a multidisciplinary repository, tracks, curates, and archives diverse datasets, making them publicly discoverable through digital object identifiers and detailed ISO 19115-2 metadata. This publicly accessible repository will facilitate data access for performance monitoring and adaptive management and ensure data interoperability and reuse.

Collaboration:
Two Texas workgroups were established to provide input on coastal priorities: State & Federal Representatives and Non-Governmental Organizations. Moving forward, continued engagement in the 2026 FPL process will integrate with ongoing coastal restoration planning processes such as TGLO's Coastal Resiliency Master Plan. The program will leverage state and federal efforts including the DOI wind-tidal flat restoration and USDA Gulf Coast Conservation Reserve (FPL4 proposed). Work will also continue with Texas representatives and working groups during the project selection process, at which time potential leveraging opportunities (co-funding, adjoining or building on other work) will be considered.

Public Engagement, Outreach, and Education:
The engagement process for 2026 FPL is ongoing and involves multiple steps to ensure comprehensive input and alignment with restoration priorities. A content analysis of 119 planning and restoration documents, including those from entities participating in our federal/state and NGO working groups, was conducted to identify key concerns, past restoration projects and programs, and current restoration needs. This analysis, combined with other environmental data, guided the development of potential 2026 FPL programs. These programs were presented to the working groups in the summer of 2023 and followed by a survey to gather feedback on the level of support and to request suggestions for changes.

The working groups were also given the opportunity to submit additional programs for consideration. After edits and budget adjustments, the proposed programs were opened for public comment in March of 2024. Based on the feedback received and the availability of funding, the programs were then refined, combined, and revised to better meet the needs and priorities identified throughout the process.

Moving forward, the selection process for 2026 FPL grant subrecipients will require that projects are vetted through the Texas 2026 FPL process or other public process, such as the TGLO's Coastal Resiliency Master Plan, NRDA, or NFWF. Criteria for selecting projects will include but are not limited to, the following factors: alignment with issues outlined in the program activity description, availability of funds for the program, project readiness, leveraging opportunities, scalability, risk/benefit ratio, and distribution of funds across the Texas coast. This comprehensive process, which includes both completed and forthcoming steps during program planning and implementation, will ensure that the final project selections align with the RESTORE Planning Framework document and reflect the input of workgroups, elected officials, the public, and the Office of the Governor.

Leveraging:
N/A

Environmental Compliance:
The planning of this program's activity is covered by the Council's NEPA Categorical Exclusion for planning and related activities (Section 4(d)(3) of the Council's NEPA Procedures). Permitting will be necessary in the implementation of restoration activity that involves placement and modification of sediment within Texas waters and includes USACE permits, permits for Beneficial Use of Dredge Material, Coastal Zone Management Consistency Certification (TGLO), Surface Lease (TGLO), 401 Water Quality (TCEQ), and consultation with appropriate agency as it related to Essential Fish Habitat, Endangered Species Act, Migratory Bird Treaty and Marine Mammal Protection Act. All specific environmental compliance needs will be identified during project identification and development activities.

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Budget

Project Budget Narrative:
A total budget of $46,800,000 is proposed for 2026 FPL activities associated with this program. These funds are intended for planning, implementation and monitoring of activity related to the protection and restoration of waterbird rookery habitat. An estimated 3% will be used for project planning, which includes activities such as project selection and development. An additional estimated 5% will be allocated for monitoring and data management activities which include project activity monitoring and collection of data to support metrics for evaluation of success.

Total FPL Project/Program Budget Request:
$ 46,800,000.00

Estimated Percent Monitoring and Adaptive Management: 5 %

Estimated Percent Planning: 3 %

Estimated Percent Implementation: 82 %

Estimated Percent Project Management: N/A

Estimated Percent Data Management: N/A

Estimated Percent Contingency: 10 %

Is the Project Scalable?:
Yes

If yes, provide a short description regarding scalability.:
Given the program's budget of $46.8 Million and Texas's estimated need of nearly $300 million (Table 1), this program will prioritize and scale projects to maximize impact. The program will consist of several independent projects, which can be scaled down or reduced in number based on available funding.

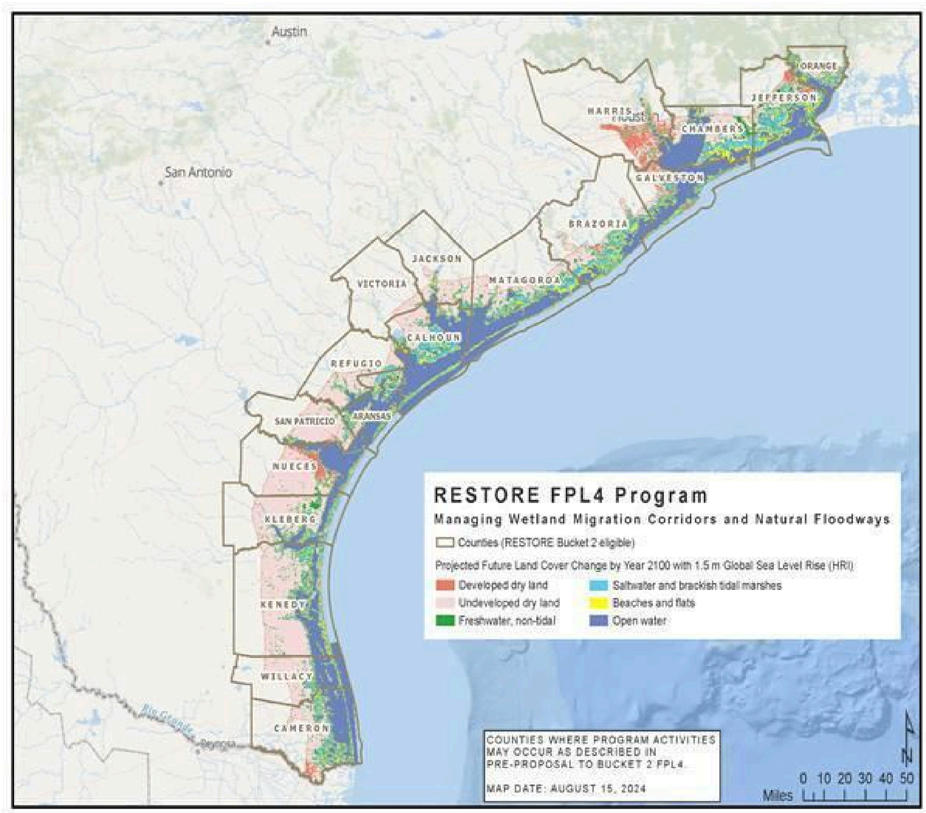
Environmental

Environmental Requirement	Has the Requirement Been Addressed?	Compliance Notes (e.g.,title and date of document, permit number, weblink etc.)

National Environmental Policy Act	N/A	Note not provided.
Endangered Species Act	N/A	Note not provided.
National Historic Preservation Act	N/A	Note not provided.
Magnuson-Stevens Act	N/A	Note not provided.
Fish and Wildlife Conservation Act	N/A	Note not provided.
Coastal Zone Management Act	N/A	Note not provided.
Coastal Barrier Resources Act	N/A	Note not provided.
Farmland Protection Policy Act	N/A	Note not provided.
Clean Water Act (Section 404)	N/A	Note not provided.
River and Harbors Act (Section 10)	N/A	Note not provided.
Marine Protection, Research and Sanctuaries Act	N/A	Note not provided.
Marine Mammal Protection Act	N/A	Note not provided.
National Marine Sanctuaries Act	N/A	Note not provided.
Migratory Bird Treaty Act	N/A	Note not provided.
Bald and Golden Eagle Protection Act	N/A	Note not provided.

Clean Air Act	N/A	Note not provided.
Other Applicable Environmental Compliance Laws or Regulations	N/A	Note not provided.

Maps, Charts, Figures



Caption : Managing Wetlands Migration Corridors and Natural Floodways Program

Other Uploads

Main Uploads_0:
Tx-Wetlands-Fig1-TCRMP_Model.docx

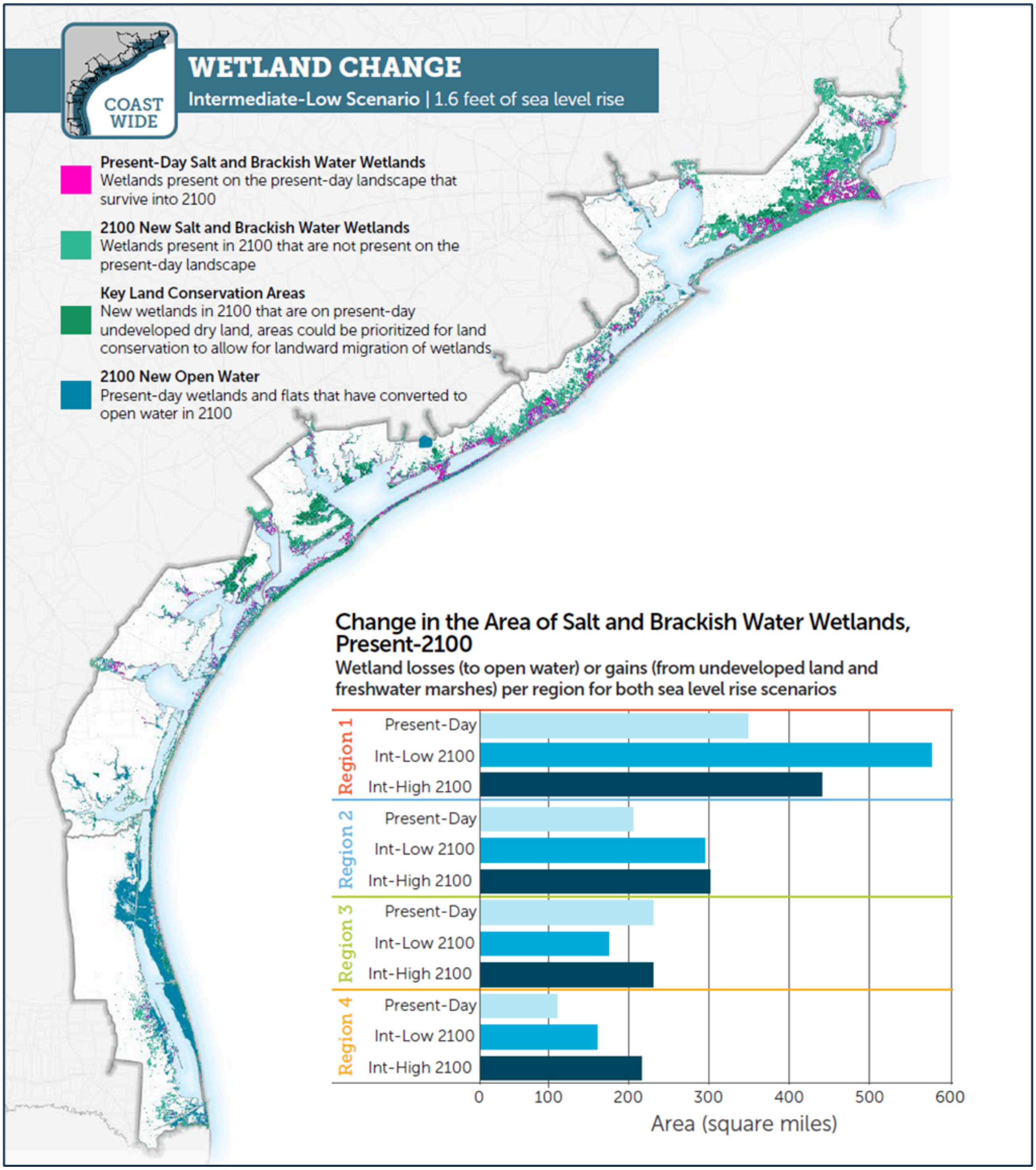


Figure 1. Map and graph for projected estuarine change along the Texas coast. The map highlights the importance of wetland migration corridors and key conservation areas needed to preserve estuarine wetlands in the future. Image credit: Texas General Land Office, Texas Coastal Resilience Master Plan, 2023.

Main Uploads_1:

Tx-Wetlands-Table1.docx

Table 1. Select wetland projects from TCRMP that involve habitat creation, land acquisition & hydrologic connectivity. This table highlights the diverse need for addressing the conservation and restoration of coastal wetlands in Texas.

Project Type and Title	Project ID	Project Estimated Cost
Habitat Creation and Restoration* (excludes rookery and oyster projects)		**$51,000,000**
Anahuac NWR East Unit Beneficial Use	1390	$16,000,000
Bessie Heights Wetland Restoration	9025	$7,700,000
Highland Bayou Shoreline and Marsh Restoration Project	9248	$1,700,000
Lower Neches WMA Lake Street Drive Beneficial Use	1387	$6,000,000
McFaddin NWR Willow Lake Marsh Beneficial Use	1389	$8,600,000
San Bernard NWR Sargent Unit Beneficial Use	1391	$11,000,000
Habitat Creation and Restoration; Land Acquisition		**$56,200,000**
East and West Galveston Bay Watershed, Wetland, and Habitat Conservation	9108	$31,200,000
South Padre Island Coastal Beach Protection	9051	$25,000,000
Habitat Creation and Restoration; Shoreline Stabilization; Land Acquisition		**$9,700,000**
Dollar Bay Wetland Protection, Restoration, and Acquisition	9066	$9,700,000
Habitat Creation and Restoration; Studies, Policies, and Programs; Hydrologic Connectivity		**$24,300,000**
Farming Out Pollutants in Petronila Creek	9209	$20,000,000
Hydrologic Restoration of Welder Flats	1342	$4,300,000
Hydrologic Connectivity		**$6,000,000**

Texas Bayou Water Control Structure	1356	$6,000,000
Hydrologic Connectivity; Studies, Policies, and Programs		**$250,000**
Matagorda Bay Regional Inflow Study	9070	$250,000
Land Acquisition		**$46,600,000**
Coastal Heritage Preserve	240	$24,000,000
Follet's Island Conservation Initiative	9046	$7,600,000
Bastrop Bayou Marsh Acquisition	1262	$10,000,000
Shell Point Ranch Wetlands Protection	9003	$5,000,000
Land Acquisition; Habitat Creation and Restoration		**$92,700,000**
Anahuac NWR Conservation and Restoration	10000	$25,000,000
Columbia Bottomlands Ecosystem Preservation	1284	$4,700,000
Lake Austin Coastal Prairie Conservation	9224	$60,000,000
Middle Armand Bayou Protection Project	9150	$3,000,000
Land Acquisition; Habitat Creation and Restoration; Shoreline Stabilization		**$10,000,000**
Moody NWR Conservation and Restoration	9082	$10,000,000
Grand Total		**$296,750,000**

Main Uploads_2:
Tx-Wetlands-Fig2-Map.docx

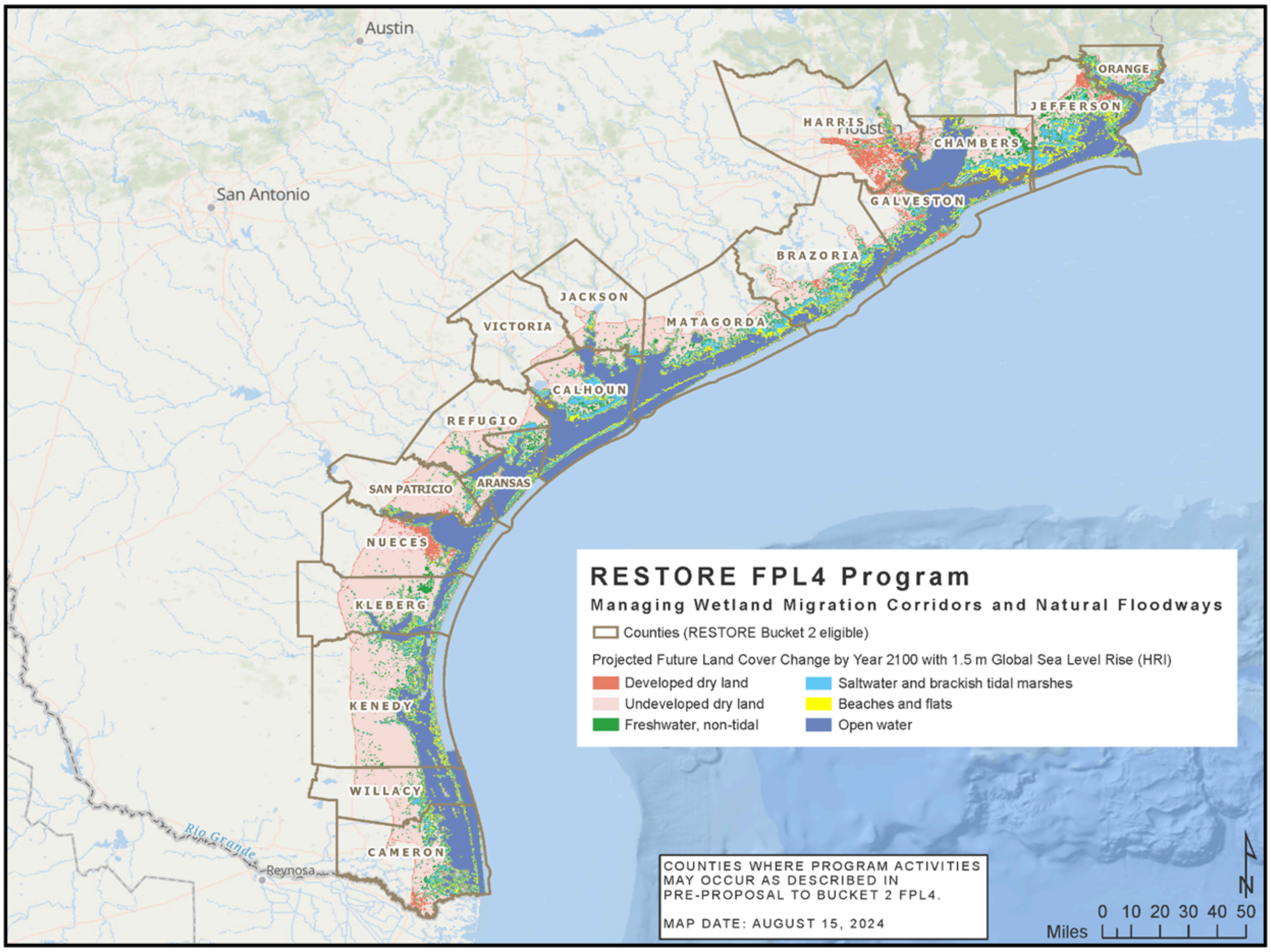


Figure 2. Map of RESTORE eligible counties and program activity.

GIS Data_4:
TX_FPL3b_WQ.zip

Council Staff Review: Managing Wetlands Migration Corridors and Natural Floodways Program

Note: All comments indicated below have been addressed in this revised proposal.

FPL Internal Staff Review

Project/Program	Managing Wetlands Migration Corridors and Natural Floodways Program		
Primary Reviewer	Heather Young	Sponsor	Texas
EC Reviewer	John Ettinger	Co-Sponsor	N/A

1. Is/Are the selected Priority Criteria supported by information in the proposal?		Yes
Notes		

2. Does the proposal meet the RESTORE Act geographic eligibility requirement?		More information needed
Notes	Location states all activity will be within TX Coastal Zone within Texas RESTORE eligible counties including Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Harris, Jefferson, Matagorda, and Refugio. However, 18 counties were selected in PIPER and featured on map. Needs clarification. Response: TX added the 8 other eligible counties: Orange, Jackson, Victoria, San Patricio, Nueces, Kleberg, Kenedy, Willacy	

3. Are the Comprehensive Plan primary goal and primary objective supported by information in the proposal?		Yes
Notes		

4. Planning Framework: If the proposal is designed to align with the Planning Framework, does the proposal support the selected priority approaches, priority techniques, and/or geographic area?		Yes
Notes		

5. Does the proposal align with the applicable RESTORE Council definition of project or program?		Yes
Notes		

6. Does the budget narrative adequately describe the costs associated with the proposed activity?	More information needed

Notes	The 2026 FPL proposal provides the total funding amount requested for the activity, along with the percentage breakdown between FPL Categories 1 and 2. By applying the percentages to the total for the activity the requested amount in FPL Category 1 is $8,424,000 and Category 2 is $38,376,000. Need to verify numbers are correct. This comment has been addressed.

7. Have three external BAS reviews been completed and has the proposal sponsor provided their response?		More information needed
Notes	Please see the external BAS review comments, and external reviews summary attached with these review comments.	

8. Have appropriate metrics been proposed to support all primary and secondary goals?		More information needed
Notes	Recommend adding PRM011 : Restoration planning/design/permitting - # E&D plans developed. Omission was likely a typo since the Narrative description of PRM013 EC states "Number of E&D plans developed". This comment has been addressed.	

9. Environmental compliance: If FPL Category 1 has been selected for the implementation component of the project or program, does the proposal include environmental compliance documentation that fully supports the selection of Category 1?		N/A
Notes	The implementation component is in FPL Category 2.	

Summary of Best Available Science Review: Managing Wetlands Migration Corridors and Natural Floodways Program

Reviewers provided a range of feedback on the Texas wetlands proposal, recognizing strengths in its alignment with regional planning and its use of peer-reviewed or publicly available sources, while also highlighting areas needing improvement. The objectives and methods were generally justified, particularly through references to the Texas Coastal Resiliency Master Plan and relevant literature, though some citations were outdated, inaccessible, or incomplete. All reviewers agreed the proposal was geographically appropriate for the Gulf Coast region. However, there were concerns over inadequate citation of supporting science in parts of the document, especially regarding secondary benefits like sediment and nutrient reduction.

While short-term risks related to project implementation, such as land acquisition and dredge material sourcing, were briefly addressed, long-term risks like sea level rise and climate impacts were insufficiently discussed. Adaptive management was mentioned as a strategy, with a contingency budget included, but reviewers noted the lack of detail on how this approach would be operationalized or linked to performance metrics. The proposal does mention measures of success aligned with RESTORE Act goals, yet some metrics—particularly for land acquisition, community resilience, and hydrologic restoration—were deemed vague or incomplete.

Reviewers had mixed opinions on whether the program demonstrated experience. In-state reviewers were confident in the agencies' expertise, but out-of-state reviewers found the proposal unclear about the lead entity and partners. While the goals and methods were generally well-defined, one reviewer noted a mismatch between some proposed activities and the primary wetland restoration goal. Environmental benefits were well-articulated in relation to climate and land use stressors, though the proposal lacked an evaluation of past project successes and failures. Finally, while a data management and monitoring plan was included, reviewers called for more specific details, particularly regarding long-term monitoring and how adaptive management would respond to ecological performance over time.

Additional suggestions included incorporating nutrient and pest management plans, requiring long-term ecological monitoring, and offering clearer definitions of performance targets across project types. Overall, the proposal was seen as grounded in regional science and planning but would benefit from stronger documentation, risk analysis, and implementation strategies.

Summary of Texas' Response to BAS Comments: Managing Wetlands Migration Corridors and Natural Floodways Program

In response to the BAS comments, the state strengthened the proposal by updating and properly citing references (added 34 additional references), ensuring key documents are either linked or summarized within the proposal, and including maps and tables where necessary. They explicitly addressed long-term climatic risks, including sea level rise, by incorporating relevant study results and improving the connection between adaptive management strategies and future environmental changes. The state also acknowledged the need for clearer metrics, adding additional metrics, specific to land acquisition and community resilience. Also, in response to a comment they clarified the role of TCEQ in the RESTORE Bucket 2 process. More details were provided to address comments regarding project types, expected distribution, added success stories from past efforts, and clarifications on the integration between monitoring and adaptive management. Some issues, such as concerns about risk and uncertainty,were addressed indirectly through these broader improvements in the narrative, additional citations, and enhancement to the “Risk and Uncertainties” Section.

Best Available Science Review Forms: Managing Wetlands Migration Corridors and Natural Floodways Program

SCIENCE EVALUATION

Bucket 2: Comprehensive Plan Component

Proposal Title: Managing Wetland Migration Corridors and Natural Floodways Program
Location (If Applicable): The location of this program activity is within the Texas Coastal Zone, in areas ofhigh potential for coastal wetland protection. This includes coastal and estuarine areas within TexasRESTORE eligible counties including Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston,Harris, Jefferson, Matagorda, and Refugio.
Council Member Bureau or Agency: Texas Commission on Environmental Quality
Type of Funding Requested: Planning / Implementation

Reviewed by: In state
Date of Review: 9/30/2024

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Yes
Comments:	

The proposal does provide peer-reviewed justification for the objectives and methods decribed; however, some of the references, particularly the data on land-use changes and wetland loss, is over a decade old. Using more recent data would make the justification more compelling.

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes
Comments:	
This proposal pertains specifically to the Texas Gulf Coast.	

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Yes
Comments:	
Citations are correct and properly presented.	

Question 4.	
Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	Yes
Comments:	
The proposal includes a brief mention of the effects of Extreme Climatic Events on the success of restoration projects. It does not address the risk posed by increasing rates of sea level rise, which also threaten the success of such projects. Other risks, including challenges faced by land acquisition and beneficial use projects, are more thoroughly addressed.	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A

Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes
Comments:	

Question B	
Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	Yes
Comments:	
I see no evidence here of any sort of bias in the choice of supporting science.	

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Yes
Comments:	
The proposal incorporates references that sufficiently discuss risks and uncertainties associated with the types of projects likely to take place under the proposed program.	

Science Context Evaluation:

Question A	
Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Yes
Comments:	
The proposing agencies have long-standing reputations in implementation of these sorts of project.	

Question B	
Does the project/program have clearly defined goals and objectives?	Yes
Comments:	

Question C	
Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Yes
Comments:	
While specific methods are not proposed, this is a programmatic proposal under which many different types of projects can be proposed and funded. The program incorporates review methods which should ensure that methods used in the funded projects are both scientifically sound and cost-effective.	

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	Yes
Comments:	
The proposal does an excellent job in this area.	

Question E	
Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Yes
Comments:	
The program describes the metrics which will be applied to programs it funds. These metrics are quantitative and do align with the Comp Plan goals/objectives.	

Question F	
Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)? (Captures risk measures as defined under best available science by the RESTORE Act)	Need more information
Comments:	
The proposal includes only a brief mention of the effects of Extreme Climatic Events on the success of the kinds of restoration projects it anticipates funding. It does not address the risk posed by increasing rates of sea level rise, which also threaten the success of such projects. Other risks, including challenges faced by land acquisition and beneficial use projects, are more thoroughly addressed.	

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	Yes
Comments:	
The proposal includes an effective strategy for implementing adaptive management through the use of longitudinal working groups who will engage with proposed projects thoughout project life. These groups will be empowered to address issues that may arise from scientific uncertainties. It also includes a 10% contingency budget to account for unexpected challenges.	

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	Yes
Comments:	

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	No
Comments:	
The proposal does not discuss past successes and failures other than in a general way; however, the agencies involved have extensive experience overseeing these types of projects. I would expect them, as well as the individual project PIs, to have immense knowledge of these types of efforts and be well-versed in the best practices needed to give individual projects the greatest chance of success.	

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is the appropriate best available science justification provided? If applicable, how is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	Yes
Comments:	

The performance criteria included (metrics) can inform adaptive management so long as they are collected longitudinally over an adequate time period. Metrics such as acres restored are largely meaningless in terms of ecological impacts if they are collected at the end of the construction phase of a project. Individual projects must be monitored over the long term (25 years) to demonstrate ecological stability and resilience to external stressors.

Please summarize any additional information needed below:
I would like this proposal to include nutrient management plans and Integrated Pest Management as additional strategies for working with agricultural landowners to improve water quality. I would also like to see a requirement that individual projects account for the potential long-term threat of accelerated sea level rise and the short-term threat of extreme climatic events. Otherwise, a lot of this money will be thrown away. Lastly, I would like to see a commitment by the proposers to requiring long-term monitoring of success criteria such as ecological and hydrologic function and increase in biodiversity in projects that involve habitat restoration.

SCIENCE EVALUATION

Bucket 2: Comprehensive Plan Component

Proposal Title: Managing Wetland Migration Corridors and Natural Floodways Program
Location (If Applicable): The location of this program activity is within the Texas Coastal Zone, in areas of high potential for coastal wetland protection. This includes coastal and estuarine areas within TexasRESTORE eligible counties including Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston,Harris, Jefferson, Matagorda, and Refugio.
Council Member Bureau or Agency: Texas Commission on Environmental Quality
Type of Funding Requested: Planning / Implementation

Reviewed by: Out of State
Date of Review: 10/14/2024

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Need more information
Comments:	
The proposed objectives and justifications can benefit from more references. There are references to reports, management plans, DWH projects/programs etc. However, some of them are either not accessible or no specifics are given to trace them.	

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes
Comments:	
The information supporting the proposal pertains to the Gulf Coast.	

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Need more information
Comments:	
This is similar to #1. In many places there is no citation to support the claims. It might be argued that they are common knowledge, and I cannot disagree with that as someone familiar with science. However, I still want to see evidence. For example, as a secondary benefit, they talk about nutrient and sediment reduction, but provide no evidence that there is excess nutrient and sediment. Nutrients and sediments are not all bad.	

Question 4.	
Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	Need more information
Comments:	
They address uncertainties and risks in a paragraph, but it is limited to land acquisition, use of dredge material and a general statement about potential delays. They could have done a much better job.	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A	
Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes

Comments:
Many of the scientific claims of the applicant are likely true even if they do not provide citation or supporting data. However, there are parts where they did not provide justification. For example, is there a sediment problem that requires sediment reduction? Coastal wetlands can benefit from sediment.

Question B	
Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	No
Comments:	
I don't think the applicant explained well whether their proposal relies on high-quality, objective, and reliable scientific data. There was very little statistical data.	

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Yes
Comments:	
I tend to say yes here as they addressed the two big ones.	

Science Context Evaluation:

Question A	
Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Need more information
Comments:	
Frankly, I could not figure out who the applicant was. I know it is some entity in Texas. There is a reference to content analysis by Heart Research Institute to identify key needs. Another one refers to the Texas Coastal Resiliency Master Plan where 121 projects are proposed at an estimated $1.87B. There is also reference to previous Restore projects in Texas. I could not tell who they were and if they managed such large projects.	

Question B	
Does the project/program have clearly defined goals and objectives?	Yes

Comments:
The goals and objectives are clearly defined.

Question C	
Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Yes
Comments:	
The methods are clear for most but not all. However, I understand where they come from as they can only explain some. Land acquisition, stewardship, restoring hydrologic connectivity, and use of dredge material are explained relatively well. However, the part related to the activities supporting the secondary benefits are not described well.	

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	Yes
Comments:	
Although they do identify several key benefits, I feel like they rushed this part. They could have done better by being more specific, yet it is sufficient.	

Question E	
Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Need more information
Comments:	
They list several measures of success, but I find some of them vague. For example, the metric related to community resilience will use the number of residential, commercial and public facilities benefiting. How would they measure if a facility is benefiting from the project? Another one is restoring hydrology. They list “acres with restored hydrology”as the metric. Is this area of watershed? N, P, TSS avoided or removed is another one. I assume they will use models for this as measuring those is nearly impossible.	

Question F	
Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)?	No

(Captures risk measures as defined under best available science by the RESTORE Act)	
Comments:	
The only relevant information is the brief general statement about climate events, like hurricanes, extreme droughts, etc. potentially impacting project implementation, borrowed from Zabin et al. (2022)	

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	Need more information
Comments:	
There is some discussion on risks related to land acquisition and finding dredge material. I have not seen mitigation plans. However, the section on Adaptive Management somewhat touches this.	

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	Need more information
Comments:	
This question is not very clear to me. I don't want to misguide you.	

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	No
Comments:	
I did not see it in the proposal.	

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is appropriate best available science justification provided? If applicable, how	Yes

is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	

Comments:
They will use help from the Texas Commission on Environmental Quality (RCEQ) and the Gulf of Mexico Research Initiative Information and Data Cooperative (GRIIDC) for data sharing. Data will be archived a GRIIDC. I did not see anything about quality control of data.

Please summarize any additional information needed below:

SCIENCE EVALUATION

Bucket 2: Comprehensive Plan Component

Proposal Title: Managing Wetland Migration Corridors and Natural Floodways Program	
Location (If Applicable): The location of this program activity is within the Texas Coastal Zone, in areas of high potential for coastal wetland protection. This includes coastal and estuarine areas within TexasRESTORE eligible counties including Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston,Harris, Jefferson, Matagorda, and Refugio.	
Council Member Bureau or Agency: Texas Commission on Environmental Quality	
Type of Funding Requested: Planning / Implementation	

Reviewed by: Out of Gulf	
Date of Review: 15Sep2024	

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Yes
Comments:	

The objectives and methods were reasonably informed by peer reviewed, publicly available information and ongoing coastal restoration planning processes. For example, a landscape change analysis performed for the Texas Coastal Resiliency Master Plan (TCRMP) was used to inform key areas for land conservation that will support future wetland habitats. A study by the Hart Research Institute that analyzed the content of 119 planning and restoration documents was used to justify the need and process for the proposed program, including identification of priority sites. However, that document was not cited and could not be reviewed.

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes
Comments:	
Information used was heavily drawn from materials that pertain directly to the Gulf Coast Region. In the instances where sources refer to other geographies, those concepts are adaptable or applicable to the Gulf Coast region. For example, literature related to Adaptive management approaches which is a method that can be readily applied in any geography.	

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Need more information
Comments:	
In a few instances, sources were not completely cited. Notably, the Harte Research Institute study was not completely cited and Table 1 and other figures were not accessible. However, overall the sources were represented in a fair and unbiased manner.	

Question 4.	
Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	No
Comments:	
Recognizing the challenges of evaluating uncertainties and risks for projects that have yet to be identified, the proposal described several overarching uncertainties for the implementation of select project types and indicated that adaptive management will be used to minimize uncertainty. Inclusion of dedicated funds in the budget to allow for the implementation of adaptive management is notable and suggests a higher likelihood of overall program success, if it is applied effectively. However, long-term uncertainties and risks were not evaluated in this proposal. Likewise, the planned application of adaptive management approaches was not fully explained nor linked to performance metrics.	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A	
Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes
Comments:	
The applicant based the proposed program on information from multiple planning and restoration documents for the region, such as the TCRMP which is underpinned by peer-reviewed information.	

Question B	
Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	Yes
Comments:	
The proposed methods to develop a framework to prioritize the selection of projects is based on previous scientific analysis and initiatives, such as the SCA tool and TCRMP.	

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Need more information
Comments:	
The applicant outlined risks and uncertainties for select project types on the basis of scientific understanding and logistical considerations. As projects are identified, a project specific risk assessment should be conducted within the framework of adaptive management methods. Lacking from the proposal was specific details about how adaptive management approaches would be applied. See related comments below on the weaknesses of risk and uncertainty discussions and the adaptive management/monitoring proposed approaches.	

Science Context Evaluation:

Question A

Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Need more information
Comments:	
Unclear who the program sponsor and partners are.	

Question B	
Does the project/program have clearly defined goals and objectives?	Yes
Comments:	
The goals are clearly stated as addressing estuarine wetland loss by preserving corridors for wetland migration and restoring wetlands that will have a path to migrate as sea level rises, although there appears to be a typo under the project budget narrative that lists the goal as “project planning, and restoration of waterbird rookery habitat”. One concern is that the types of project activities that may be funded under this program are quite broad and some are not directly related to the stated goal. While the secondary activities may support wetlands indirectly (e.g., stormwater management), without strategic targeting of projects the RESTORE program goal to achieve long-term benefits to wetland functions and values may not be optimally met.	

Question C	
Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Yes
Comments:	
The proposal clearly describes methods for site selection which rely heavily on previously vetted projects, and indicates that priority will be given to projects that are scalable and equitably funded.	

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	Yes
Comments:	
The ecological, social and economic importance of coastal and estuarine wetland habitats are described in relation to climate and habitat conversion stressors that are identified in the literature and multiple regional plans.	

Question E	
Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Yes
Comments:	
The program includes example metrics that would be used for particular project types that align with Comprehensive Plan goals. For example, wetland acres restored, hydrologic restoration acres restored, lbs Nitrogen avoided or removed. However, not all potential project activities are captured in the metrics. Land acquisition is an identified activity without a corresponding metric. One possible metric could be Future marsh protected (acres).	

Question F	
Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)? (Captures risk measures as defined under best available science by the RESTORE Act)	No
Comments:	
The proposal generally discusses short-term risks that may hinder project implementation, but long-term risks from climate and changing land are not discussed.	

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	No
Comments:	
Other applicable short-term implementation risks and scientific uncertainties are not discussed. Only risks or uncertainties that may prevent or delay the initial project implementation are discussed.	

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	No
Comments:	

The elements directly above (long-term risks and short-term implementation risks) were not discussed in the proposal.

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	Need more information
Comments:	
The program has not explicitly evaluated past successes and failures within the proposal. A Restore Council 2023 document was referred to (without an included citation) within the proposed methods section that may indicate consideration for prior successes and failures, but this is not clearly stated.	

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is appropriate best available science justification provided? If applicable, how is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	Need more information
Comments:	
The program has identified a general monitoring and data management strategy as well as the use of an adaptive management strategy. Generally, projects will be monitored to assess needs and performance and as implementation issues arise ("in particular those that may set back, delay, or prevent the implementation of a project"), a contingency budget will be in place to address those issues. However, beyond initial implementation it is unclear how adaptive management/monitoring will inform or be informed by the performance criteria. Data management for the program is described to promote transparency, including making information publicly available from planning data, program budgets and performance reports. Likewise the TCEQ and GRIIDC will collaborate with data users to ensure data is accessible.	

Please summarize any additional information needed below: