



# Prospectus

Frentress-Johnson West Bay Mitigation Bank

February 25, 2020

## PROPOSED BY

Chocolate Bay Conservation Holdings LLC

## PROPOSED TO

U.S. Army Corp of Engineers & the  
Interagency Review Team



ALLUVION  
RESOURCE  
COMPANY, LLC

## Prospectus

### Frentress-Johnson West Bay Mitigation Bank

#### **Contact Information:**

##### Sponsor, Property Owner, & Long-term Steward:

Chocolate Bay Conservation Holdings LLC

Mailing Address: c/o Eco-Capital Advisors, LLC, 3414 Peachtree Road NE, Suite 990, Atlanta GA 30326

Phone Number: 770-820-8270

Email Address: [normanly@ecocapitaladvisors.com](mailto:normanly@ecocapitaladvisors.com)

Point of Contact (POC): Brian Normanly

##### Sponsor's Consultant:

Alluvion Resource Company, LLC

Mailing Address: 8010 FM 699 Joaquin, TX 75954

Phone Number: 936-488-8137

Email Address: [keith@alluvionrc.com](mailto:keith@alluvionrc.com)

POC: Keith Webb

##### Mineral Owner(s):

Black Stone Minerals Company, L.P. Houston

Mailing Address: 1001 Fannin Suite 2020 Houston, TX 77002

Phone Number: 713-445-3200

Email Address: not known

POC: not known

##### Conservation Easement Holder:

Galveston Bay Foundation, Inc

Mailing Address: 1100 Hercules Avenue, Suite 200 Houston TX 77058

Phone Number: 281-332-3381

Email Address: [msinger@galvbay.org](mailto:msinger@galvbay.org)

POC: Matt Singer

##### Long-Term Stewardship Endowment Fund Managing Entity:

Texas Parks & Wildlife Foundation

Mailing Address: 2914 Swiss Avenue Dallas, TX 75204

Phone Number: 217-720-1478

Email Address: [mgregg@tpwf.org](mailto:mgregg@tpwf.org)

POC: Merrill Gregg

**Introduction:**

Alluvion Resource Company, LLC (ARC), on behalf of Chocolate Bay Conservation Holdings LLC (Landowner/Sponsor) is developing the Frentress-Johnson West Bay Mitigation Bank (FJMB or Bank), in Brazoria and Galveston Counties, Texas. The Bank will be established in accordance with the requirements specified in CMLAR §332.8(d)(6) in collaboration with the United States Army Corps of Engineers (USACE) and the Interagency Review Team (IRT). The FJMB is part of a larger land holding, the Frentress-Johnson Coastal Conservation Area (FJCCA) which is comprised of seven tracts; five in the Freeport area (representing ~450 acres) and two tracts (~9,600 acres) on Chocolate Bay, for a combined total acreage of 10,050 acres of diverse coastal wetland habitat of conservation concern (Attachment A, Figure 1).

Final Bank acreages will be determined upon completion of engineering and design prior to submission of the Draft Mitigation Banking Instrument. The Bank will include habitats of conservation interest including, but not limited to, salt, fresh, intermediate, and brackish marshes, tidal mud flats and algal mats, riparian wetlands along bayous, and wet coastal prairie/mima complexes. All tracts to be included within the Bank are adjacent or proximal to the Brazoria National Wildlife Refuge (Attachment A, Figure 2) within the West Bay Conservation Corridor.

Relevant to site selection considerations discussed later in this document, the FJMB is an integral component of a multifaceted more comprehensive FJCCA conservation project. Notably, the FJCCA represents one of the largest private land holdings in the West Bay Conservation Corridor to be dedicated explicitly to wetland conservation purposes; generally divided into the two following categories; 1) wetland and aquatic resource mitigation and 2) Restore Act/Gulf Environmental Benefit Fund alternatives (Attachment A, Figure 3). Irrespective of the strategy employed, the entire land base is suitable for protection in perpetuity by a conservation easement and/or fee title transfer to a conservation entity (public agency or conservation non-profit). Approval by the Restore Act Trustees and National Fish and Wildlife Foundation (NFWF) to fund an acquisition of the approximately 5,000-acre tract east of Hall's Bayou by Galveston Bay Foundation was announced in November of 2019. This tract is located east of Hall's Bayou and bordered to the south by Chocolate Bay. FJMB is west of Hall's Bayou bordered to the west by New and Persimmon Bayou, and to the south by Chocolate Bay and includes the Freeport tracts. These habitats collectively represent ideal candidates (both in ecological quality and sheer quantity) for coastal wetland conservation via available means and methods, particularly those representing novel approaches to public-private partnerships.

**Purpose and Goals of the Bank:**

The purpose of the Bank is to provide USACE permit applicants the ability to compensate for unavoidable adverse impacts to the aquatic ecosystem through the utilization of more extensive, higher quality, and more cost-effective methods of protection of waters of the U.S. and other aquatic resources than are typically achieved by other forms of compensatory mitigation. This will be accomplished through the enhancement, restoration, and/or preservation of the regulated wetland communities existing within the Bank. The Bank will be used for compensatory mitigation for unavoidable impacts to waters of the U.S., including wetlands, that result from activities authorized by said Acts, provided such use has met all applicable requirements and is authorized by the USACE.

The goals of the Bank are to successfully restore, enhance, and preserve wetland functions associated with the wetlands and non-wetland waters of the U.S. occurring within the Bank; and to perpetually protect these rare and difficult-to-replace habitats occurring within the site. This will be accomplished through the development and approval of a Mitigation Banking Instrument (MBI) which will describe the



specific details for the restoration, enhancement, and/or preservation of aquatic resources located within the Bank, including the long-term management and financing mechanism(s).

**Project Location:**

Tract	Lat	Lon
Freeport 1	28.997264	-95.249591
Freeport 2	28.995800	-95.257208
Freeport 3	29.015368	-95.282767
Freeport 4	29.033137	-95.296727
Freeport 5	29.040213	-95.319049
Chocolate Bay	29.213827	-95.126932

**Ecological Suitability of the Proposed Bank:**

All tracts were carefully evaluated and strategically selected over the course of several years for reasons focused around 1) landscape scale and specific watershed protection priorities and 2) site specific characteristics and considerations relevant to conservation outcomes in an area with very limited availability of suitable tracts for mitigation purposes. Collectively, both the landscape scale/watershed need, and site-specific characteristics represent a focused, watershed-oriented, landscape approach espoused by CMLAR (2008) and various other conservation initiatives active in the West Bay Conservation Corridor and the larger Galveston Bay system.

With regard to the FJMB, direct consideration is given to 1) the restoration, enhancement, and/or preservation of some of the last remaining, un-conserved, high quality coastal wetland habitat in a very rapidly developing part of the state and nation, 2) the acknowledgment that these habitat types represent exceptionally unique and hard-to-replace aquatic resources worthy of restoration, enhancement, and/or preservation, 3) the infrequency of occurrence of these habitat types within the watershed as relates to historic extent, 4) the compatibility of this proposed conservation project with existing watershed plans, conservation initiatives, and adjacent land uses, 5) industrial and commercial land development trends within the watershed and 6) the limited availability of suitable mitigation sites within the watershed. These various conservation-worthy attributes include, but are not limited to, the following:

1. Proximity to state, federal, private or otherwise protected or conserved lands (e.g. Brazoria National Wildlife Refuge, Follett’s Island conservation acquisition, Ridge Slough Permittee Responsible Mitigation areas, and others) (Attachment A, Figure 4).
2. Expansive opportunities to conserve wetlands and riparian zones of Hall’s Bayou (listed by Texas Parks and Wildlife Department (TPWD) as an Ecologically Significant River/Stream Segment), Persimmon Bayou, New Bayou, and Chocolate Bay. The project contains thousands of contiguous acres of wetlands and coastal prairies comprised of palustrine emergent, estuarine, and marine wetlands, some of which are considered critically imperiled. TPWD reports that Hall’s Bayou contains some of the last submerged aquatic vegetation in the Galveston Bay system and has documented the presence of three (3) globally rare plant communities within portions of the FJCCA adjacent to the Bank; the Vertisol Coastal Prairie, Houston Coastal Prairie, and Gulf Coast Chenier Forest (Singhurst 2018).

PROSPECTUS

3. These areas are documented to have been utilized (at least seasonally) within the last 3 years by 2 whooping cranes, a federally listed endangered species, and likely provides suitable habitat for the eastern black rail (USFWS pers com.), a candidate species for listing as a federally threatened species.
4. Many of the wetlands within these tracts are identified as Priority Protection Habitat Areas by the Texas General Land Office in consultation with Texas Parks and Wildlife Department and other public agencies, academic institutions, and private groups and citizens, for numerous reasons including, but not limited to functions serving as fish nursery areas, high quality marsh habitat, and diamondback terrapin habitat. Notably, all the tracts are targeted acquisition sites by numerous conservation organizations and resource agencies (Attachment A, Figure 5)
5. The Texas Coastal Resiliency Master Plan has identified needed projects in the immediate vicinity of the various tracts, which includes a bird rookery island restoration project in Chocolate Bay
6. Galveston Bay Foundation identifies the Bank tracts within its Habitat Conservation Blueprint area within the West Bay Conservation Corridor.
7. The Bank further conforms to a myriad of Galveston Bay system watershed plans and initiatives for coastal wetland conservation, such as the West Bay Conservation Initiative, the Galveston Bay Estuary Program, NOAA's Texas Coastal and Estuarine Land Conservation Program Plan, Ducks Unlimited Texas Prairie Wetlands Project of the Gulf Coast Initiative, Texas Nature Conservancy's Gulf Coast Prairies and Marshes Ecoregional Plan, Trust for Public Land's Galveston Bay Land Conservation Initiative, the Texas Conservation Action Plan, the Gulf Coast Joint Venture, the West Bay Watershed Protection Project, and the Conservation Fund's Gulf Coast Conservation Vision Plan.

The FJCCA/FJMB in the purest sense, represents a unique opportunity for a unified effort between public and private entities for a shared and righteous undertaking; the conservation of imperiled coastal wetland habitats of special value to Texans and the greater community of conservationist.

**Aquatic Resource Type's and Estimated Amounts:**

The wetland delineation has been completed for the FJMB. The aquatic resource types comprising the proposed FJMB tracts are listed below and shown in Attachment B:

• E2EM High Marsh	2039.04 ac
• E2EM Low Marsh	1796.67 ac
• Tidally Influenced Open Water	388.04 ac
• PEM Freshwater Marsh	134.53 ac
• PSS Freshwater Marsh	90.43 ac
• Upland/Nonwetland*	929.09 ac
<b>Total</b>	<b>5377.80 ac</b>

The final amount of acres to be included within the Bank will be based on forthcoming design plans and determination of appropriate buffer acreages.

**Conceptual Mitigation Workplan** (Attachment A, Figure 7):

Restoration Reestablishment

Restoration via reestablishment will occur within upland/non-wetland areas historically and heavily impacted by agricultural operations associated with levee construction, rice cultivation and field leveling, construction of water management systems, and continual heavy cattle grazing. The reversal of the effects of these activities will include 1) minor grading to restore more natural contours and elevations, 2) levee breaches, 3) ditch plugs/low berms to reverse drainage, 4) microtopography development, 5) invasive exotic species control, and 6) elimination of cattle overgrazing.

Enhancement

Much of the existing wetland habitat found throughout the Bank is of generally good to excellent quality. Nevertheless, these expansive areas will benefit from invasive exotic species control (e.g. Chinese tallowtree and deep-rooted sedge) and elimination of cattle overgrazing. These areas also will likewise receive benefits of the reestablishment activities described above, due to their direct hydrologic connection to, and proximity with, these areas.

Additional upland/nonwetland areas will also be included within the FJMB as buffer habitat and enhanced via invasive exotic species control as well as elimination of cattle overgrazing. These areas will be perpetually managed similarly to the adjacent conserved wetland habitats.

**Construction Methods, Timing, & Sequence**

At this stage, design concepts are being developed to best accommodate the existing habitats planned for inclusion in the Bank. Irrespective of the construction methods that will eventually be selected, the plans for timing and sequence will ensure the integrity of the existing communities and will be developed to have “no effect” on federally listed species (seasonally or otherwise) (Attachment B), or sites that may be eligible for listing in the National Register of Historic Places (Attachment C). The mitigation plan will include the protection and enhancement of extant native plant communities, as appropriate, and will include a non-native/noxious species abatement plan with performance standards. Importantly, any earthmoving activities that may be prescribed will be limited in scope, scale, and location, to maximize the positive ecological effects of the project while minimizing risk to any existing sensitive habitats.

**Proposed Service Area:**

The service area is the watershed, ecoregion, physiographic province, and/or other geographic areas within which the mitigation bank is authorized to provide compensatory mitigation required by DA permits. Service areas must be appropriately sized for each credit type to ensure that the aquatic resources provided will effectively compensate for adverse environmental impacts across the entire service area respectively. The FJMB service area will be wholly contained within the Galveston District and are based on an ecoregion and watershed (utilizing Hydrologic Unit Codes (HUC)) approach. (Attachment A, Figure 8)

The Primary Service Area shall include the two 8-digit HUCs within which the FJMB is located (Austin-Oyster 12040205 & the West Galveston Bay 12040204 HUCs). The Primary Service Area also includes the Buffalo-San Jacinto 12040204 HUC (excluding the Addicks and Barker reservoir watersheds) and the North Galveston Bay 12040104 HUC. Impacts to like-kind habitats will be mitigated on a 1:1 basis within the



Primary Service Area. The Primary Service Area includes Galveston County in its entirety, and portions of Brazoria, Fort Bend, Harris, Liberty, and Waller Counties.

The Secondary Service Area shall include the Lower Trinity 12030203 and the East Galveston Bay 12040202 HUCs, where impacts to like-kind habitats will be mitigated on a 1.5:1 basis. The secondary Service Area includes portions of Liberty, Chambers, Jefferson, San Jacinto, and Polk Counties.

This Service Area rationale incorporates a watershed approach based on receiving and contributing water bodies within the Galveston Bay system that will benefit from conservation of the wetland and aquatic function within the Bank and will be appropriately limited to like-kind habitats within the Service Area.

The Service Area excludes waters of the U.S., including wetlands, which are located:

- On lands owned fee-simple by the State of Texas, including those leased by the State of Texas to Texas Parks and Wildlife Department (TPWD), unless use of the bank is approved by TPWD or the State of Texas.
- Addicks and Barker Reservoir watersheds

**General Need and Technical Feasibility:**

Excerpts below from West Bay Watershed Wetland and Habitat Protection Brazoria and Galveston, West Bay, Texas, Final Report: January 2017; GLO Contract No. 12-522-000-6749, TCEQ Contract No. 582-11-13166 provide an assessment of the general need for conservation of the habitats represented in the FJMB (and the FJCCA). This approach is further validated by various aspects of the assessments of the East and West Galveston Bay by the Environmental Protection Agency (Attachment D).

“Galveston Bay is the largest and most productive estuary in Texas, and second only to the Chesapeake Bay system among U.S. estuaries in fisheries productivity. Galveston Bay is the single defining geographic feature for the Houston metropolitan region, and serves as the foundation for its economy. Galveston Bay and its many waterways and diverse natural features afford an array of recreational opportunities for residents and visitors, and play an essential role in maintaining quality of life. Over five million people, or 75 percent of Texas’ coastal population, reside in the five counties surrounding Galveston Bay. Human activities have significantly altered the ecosystem and affected its productivity, converting coastal wetlands to human uses, and fragmenting remaining coastal natural areas. The Houston metropolitan area is growing rapidly, and its population is expected to nearly double by 2035 (H-GAC, 2007). This growth will place increasing pressure on coastal natural resources, and likely result in additional coastal habitat loss and fragmentation. The U.S. EPA characterizes coastal wetland and associated habitat loss in Texas as severe (EPA, 1999), and this is a continuing concern because of the many important functions and values these features provide. Wetland loss in the Galveston Bay system is greater than in other areas of the state. Many local scientists and resource managers believe that continued habitat loss poses the greatest single threat to the Galveston Bay ecosystem. GBEP’s habitat loss studies primarily focus on wetlands. However, the bay system features a diversity of habitats, including extensive coastal prairie and woodland complexes that contribute to the health and productivity of the estuary, and provide many important functions and values to humans. The upland components of these habitat complexes receive limited regulatory protection, and are subject to significant loss and fragmentation. While minimal data exist on fragmentation and loss of these valuable upland features, the U.S. Fish and Wildlife Service (USFWS) reports that less than one percent remains of the once vast expanses of coastal prairie, and considers coastal prairie ecosystems to be “critically imperiled” (USFWS, 2000).”

“The West Bay watershed is a highly biologically productive area. Because of its rich natural features and relatively high water quality, West Bay and its watershed support an abundance and diversity of fisheries and wildlife. Preserving wetlands and natural areas is critical to maintaining the water quality in this relatively pristine region, and to protecting valuable fish and wildlife habitat. The greater Galveston Bay watershed lost nearly 35,000 acres (20%) of its wetlands between 1950 and 1990, and 1800 acres (70%) of its seagrasses. Much of this wetland loss and nearly all of the seagrass loss occurred in and around West Bay. Recent studies indicate that the system continues to lose wetlands at a rapid rate. The Houston metropolitan area is expected to grow rapidly in coming decades, and subsequent wetlands and habitat loss is expected, including continued loss in the West Bay area. Increased urbanization will also likely impact water quality.”

Projected population growth coupled with an ever-increasing need for energy and petrochemical products are major drivers of industrial and domestic development within the Service Area. International commerce and infrastructure development associated with the Ports of Houston and Freeport will continue to expand to service global needs. Further, such growth requires improvements in transportation systems to accommodate current and projected population growth, as well as expansion of distribution corridors to facilitate commerce between local, regional, national, and global economies. The conservation of ideally suited, high value tracts of land as mitigation banks in this area will support environmental sustainability and resource stewardship initiatives in a rapidly developing area, as well as promote economic stability and growth within the state of Texas (and beyond). Thus, there is a market need for bank credits that justifies the Sponsor’s desire to develop this mitigation bank project in the Service Area.

As previously described, any restoration/reestablishment work will be minimized to the extent practicable to ensure the integrity of any sensitive habitats and the successful attainment of ecological uplift prescribed for the site. Any construction activities will be designed by experienced engineers and ecologists using commonly applied wetland restoration techniques and habitat management practices for similarly situated sites to increase functional capacity at self-sustaining levels over time while minimizing maintenance efforts.

**Easements, Encumbrances, and/or Other:**

All non-compatible easements/encumbrances will be excluded from the creditable acreage of the FJMB. A description of existing easements and encumbrances (i.e. ROW’s, roads, Federal Gulf Intracoastal Waterway, oil and gas infrastructure, etc) will be compiled and included within the draft mitigation banking instrument. In addition, Phase I environmental reports are completed; there are no Phase I issues associated with any of the tracts.

**Proposed Ownership Arrangement and Long-term Management Strategy:**

The surface estate for the FJMB is owned by the Sponsor (Chocolate Bay Conservation Holdings, LLC). No mineral rights are owned by the Sponsor. The majority of the subsurface mineral’s are owned by Blackstone Minerals Company, L.P. Active oil and gas leases occur on the Chocolate Bay tract, but are governed by surface use agreements and restrictions. As a result, the Sponsor has been able to work with the mineral’s estate owners/leasee(s) to focus development activities on previously used well locations, rights of ways, and uplands to avoid and minimize effects on wetlands planned for inclusion within the Bank. Thus far, these joint efforts are an integral component of the mineral’s management strategy for



the FJMB. A detailed Mineral's Management Plan will be included in the draft mitigation banking instrument.

Site protection and long-term management strategies include creating/supplementing a conservation-oriented landscape mosaic around the Brazoria National Wildlife Refuge and other conserved lands functioning as buffers, as described in the site selection approach in previous paragraphs. This includes:

- Fee-title transfer of the Chocolate Bay tract east of Hall's Bayou (~5000 ac) to Galveston Bay Foundation (GBF),
- Donation of a conservation easement to Galveston Bay Foundation on the Chocolate Bay tract west of Hall's Bayou (~4600 ac) included within the Bank (Attachment E),
- Fee title transfer of the Freeport tracts (~450 ac) included within the Bank to either USFWS Brazoria National Wildlife Refuge or GBF. Alternatively, these tracts may be protected by a conservation easement held by GBF in the event a fee title transfer isn't feasible.
- Long-term Stewardship Fund Management will be conducted by Texas Parks and Wildlife Foundation (Attachment F)

**Qualifications of Sponsor:**

Chocolate Bay Conservation Holdings, LLC is a special-purpose entity established and managed under a partnership arrangement between the Lyme Timber Company, LP and Eco-Capital Advisors, LLC ("Lyme-ECA Partnership"). This partnership also includes Advanced Ecology, Ltd. (AEL), and Conservation Equity Partners, LLC (CEP). The Lyme-ECA Partnership is in the process of developing twelve (12) mitigation projects occurring within seven states, including eight mitigation banks that have been approved and constructed. Prior to forming the Lyme-ECA Partnership, principals of both firms collectively developed over one hundred (100) mitigation and conservation projects occurring within twenty (20) states and seventeen (17) USACE Districts. Projects co-managed by ECA, AEL, and CEP Principals, include numerous approved mitigation banks in both the Fort Worth and Galveston Districts (e.g. Bushneck Bayou MB, Fall-Off Creek MB, Keystone MB, Straus-Medina MB, & Daisetta Swamp MB).

**Establishment and Operation:**

The Bank will be established in accordance with the standard operating procedures in place in the Galveston District, including the use of interim hydrogeomorphic models (iHGM) for assessing baseline conditions and credit generation. In addition, the Bank review and development process codified in the Federal Register, along with any locally derived policies and procedures, will govern the Bank development process, including the details for the establishment and operation of the FJMB. Notably, ecologically based performance standards will be developed to ensure that Bank goals and objectives are being met and for credit release events, as may be required. These details will be provided in draft mitigation banking instrument.

**Assurance of Water Rights:**

Texas surface water is owned and held by the State in trust for public use and protection. In 2007, the 80th Texas Legislature created the Environmental Flows Advisory Group, tasked with establishing appropriate environmental flow standards for each river basin and bay system in the state. Texas Parks and Wildlife Department, Texas Commission on Environmental Quality, and the Texas Water Development Board jointly administer the Instream Flow Program. Importantly, Texas State law prohibits

the issuance of water rights permits for instream flows for environmental needs (§ 11.0237, TX Senate Bill 3, Texas Water Code). Rather, “the TCEQ is required by the Texas Water Code to consider and provide for freshwater inflows necessary to maintain the viability of Texas bay and estuary systems in TCEQ’s regular granting of permits for the use of state waters...” These considerations are directly relevant to determining, on a case by case basis, the applicability of a water rights requirement for mitigation projects in Texas; whereby mitigation projects are by default purposed towards conservation of ecological function dependent on environmental flows or tidal action. Notwithstanding the forgoing, a distinction should be made between projects relying on artificial methods (e.g. irrigation/lift pumping) or highly managed systems for establishing and/or maintaining wetland hydrology versus those relying on existing hydrologic regimes resulting from one or more of the following; naturally occurring stream out-banking events, direct precipitation, overland flows, or tidal action.

Because the tracts comprising the FJMB represent the last privately-owned tracts at the interface of the Gulf of Mexico and the river/bayou deltas flowing into the bays and estuaries from the inland portion(s) of the watershed, the environmental flows standards directly target these systems for protection by ensuring instream flows necessary for the continued existence of these highly diverse, productive, and culturally valuable estuarine systems. In fact, TCEQ has pledged (through rulemaking) to maintain unappropriated water for environmental flows for the bay (Attachment G). Finally, the Bay and Basin Expert Science Team (BBEST), appointed by the state Environmental Flows Advisory Group, has specified base flows and pulse flows to maintain a natural instream flow regime within the Trinity River, San Jacinto River, and Galveston Bay. Future water rights permitting in these river basins will be subject to the instream flow requirements adopted in 2011 (TCEQ 2011).

The current status of the sources of hydrology for the proposed FJMB eliminate the need for water rights for maintenance of wetland function. Current and historic wetland hydrology is a result of a) direct precipitation, b) overland flows, c) inflows from Persimmon, New, and Hall’s Bayous, and d) tidal action. Natural hydrologic patterns will continue to provide wetland function on the site(s) for the reasonably foreseeable future.

**Attachments:**

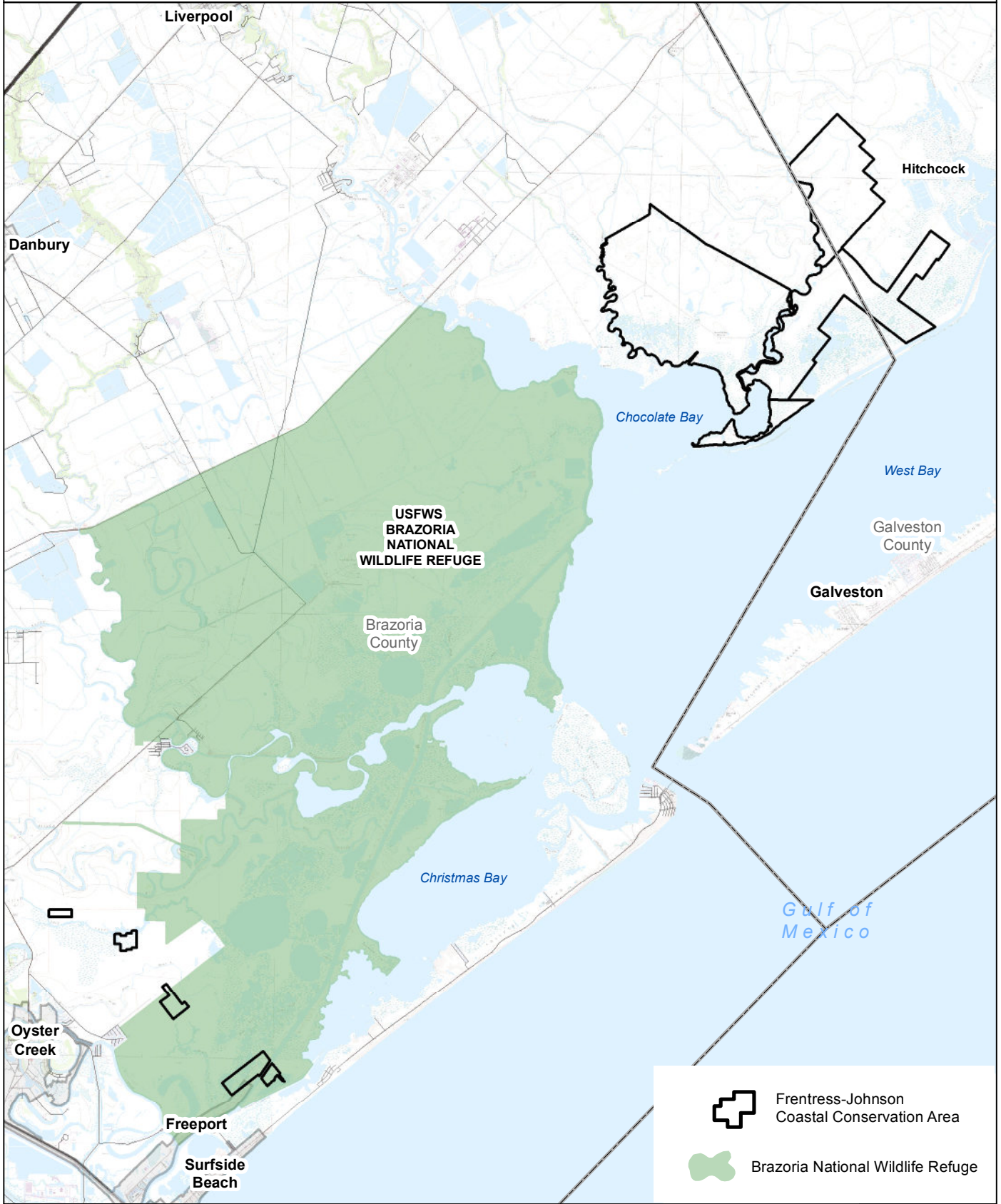
- Attachment A Figures
- Attachment B T&E IPAC Reports
- Attachment C Cultural Investigation
- Attachment D Coastal Wetlands Initiative Excerpt
- Attachment E Letter of Intent Galveston Bay Foundation
- Attachment F Long-term Stewardship Fund Management Agreement
- Attachment G TCEQ Water Rights Rule

Attachment A





Figure 1  
 Frentress-Johnson Coastal Conservation Area  
 Brazoria and Galveston Counties, Texas





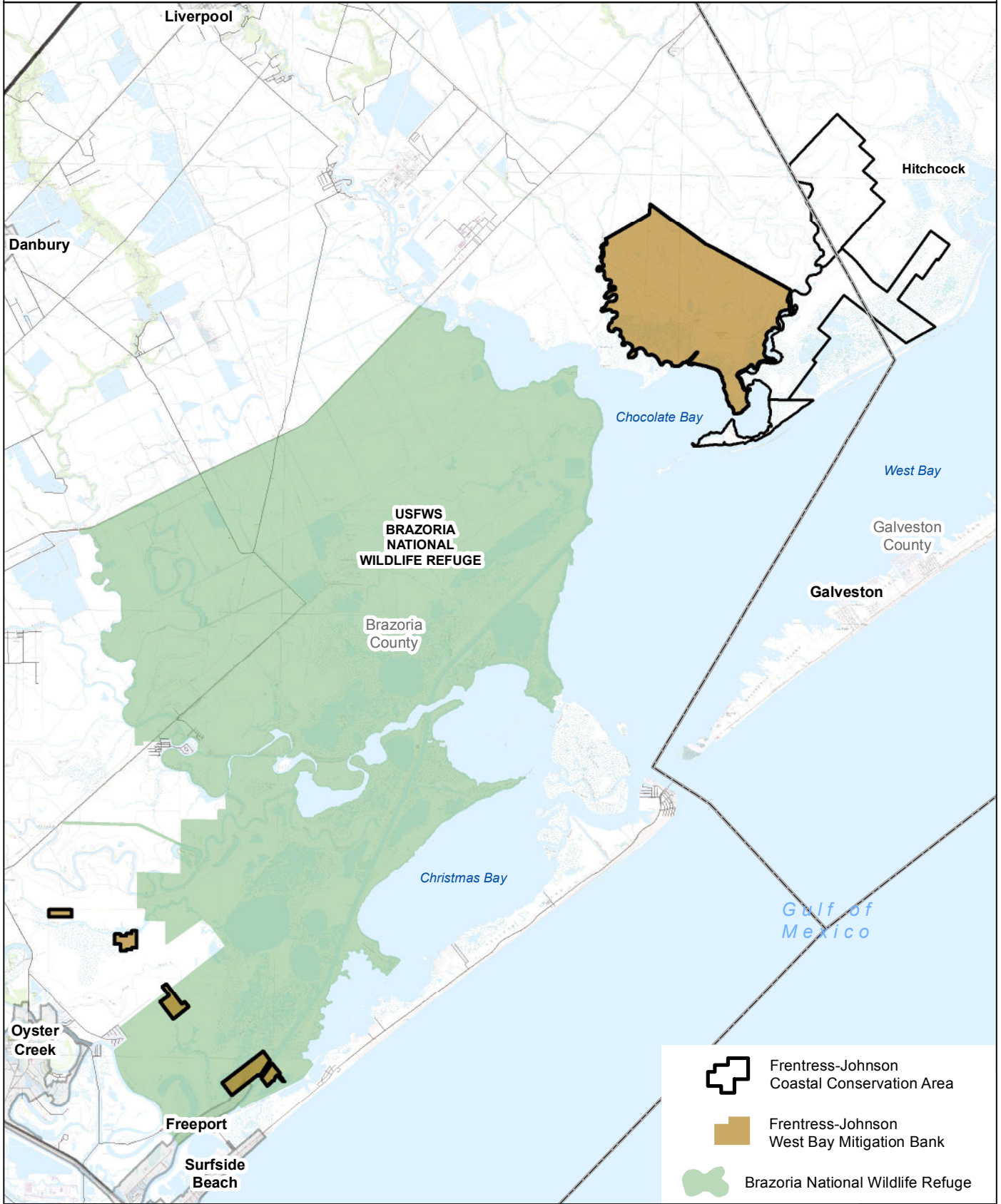
 Frentress-Johnson Coastal Conservation Area  
 Brazoria National Wildlife Refuge



Figure 2  
 Frentress-Johnson West Bay Mitigation Bank  
 Brazoria and Galveston Counties, Texas



-  Frentress-Johnson Coastal Conservation Area
-  Frentress-Johnson West Bay Mitigation Bank
-  Brazoria National Wildlife Refuge

0 2 4 6 Miles



Figure 3: Conservation Strategies  
Frentress-Johnson Coastal Conservation Area  
Brazoria and Galveston Counties, Texas

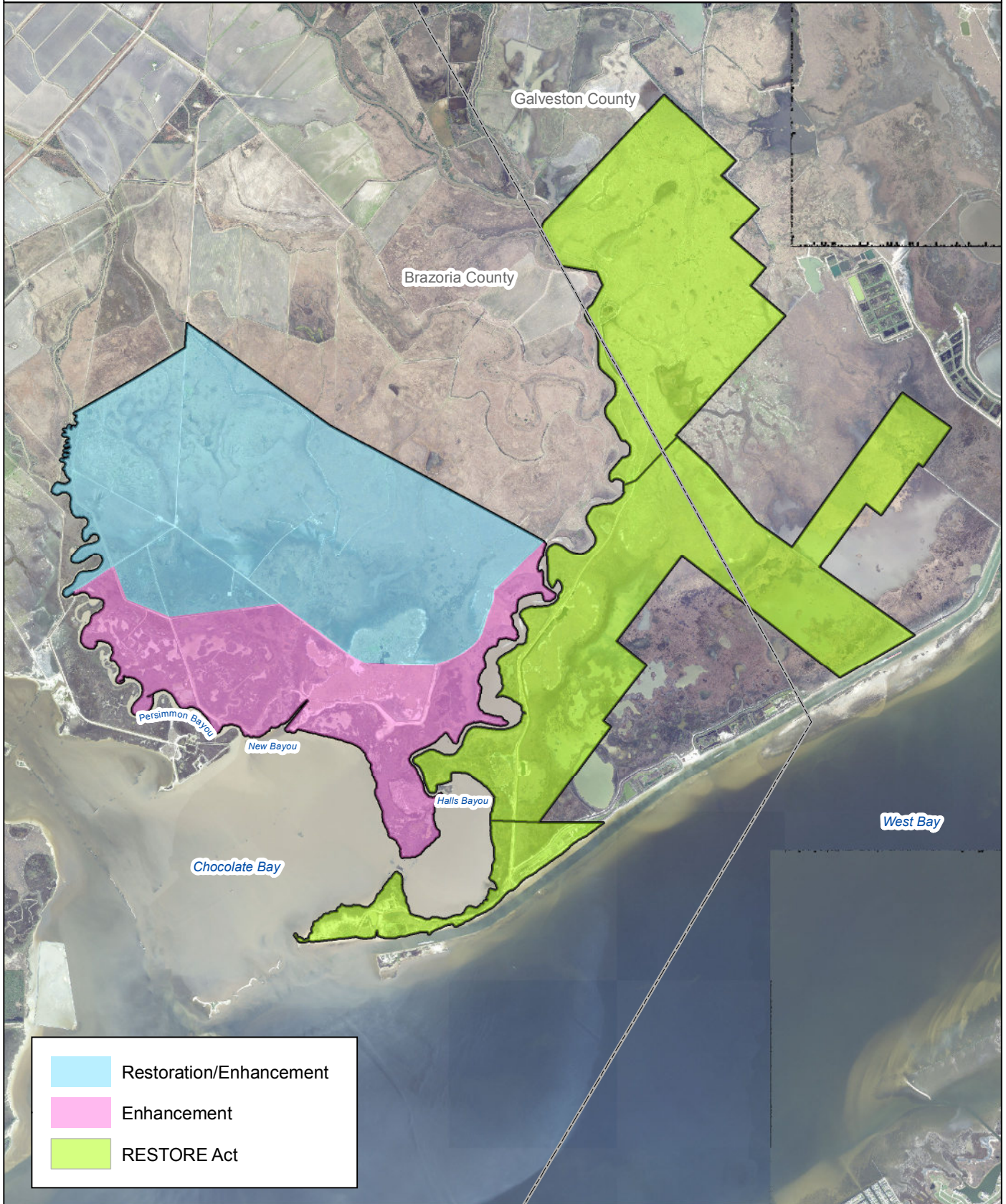
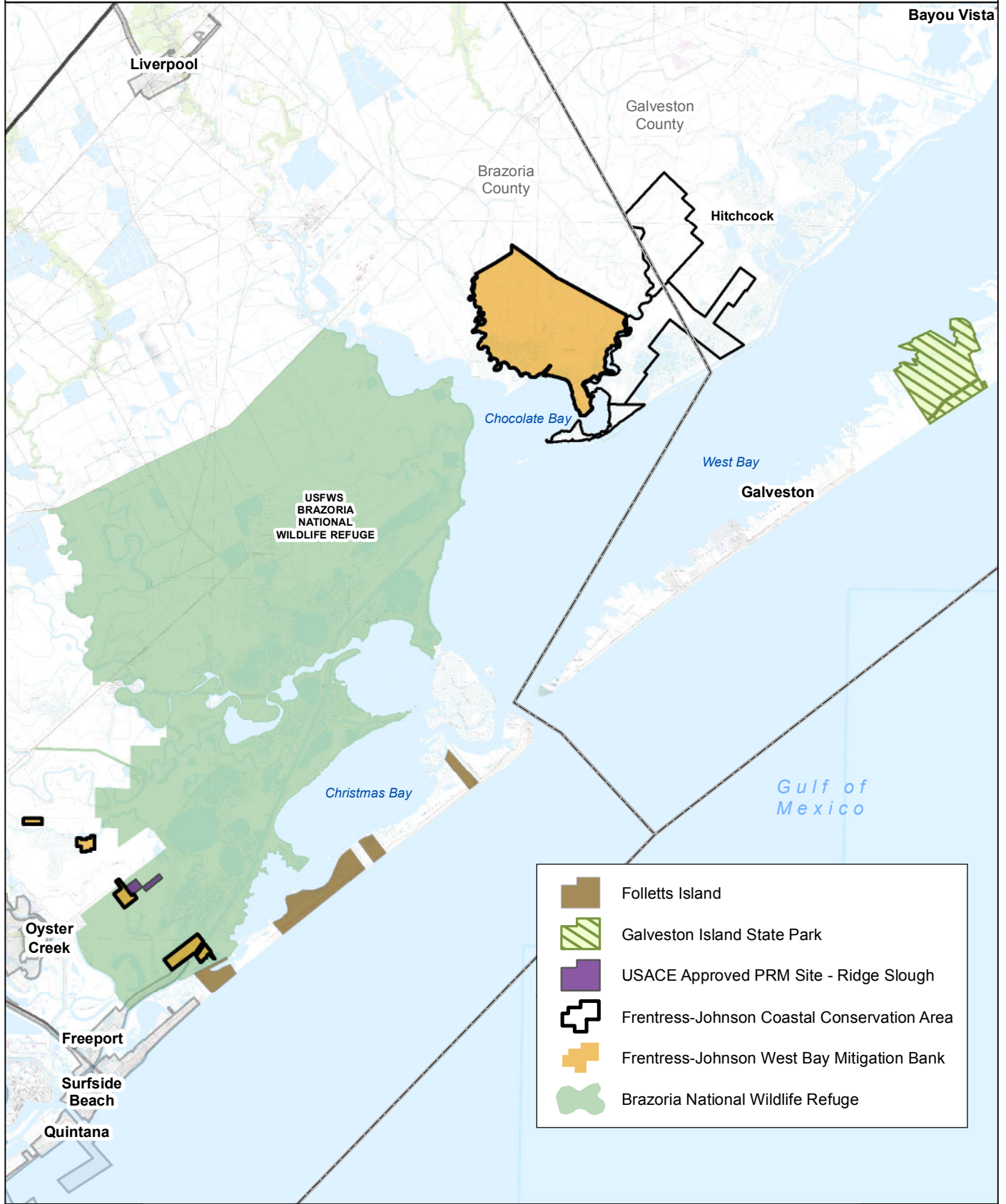




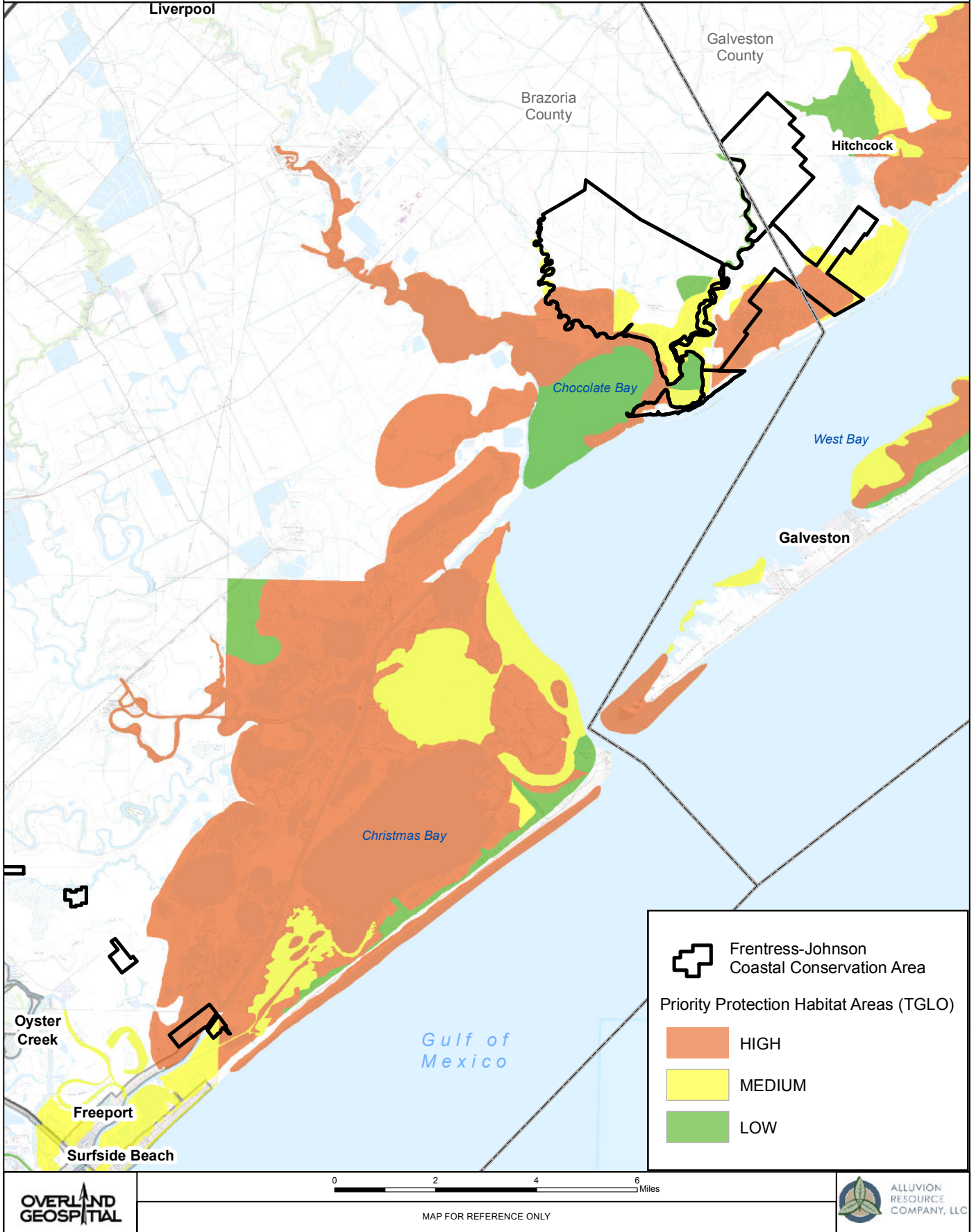
Figure 4: Adjacent or Proximal Conserved Lands  
 Frentress-Johnson West Bay Mitigation Bank  
 Brazoria and Galveston Counties, Texas



-  Folletts Island
-  Galveston Island State Park
-  USACE Approved PRM Site - Ridge Slough
-  Frentress-Johnson Coastal Conservation Area
-  Frentress-Johnson West Bay Mitigation Bank
-  Brazoria National Wildlife Refuge

0 2.5 5 7.5 Miles

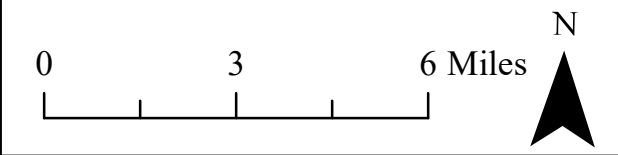
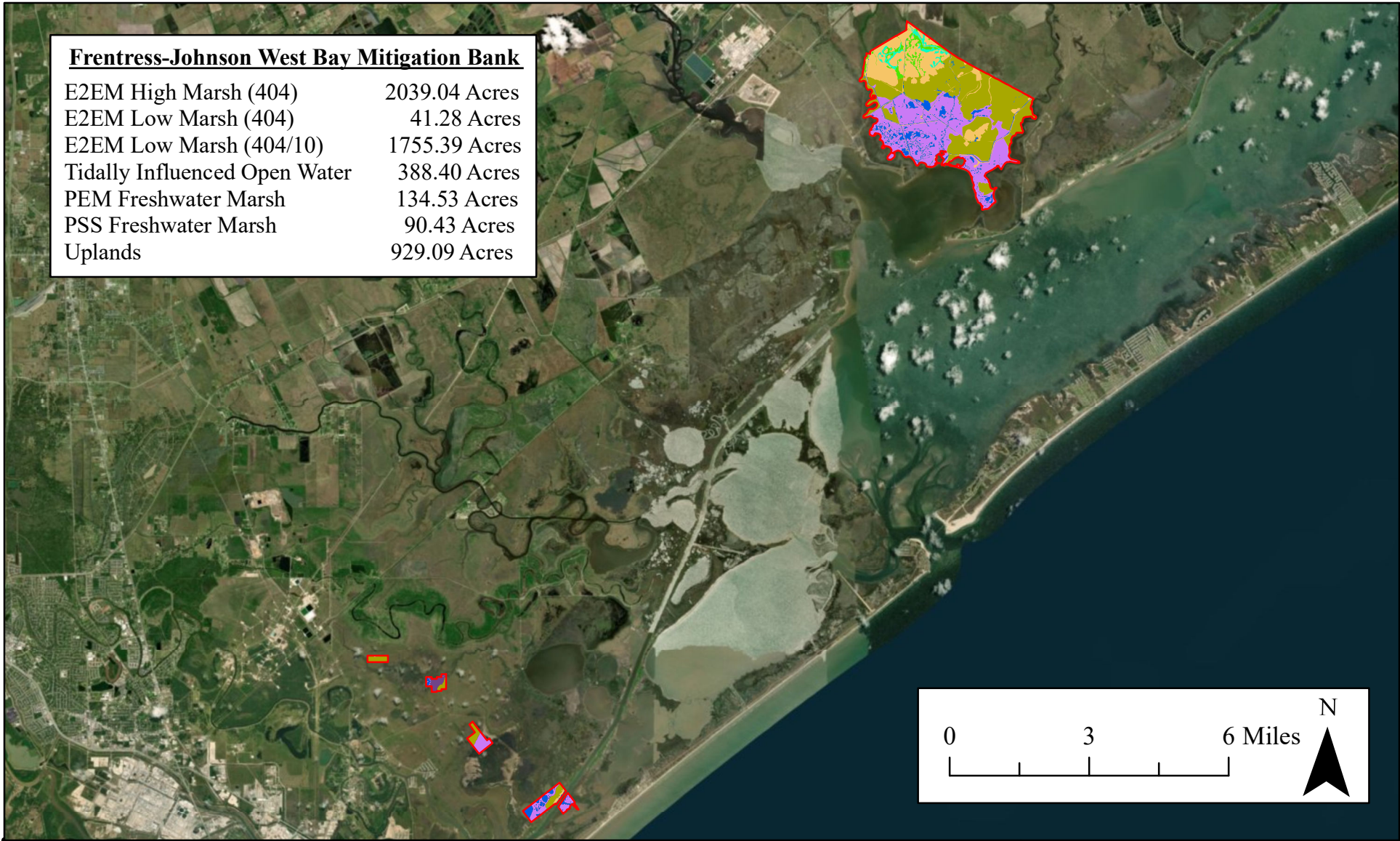
Figure 5: Priority Protection Habitat Areas  
 Frentress-Johnson West Bay Mitigation Bank  
 Brazoria and Galveston Counties, Texas





**Frentress-Johnson West Bay Mitigation Bank**

E2EM High Marsh (404)	2039.04 Acres
E2EM Low Marsh (404)	41.28 Acres
E2EM Low Marsh (404/10)	1755.39 Acres
Tidally Influenced Open Water	388.40 Acres
PEM Freshwater Marsh	134.53 Acres
PSS Freshwater Marsh	90.43 Acres
Uplands	929.09 Acres




<p><b>Legend</b></p> <p> <span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> Mitigation Bank               <span style="background-color: purple; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> Low Marsh 404               <span style="background-color: yellow; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> PEM  <span style="background-color: green; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> ESS               <span style="background-color: lightpurple; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> Low Marsh 404/10               <span style="background-color: cyan; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> PSS  <span style="background-color: yellowgreen; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> High Marsh 404               <span style="background-color: blue; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> Open Water               <span style="background-color: orange; display: inline-block; width: 15px; height: 10px; vertical-align: middle;"></span> Upland         </p> <p>Prepared by: </p>	Project: Frentress-Johnson West Bay Mitigation Bank	 <b>Figure 6</b> <b>Aquatic and Wetland Resource</b> <b>Types and Amounts</b> Brazoria County, Texas
	Project No: 2470	
	Date Drawn: 2/6/2020	
	Source: ESRI World Imagery	
	Projection: NAD 1983 UTM Zone 15N	
Scale: 1 in = 15,840 feet	Drawn by: JG	



Figure 7: Conceptual Mitigation Strategies  
Frentress-Johnson West Bay Mitigation Bank  
Brazoria County, Texas

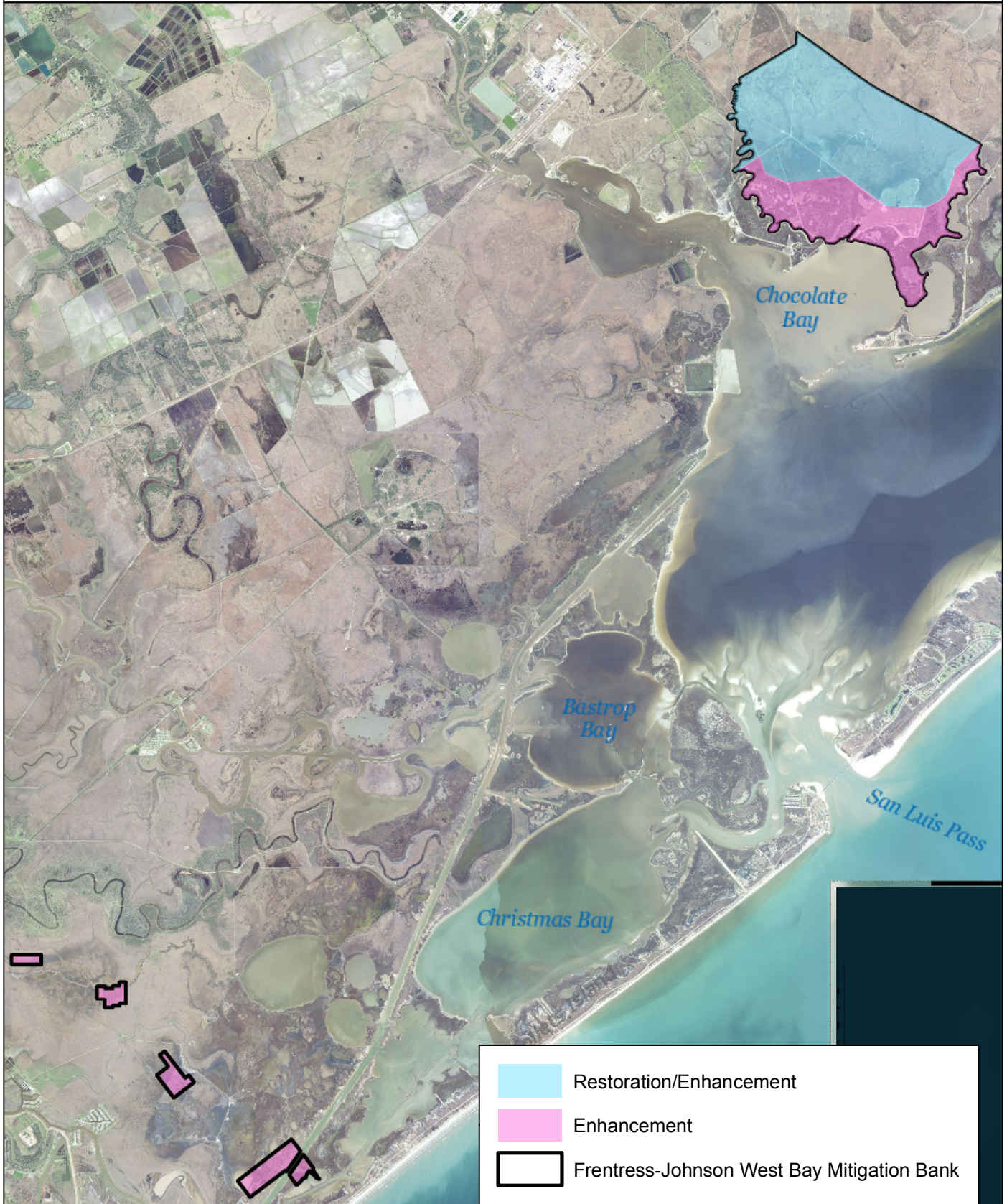
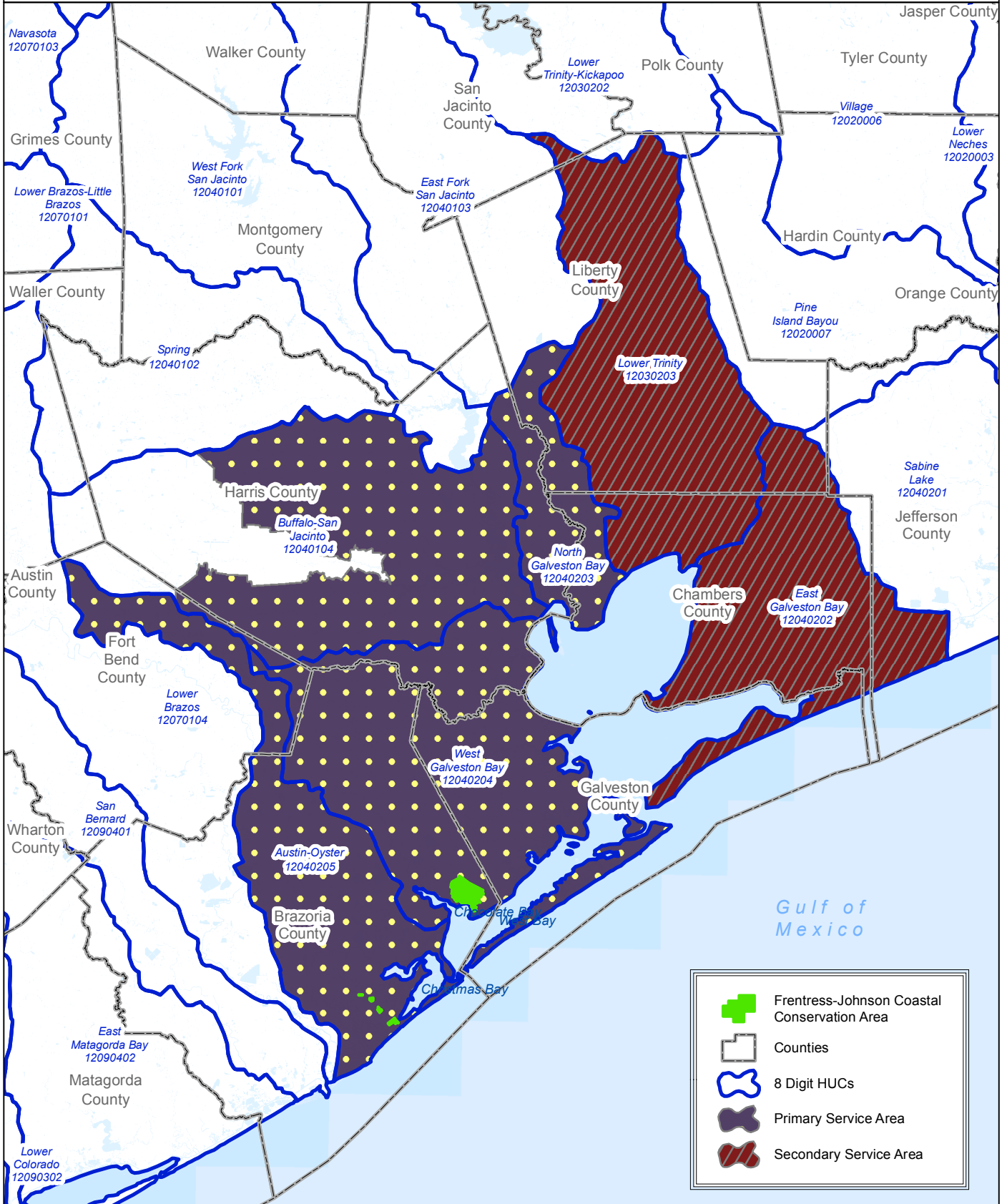




Figure 8: Service Area  
 Frentress-Johnson Coastal Conservation Area  
 Brazoria and Galveston Counties, Texas



Attachment B







# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Texas Coastal Ecological Services Field Office  
17629 El Camino Real #211  
Houston, TX 77058  
Phone: (281) 286-8282 Fax: (281) 488-5882  
<http://www.fws.gov/southwest/es/TexasCoastal/>  
[http://www.fws.gov/southwest/es/ES\\_Lists\\_Main2.html](http://www.fws.gov/southwest/es/ES_Lists_Main2.html)

In Reply Refer To:

October 12, 2018

Consultation Code: 02ETTX00-2019-SLI-0075

Event Code: 02ETTX00-2019-E-00150

Project Name: Frentress-Johnson West Bay Mitigation Bank

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

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

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

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

requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

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

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

### **Section 7**

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

**Is not likely to adversely affect** - the project may affect listed species and/or critical habitat; however, the effects are expected to be discountable, insignificant, or completely beneficial. Certain avoidance and minimization measures may need to be implemented in order to reach this level of effects. The Federal agency or the designated non-Federal representative should seek written concurrence from the Service that adverse effects have been eliminated. Be sure to include all of the information and documentation used to reach your decision with your request for concurrence. The Service must have this documentation before issuing a concurrence.

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

**No effect** - the proposed action will not affect federally listed species or critical habitat (i.e., suitable habitat for the species occurring in the project county is not present in or adjacent to the action area). No further coordination or contact with the Service is necessary. However, if the

---



project changes or additional information on the distribution of listed or proposed species becomes available, the project should be reanalyzed for effects not previously considered.

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

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

The Service's Consultation Handbook is available online to assist you with further information on definitions, process, and fulfilling Act requirements for your projects at: [http://www.fws.gov/endangered/esa-library/pdf/esa\\_section7\\_handbook.pdf](http://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf)

### **Section 10**

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

### **Service Response**

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

### **Proposed Species and/or Proposed Critical Habitat**

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

### **Candidate Species**

Candidate species are species that are being considered for possible addition to the threatened and endangered species list. They currently have no legal protection under the ESA. If you find you have potential project impacts to these species the Service would like to provide technical

---

assistance to help avoid or minimize adverse effects. Addressing potential impacts to these species at this stage could better provide for overall ecosystem health in the local area and avert potential future listing.

Several species of freshwater mussels occur in Texas and four are candidates for listing under the ESA. The Service is also reviewing the status of six other species for potential listing under the ESA. One of the main contributors to mussel die offs is sedimentation, which smothers and suffocates mussels. To reduce sedimentation within rivers, streams, and tributaries crossed by a project, the Service recommends that you implement the best management practices found at: <http://www.fws.gov/southwest/es/TexasCoastal/FreshwaterMussels.html>.

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

### **Migratory Birds**

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

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

The construction of overhead power lines creates threats of avian collision and electrocution. The Service recommends the installation of underground rather than overhead power lines whenever possible. For new overhead lines or retrofitting of old lines, we recommend that project



developers implement, to the maximum extent practicable, the Avian Power Line Interaction Committee guidelines found at <http://www.aplic.org/>.

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

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

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

### **Wetlands and Wildlife Habitat**

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

---

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

If your project will involve filling, dredging, or trenching of a wetland or riparian area it may require a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (COE). For permitting requirements please contact the U.S. Corps of Engineers, District Engineer, P.O. Box 1229, Galveston, Texas 77553-1229, (409) 766-3002.

### **Beneficial Landscaping**

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

### **State Listed Species**

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

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

Attachment(s):

- Official Species List
-



## Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information 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 #211

Houston, TX 77058

(281) 286-8282

---

## Project Summary

Consultation Code: 02ETTX00-2019-SLI-0075

Event Code: 02ETTX00-2019-E-00150

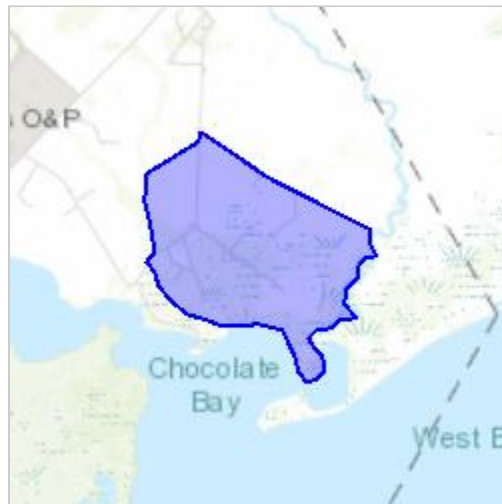
Project Name: Frentress-Johnson West Bay Mitigation Bank

Project Type: LAND - RESTORATION / ENHANCEMENT

Project Description: Proposed wetland mitigation bank of approximately 5,000 ac

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/29.21266826895715N95.11911242543911W>



Counties: Brazoria, TX

---



## Endangered Species Act Species

There is a total of 9 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<sup>1</sup>, 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.

- 
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 <i>Trichechus manatus</i>	Threatened
<p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.  <i>This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.</i>            Species profile: <a href="https://ecos.fws.gov/ecp/species/4469">https://ecos.fws.gov/ecp/species/4469</a></p>	

---

## Birds

NAME	STATUS
<p>Piping Plover <i>Charadrius melodus</i></p> <p>Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered.</p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/6039">https://ecos.fws.gov/ecp/species/6039</a></p>	Threatened
<p>Red Knot <i>Calidris canutus rufa</i></p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/1864">https://ecos.fws.gov/ecp/species/1864</a></p>	Threatened
<p>Whooping Crane <i>Grus americana</i></p> <p>Population: Wherever found, except where listed as an experimental population</p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a></p>	Endangered

## Reptiles

NAME	STATUS
<p>Green Sea Turtle <i>Chelonia mydas</i></p> <p>Population: North Atlantic DPS</p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/6199">https://ecos.fws.gov/ecp/species/6199</a></p>	Threatened
<p>Hawksbill Sea Turtle <i>Eretmochelys imbricata</i></p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/3656">https://ecos.fws.gov/ecp/species/3656</a></p>	Endangered
<p>Kemp's Ridley Sea Turtle <i>Lepidochelys kempii</i></p> <p>There is <b>proposed</b> critical habitat for this species. The location of the critical habitat is not available.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/5523">https://ecos.fws.gov/ecp/species/5523</a></p>	Endangered
<p>Leatherback Sea Turtle <i>Dermochelys coriacea</i></p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/1493">https://ecos.fws.gov/ecp/species/1493</a></p>	Endangered
<p>Loggerhead Sea Turtle <i>Caretta caretta</i></p> <p>Population: Northwest Atlantic Ocean DPS</p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/1110">https://ecos.fws.gov/ecp/species/1110</a></p>	Threatened

## Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Texas Coastal Ecological Services Field Office  
17629 El Camino Real #211  
Houston, TX 77058  
Phone: (281) 286-8282 Fax: (281) 488-5882  
<http://www.fws.gov/southwest/es/TexasCoastal/>  
[http://www.fws.gov/southwest/es/ES\\_Lists\\_Main2.html](http://www.fws.gov/southwest/es/ES_Lists_Main2.html)

In Reply Refer To:

October 26, 2018

Consultation Code: 02ETTX00-2019-SLI-0171

Event Code: 02ETTX00-2019-E-00344

Project Name: Frentress-Johnson West Bay Mitigation Bank; Freeport Tracts

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

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

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

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



requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

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

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

### **Section 7**

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

**Is not likely to adversely affect** - the project may affect listed species and/or critical habitat; however, the effects are expected to be discountable, insignificant, or completely beneficial. Certain avoidance and minimization measures may need to be implemented in order to reach this level of effects. The Federal agency or the designated non-Federal representative should seek written concurrence from the Service that adverse effects have been eliminated. Be sure to include all of the information and documentation used to reach your decision with your request for concurrence. The Service must have this documentation before issuing a concurrence.

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

**No effect** - the proposed action will not affect federally listed species or critical habitat (i.e., suitable habitat for the species occurring in the project county is not present in or adjacent to the action area). No further coordination or contact with the Service is necessary. However, if the

---

project changes or additional information on the distribution of listed or proposed species becomes available, the project should be reanalyzed for effects not previously considered.

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

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

The Service's Consultation Handbook is available online to assist you with further information on definitions, process, and fulfilling Act requirements for your projects at: [http://www.fws.gov/endangered/esa-library/pdf/esa\\_section7\\_handbook.pdf](http://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf)

### **Section 10**

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

### **Service Response**

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

### **Proposed Species and/or Proposed Critical Habitat**

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

### **Candidate Species**

Candidate species are species that are being considered for possible addition to the threatened and endangered species list. They currently have no legal protection under the ESA. If you find you have potential project impacts to these species the Service would like to provide technical

---

assistance to help avoid or minimize adverse effects. Addressing potential impacts to these species at this stage could better provide for overall ecosystem health in the local area and avert potential future listing.

Several species of freshwater mussels occur in Texas and four are candidates for listing under the ESA. The Service is also reviewing the status of six other species for potential listing under the ESA. One of the main contributors to mussel die offs is sedimentation, which smothers and suffocates mussels. To reduce sedimentation within rivers, streams, and tributaries crossed by a project, the Service recommends that you implement the best management practices found at: <http://www.fws.gov/southwest/es/TexasCoastal/FreshwaterMussels.html>.

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

### **Migratory Birds**

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

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

The construction of overhead power lines creates threats of avian collision and electrocution. The Service recommends the installation of underground rather than overhead power lines whenever possible. For new overhead lines or retrofitting of old lines, we recommend that project



developers implement, to the maximum extent practicable, the Avian Power Line Interaction Committee guidelines found at <http://www.aplic.org/>.

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

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

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

### **Wetlands and Wildlife Habitat**

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

---

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

If your project will involve filling, dredging, or trenching of a wetland or riparian area it may require a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (COE). For permitting requirements please contact the U.S. Corps of Engineers, District Engineer, P.O. Box 1229, Galveston, Texas 77553-1229, (409) 766-3002.

### **Beneficial Landscaping**

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

### **State Listed Species**

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

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

Attachment(s):

- Official Species List
-

## Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information 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 #211

Houston, TX 77058

(281) 286-8282

---



## Project Summary

Consultation Code: 02ETTX00-2019-SLI-0171

Event Code: 02ETTX00-2019-E-00344

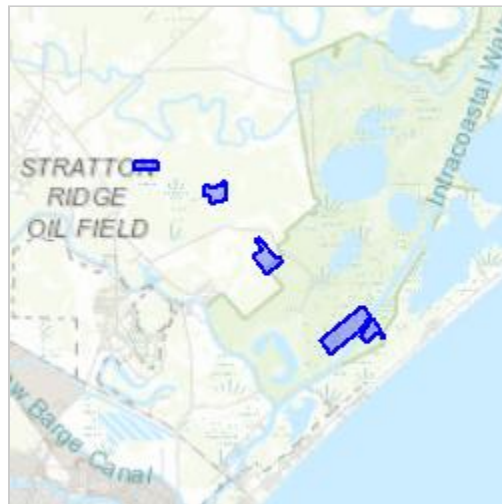
Project Name: Frentress-Johnson West Bay Mitigation Bank; Freeport Tracts

Project Type: LAND - PRESERVATION

Project Description: mitigation bank preservation

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/28.99621070634292N95.25813705186471W>



Counties: Brazoria, TX

---

## Endangered Species Act Species

There is a total of 9 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<sup>1</sup>, 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.

- 
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 <i>Trichechus manatus</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <b><i>This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.</i></b> Species profile: <a href="https://ecos.fws.gov/ecp/species/4469">https://ecos.fws.gov/ecp/species/4469</a>	Threatened

---

## Birds

NAME	STATUS
<p>Piping Plover <i>Charadrius melodus</i></p> <p>Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered.</p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/6039">https://ecos.fws.gov/ecp/species/6039</a></p>	Threatened
<p>Red Knot <i>Calidris canutus rufa</i></p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/1864">https://ecos.fws.gov/ecp/species/1864</a></p>	Threatened
<p>Whooping Crane <i>Grus americana</i></p> <p>Population: Wherever found, except where listed as an experimental population</p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a></p>	Endangered

## Reptiles

NAME	STATUS
<p>Green Sea Turtle <i>Chelonia mydas</i></p> <p>Population: North Atlantic DPS</p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/6199">https://ecos.fws.gov/ecp/species/6199</a></p>	Threatened
<p>Hawksbill Sea Turtle <i>Eretmochelys imbricata</i></p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/3656">https://ecos.fws.gov/ecp/species/3656</a></p>	Endangered
<p>Kemp's Ridley Sea Turtle <i>Lepidochelys kempii</i></p> <p>There is <b>proposed</b> critical habitat for this species. The location of the critical habitat is not available.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/5523">https://ecos.fws.gov/ecp/species/5523</a></p>	Endangered
<p>Leatherback Sea Turtle <i>Dermochelys coriacea</i></p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/1493">https://ecos.fws.gov/ecp/species/1493</a></p>	Endangered
<p>Loggerhead Sea Turtle <i>Caretta caretta</i></p> <p>Population: Northwest Atlantic Ocean DPS</p> <p>There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/1110">https://ecos.fws.gov/ecp/species/1110</a></p>	Threatened

## Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.



Attachment C



## Cultural Resources Impact Statement

The proposed Frentress Johnson West Bay Mitigation bank is approximately 4,800-acre property roughly 13-miles southeast of Liverpool, Texas north of Chocolate Bay and six areas totaling 390-acres roughly 4-miles northeast of Freeport, Texas. Proposed impacts include restoring natural drainages by backfilling drainage ditches, and culverts as well as other measures. Determining the potential for finding archaeological sites relies on topography, distance to surface water, soils, and previous archaeological investigations. In general, elevated areas close to water with well-drained soils are considered high probability areas for containing cultural resources on or near the ground surface. Those areas with buried soil horizons have the potential for containing deeply buried archaeological deposits. Determining the potential for archaeological sites within the project area includes examining topographic maps, soils information at <http://websoilsurvey.nrcs.usda.gov/>, and the Texas Archaeological Sites Atlas database.

### Chocolate Bay Tract

Topographically, the project area is flat with occasional rises from eolian deposits (e.g., dunes) and ridge/swales associated with beach activity. Streams meander across the landscape. Approximately 20 soil series are identified in the project area. Soils can be generally classified as inland and tidal. Inland soils generally occupy larger areas and formed on clayey fluviomarine deposits. Tidal soils generally occupy marshes or are frequently flooded. Eolian dunes are possible in the area.

The archaeological database shows one archaeological site (41BO1) in the project area and sites 41BO2 and 41BO76 along Chocolate Bay. Site 41BO1 was recorded as a juvenile burial eroding from the cut bank. Site 41OR2 was record as a burial and artifact scatter. Site 41BO76 was recorded as a shell midden with a light artifact scatter. Archaeological survey in and around the project area include a 1985 survey and a 2004 survey for the Corps of Engineers within the project area and a linear survey roughly 1.8-miles to the northwest of the project area. No additional information was available for the work. No historic period cemeteries are shown on the topographic map in the project area.

The elevated ridge summits, natural levees along stream, and dunes have the highest probability for containing undocumented cultural resources. The remainder of the project area has a lower probability for containing intact cultural resources. Typically, state and federal review agencies consider cultural resource surveys essential for projects in high probability areas and in areas with few previous investigations. Projects permitted by the Corps of Engineers may require a cultural resources survey. Any surveys conducted for the Corps of Engineers are reviewed by the State Historical Preservation Officer (SHPO) and must meet the state survey and reporting guidelines. If no cultural resources survey is required and artifacts, dark greasy soils, bones, or mounds

## Cultural Resources Impact Statement

are found during the construction, then work should cease and a qualified archaeologist should be contacted.

### Freeport Tracts

The proposed Frentress Johnson West Bay Mitigation bank includes six areas totaling 390-acres roughly 4-miles northeast of Freeport, Texas. There are no proposed surface or subsurface disturbances planned for these tracts. Determining the potential for finding archaeological sites relies on topography, distance to surface water, soils, and previous archaeological investigations. In general, elevated areas close to water with well-drained soils are considered high probability areas for containing cultural resources on or near the ground surface. Those areas with buried soil horizons have the potential for containing deeply buried archaeological deposits. Determining the potential for archaeological sites within the project area includes examining topographic maps, soils information at <http://websoilsurvey.nrcs.usda.gov/>, and the Texas Archaeological Sites Atlas database.

Topographically, the properties are adjacent to marshes and meandering streams. Six soil series are identified in the project area (Table 1).

Table 1. Soil series within the parcels

Series	Depth	Description
Follet 16	80-in	A/Cg stratified loam in tidal area
Francitas 17	16-in	A/Bss/Bkss fluviomarine deposits
Harris 19	12-in	Ag/Bssg clay coastal sediments
Ijam 21	9-in	A/Cg dredge material
Surfside 39	14-in	Ag/Bg clayey alluvium level to depressed areas
Veston 44	80-in	A/C/Ab/C/A'b stratified loam

The archaeological database shows several archaeological surveys along Oyster Creek and along the Gulf Intercoastal Waterway. The work along Oyster Creek recorded all of the archaeological sites. These sites include artifact scatters and shell midden exposed in cut-banks along the stream channel. No historic period cemeteries are shown on the topographic map in the project area. The closest documented archaeological sites to any of the areas are along Oyster Creek roughly one mile to the west of the individual parcels.

The elevated ridge summits, natural levees along stream, and dunes have the highest probability for containing undocumented cultural resources. Low-lying areas and marshes have a lower probability for containing intact cultural resources; therefore, an



## Cultural Resources Impact Statement

elevated area in close proximity to a stream has a higher possibility of containing an archaeological site (Table 2).

Table 2. Parcel information and probability

Parcel	Soils	Prev Invest, Arch Sites w/in 1-mi	Probability
153-ac	44, 21	41BO148-50 along Oyster Creek	Low
40-ac	39, 17	41BO73-75 along Oyster Creek	High close to creek
16-ac	39	None	High close to creek
24-ac	44	None	Low
57-ac	16, 44	None	High close to Drum Bay
100-ac	19, 39	None	High close to creek

Typically, state and federal review agencies consider cultural resource surveys essential for projects in high probability areas and in areas with few previous investigations. Projects permitted by the Corps of Engineers may require a cultural resources survey. Any surveys conducted for the Corps of Engineers are reviewed by the State Historical Preservation Officer (SHPO) and must meet the state survey and reporting guidelines. If no cultural resources survey is required and artifacts, dark greasy soils, bones, or mounds are found during the construction, then work should cease and a qualified archaeologist should be contacted.

Analysis by:

Victor Galan, PhD - Geoarchaeology

Deep East Texas Archaeological Consultants

€€

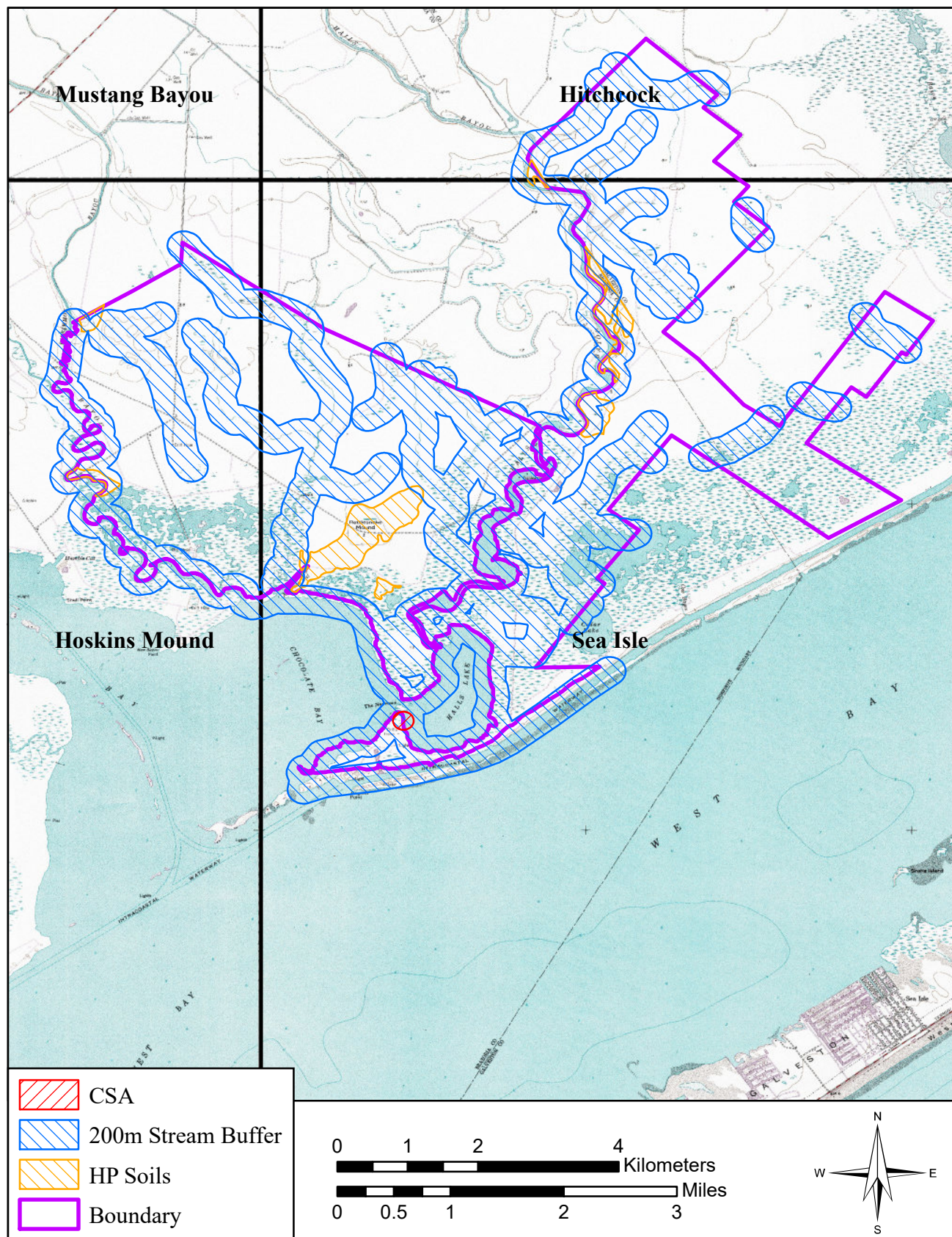


Figure 1. Archaeological high probability soils and stream buffers with Culturally Sensitive Areas on Sea Isle, Hoskins Mound, and Hichcock 7.5' Quads.

Attachment D





## Focal Watershed Review: East and West Galveston Bay, Texas

### Introduction

The Texas coast extends 367 linear miles from Louisiana to Mexico. With over 3,300 miles of tidal shoreline (which includes the outer coast, islands, sounds, bays, and creeks to the head of tidewater), Texas hosts one of the most ecologically complex and biologically diverse regions in the Gulf. The Texas coast is also home to more than one-third of the state's population and about 70 percent of the state's industrial base (Moulton et al., 1997). The Texas coastal region includes three distinct areas distinguished by particular geomorphology, climatology, hydrology, and ecology: the upper, mid, and lower coasts.

In the East and West Galveston Bay watersheds, extensive salt marshes meet bays and lagoons protected by barrier islands (Moulton et al., 1997). Counties within the smaller West Galveston Bay watershed include Brazoria, Chambers, Fort Bend, Galveston, and Harris. Counties located within East Galveston Bay watershed are Chambers, Galveston, Jefferson, and Liberty. Although these two watersheds were the focus of the review, participants provided information and comments regarding the larger Galveston Bay region, which includes the metroplex of Houston and surrounding cities and municipalities. The entire Galveston Bay watershed, which extends up the Trinity River to the Dallas/Fort Worth area, encompasses 27,000 square miles of land, and nearly half of the population of Texas (Lester and Gonzalez, 2011).

The East and West Galveston Bay watersheds (Figure 4; HUCs 12040202 and 12040204), as their names suggest, drain into Galveston Bay. Galveston Bay is a subtropical, bar-built estuary fed by two rivers, the San Jacinto and the Trinity, and associated coastal streams and bayous (Lester and Gonzalez, 2011). Habitats in the watersheds include salt, brackish, and freshwater marshes, mudflats, submerged aquatic vegetation (SAV) beds, oyster reefs, bottomland and flatwood forests, scrub-shrub, and coastal prairies (EPA, 2007).

As of 2002, one-third of commercial fishing income and half of recreational expenditures in the entire state of Texas were from Galveston Bay (Lester and Gonzalez, 2002). Brown shrimp, blue crab, red drum, spotted sea trout, southern flounder, and Gulf menhaden are abundant here. Oyster reefs are of particular ecological and economic significance in Galveston Bay, which supports nearly 27,000 acres of oyster habitat and produces more oysters than any single U.S. water body (Galveston Bay Foundation, 2010). The Bay traditionally contained up to 80 percent of all



Figure 4. East and West Galveston Bay watersheds (cross-hatched areas).

Eastern oysters (worth approximately \$10 million annually) harvested in Texas.<sup>1</sup> Oyster reefs have been surveyed in Galveston Bay since the 1950s, and comparative mapping shows that habitat location and abundance has shifted over time. When Hurricane Ike struck in 2008, it is estimated that sediment deposition associated with the storm surge covered about 60 percent of Galveston Bay's oyster reef habitat. Commercial oyster fishery landings in Matagorda Bay (located approximately 100 miles southwest of Galveston Bay) exceeded Galveston Bay for the first time in history in 2011.

The Galveston Bay watershed provides habitat for an impressive array of bird species, including great and snowy egrets, reddish egrets, piping plovers, roseate spoonbills, tricolored herons, and black skimmers. These include year-round resident, migratory, and wintering species, many of which are wetland dependent (Lester and Gonzalez, 2002; Eubanks et al., 2006). Approximately 430 species of birds overwinter, migrate, or reside here (Eubanks et al., 2006). This area is regarded as one of the top birding spots in the United States. Recreational fishing and bird watching contribute to a robust ecotourism economy.

Despite the value of wetlands to fisheries (providing food, shelter, breeding habitat, and pollutant removal) and the economy, Texas has lost 52 percent of its original wetland base (Mitsch and Gosselink, 1993). The Texas coastal plain experienced a loss of approximately 200,000 acres of wetlands between the mid-1950s and the early 1990s (from 4.1 million acres to 3.9 million acres). This loss equates to

<sup>1</sup> For more information, see <http://www.tpwd.state.tx.us/huntwild/wild/species/easteroyster/>.



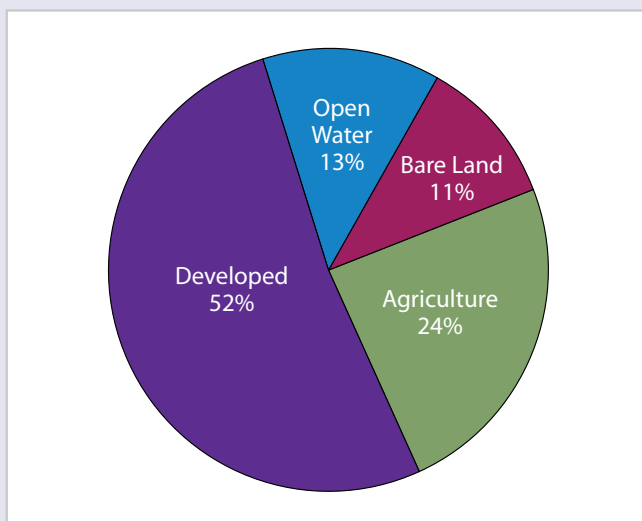
## Focal Watershed Review: East and West Galveston Bay, Texas (continued)

an average annual net loss of about 5,700 acres (Moulton et al., 1997). Of 3.9 million acres remaining in the early 1990s, about 85 percent were freshwater wetlands (3.3 million acres) and about 15 percent were estuarine wetlands (0.6 million acres). The most common types of wetlands lost in Texas coastal areas during this time were freshwater emergent and freshwater forested wetlands.

In examining historical wetland losses within the focal watershed, a trend of continuing coastal wetland losses can be gleaned from a number of studies conducted over a variety of time periods. Although the studies are not directly comparable due to slightly different geographic scopes, methodologies, and study objectives, a downward trend in the areal extent of wetlands is nonetheless apparent. Going back to the 1950s, one study found that from the 1950s until 1989, there was a gross loss of more than 88,500 acres of emergent wetlands in Galveston Bay, 5,700 acres (6 percent) of which were converted to urban uses (White et al., 1993).

More recently, analysis of aerial imagery between 1992 and 2002 indicated that 9,124 acres of freshwater wetlands and 2,913 acres of estuarine marsh in the lower Galveston watershed alone were lost to development, which represents an average overall wetland loss of approximately 1,200 acres annually (an average annual loss of 912 acres of freshwater wetlands and 291 acres of coastal wetlands). Most of the wetlands lost in Galveston Bay watershed occurred in Harris County (Jacob and Lopez, 2005; EPA, 2007).

In preparation for the East and West Galveston Bay focal watershed review, the EPA coastal wetlands team worked with the NOAA C-CAP to develop a general characterization of recent wetland changes in the East and West Galveston Bay watersheds. C-CAP examines



**Figure 5.** Wetland loss and changes in land cover, 1996-2006: East and West Galveston Bay. *Source: NOAA, 2011a.*

overall land use change, including wetlands, for the coastal regions of the United States. The program currently reports changes in wetland acreage only and does not measure change in wetland function. The C-CAP data were used to ensure consistency across all focal watersheds when comparing wetland acreage loss.

Table 3 and the accompanying pie chart (Figure 5) display C-CAP data for the areas of the two eight-digit hydrological unit code (HUC 8) watersheds that were the focus of the East and West Galveston Bay CWR (see Figure 4). According to the C-CAP analysis, more than 11,900 acres of wetlands were lost in this area between 1996 and 2006. This trend suggests an average loss of nearly 1,200 acres each year (similar to the results of the 1992–2002 analysis referenced above). The vast majority (more than 10,000

**Table 3.** Losses of Wetland Types to Other Land Uses (Acres) from 1996 to 2006, HUC 12040202 and 12040204

Wetland Types*	Developed	Agriculture	Bare Land	Open Water	Total
Palustrine forested	2,394.08	912.49	514.18	209.72	4,030.46
Palustrine scrub	2,230.84	381.63	120.98	86.29	2,819.75
Palustrine emergent	1,410.21	1,501.83	376.74	721.45	4,010.23
Estuarine forested	0.00	0.00	0.00	0.00	0.00
Estuarine scrub	0.00	0.00	0.22	0.00	0.22
Estuarine emergent	94.07	1.11	131.21	58.71	285.11
Unconsolidated shore	73.17	12.23	206.83	493.27	785.50
<b>Total</b>	<b>6,202.37</b>	<b>2,809.29</b>	<b>1,350.16</b>	<b>1,569.44</b>	<b>11,931.26</b>

\* See Appendix D for wetland classification descriptions. *Source: NOAA, 2011a.*

## Focal Watershed Review: East and West Galveston Bay, Texas (continued)

acres or 90 percent) of wetlands lost in the focal watersheds were non-tidal, with woody freshwater wetlands (palustrine forested and palustrine scrub) constituting 57 percent of the total loss. The majority (63 percent) of overall wetland loss during this time period was attributed to development or conversion to bare land (which is often associated with, or a precursor to development).

It should be noted that the information below is based on the opinions and observations of participants, who provided feedback on draft versions of this document and supplemented statements with documentation, where available.

### Stressors

In preparation for the focal watershed review, the Coastal Wetlands Team conducted a literature review to obtain a high-level snapshot of the most common coastal wetland stressors in the East and West Galveston Bay watersheds.

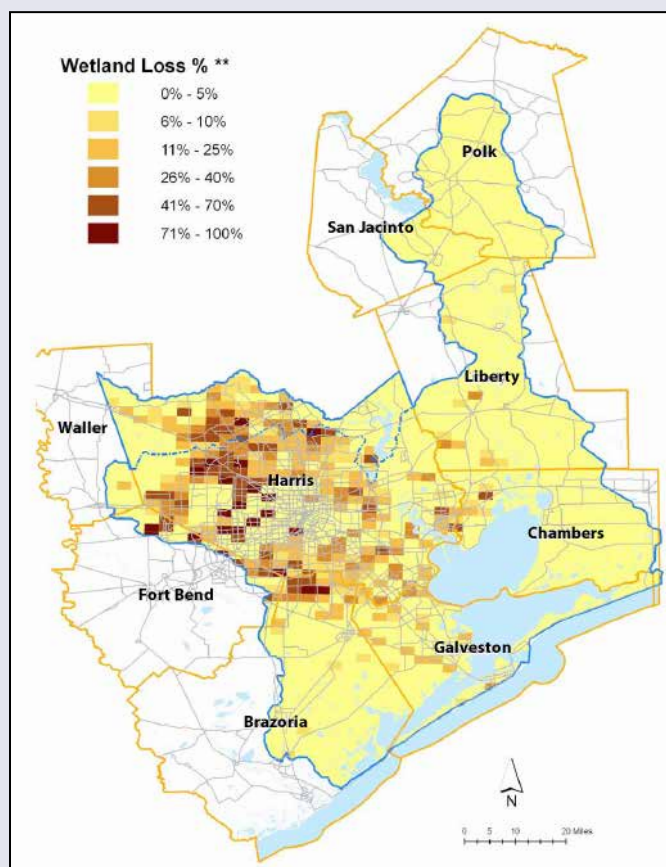
Discussion at the Galveston Bay CWR identified the following key contributors to coastal wetland acreage loss and degradation and confirmed, as well as emphasized and added to, the list of stressors identified during the literature review:

- Development (residential, commercial, infrastructure)
- Limitations of regulations
- Hydrologic modifications (including oil and gas activities, dredging, groundwater pumping, sand and gravel mining, freshwater diversions)
- Climate change, sea level rise, and coastal storms
- Oil spills
- Invasive species

**Coastal development.** Participants identified development as one of the top three primary stressors to coastal wetlands (particularly freshwater) in the focal watershed. In particular, they noted the lack of growth planning and controls in the greater Houston area (central Galveston Bay watersheds), which, while not specifically included in the geographic review area, were nonetheless of great concern to participants in terms of local wetland loss attributable to development (Figure 5). In addition to direct physical wetland alterations that result from filling and draining wetlands for development, increased development in coastal watersheds leads to increased impervious surfaces and associated hydrologic and water quality impacts on wetlands and associated aquatic systems. Increased

impervious surfaces and traditional stormwater drainage infrastructure result in increased runoff during rainstorms (contributing to flooding) and (to a lesser extent, given low permeability of soils) decreased groundwater recharge. Groundwater recharge is needed to maintain water table elevation in wetlands during dry months. In addition to the hydrologic impacts of stormwater on wetlands, stormwater runoff results in water quality impacts due to pollution from nutrients, metals, sediment, and bacteria. Other development-related impacts to wetlands include increased drinking water withdrawals, which can lower water table elevation and impact wetland hydrology.

The impacts associated with population growth and the associated impacts from development sprawl are most pronounced in Harris County, which is part of the Houston–Sugar Land–Baytown metropolitan area and is partially located in West Galveston Bay watershed (see Figure 6). This county has experienced 20.3 percent growth (with a current population of more than 4 million) from 2000 to 2010 (U.S. Census Bureau, 2011a). According to the Texas State Demographer, the population in the Houston–Sugar



**Figure 6.** Percent of total freshwater wetlands lost to development (1992–2002), Lower Galveston Bay watershed (note that this area is broader than that chosen as the review area). *Source: Jacob and Lopez, 2005.*

## Focal Watershed Review: East and West Galveston Bay, Texas (continued)

Land–Baytown area is expected to grow to 7.9 million by 2035, an increase of approximately 3.2 million people compared to the 2000 census count (Texas State Data Center, 2008).

At the CWR, participants noted two other major impacts that have resulted from growth and development pressures in the watershed:

- **Shoreline hardening.** Participants noted that shoreline stabilization, which includes the construction of bulkheads, seawalls, and other artificial armoring structures (Figure 7), has impacted coastal wetlands in Galveston Bay. Impacts due to shoreline armoring include increases in erosion along seawall-adjacent marshes from diverted wave energy (Galveston Bay Foundation, n.d.[b]), which often prompts adjacent property owners to stabilize their shorelines, thereby creating a domino effect along the shoreline. In addition to increasing erosion, shoreline hardening impacts coastal wetlands in other ways, including filling of wetlands behind the armoring structure during construction and preventing inland migration of coastal wetlands in response to sea level rise. Hardening is also one factor contributing to decreases in biodiversity and scouring impacts on SAV, which serves as a critical nursery for fish and shellfish (Bilkovic et al., 2006; Bilkovic and Roggero, 2008). Erosion-induced scouring increases the depth of nearshore areas, thereby preventing SAV recruitment and growth (Sime, 2005).



**Figure 7.** Galveston Seawall (2005). Source: Bob McMillan, Federal Emergency Management Agency.

- **Nonpoint source pollution.** Multiple nonpoint sources of pollution, including runoff from impervious surfaces (including residential lawns, parking lots and driveways), oil runoff, septic systems, industrial runoff, and agricultural runoff, decrease the quality of coastal wetland habitats in the Galveston Bay watershed (EPA, 2007). As population and development increase, so too do these nonpoint sources of pollution.

**Limitations of regulations.** Federal, state, and local regulatory programs are essential tools for protecting coastal wetlands. However, participants identified jurisdictional limitations and implementation issues associated with wetland regulations as being impediments to effective protection. Additionally, participants felt that coordination could be improved between all levels of government, which could inform the development of an overarching policy to manage wetlands in light of projected future changes to coastal communities. While wetland regulation in Texas has traditionally been the primary responsibility of the federal agencies (Army Corps and EPA), state and local governments can use regulatory tools (including zoning, subdivision control, and water pollution regulations) to protect wetlands. Participants thought that heightened awareness of wetland laws among local officials could help steer development away from wetland areas or, at the very least, notify developers that compliance with wetland laws is an important aspect of project siting and design. Participants also expressed the opinion that tidal wetlands are more effectively protected than non-tidal wetlands. This observation is corroborated by C-CAP data, which show more than 90 percent of all wetland losses have occurred in freshwater wetlands (see Table 3).

- **Changes affecting federal jurisdiction.** A major issue raised by participants at the review was a lack of clarity regarding which wetlands are jurisdictional, particularly those that are “isolated.” Participants expressed the view that the *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers (SWANCC)* and *Rapanos v. United States (Rapanos)* Supreme Court decisions have resulted in significant development of wetland areas within the Galveston Bay watershed that were previously regulated under Section 404 of the CWA. The participants believed that numerous acres of depressional wetlands located throughout the watershed are at



**Figure 8.** Example of development in depressional wetlands. Photo courtesy of Tom Dahl, USFWS.



high risk of development due to the potential for loss of protection under Section 404 of the Clean Water Act (see Appendix C, Clean Water Act Jurisdiction).

- **State regulatory role.** Some participants believe the state of Texas and/or local regulatory agencies could improve or create new regulatory programs to address wetland impacts. For example, participants indicated that Texas could use its 401 certification authority more effectively to regulate development in or near wetlands. CWA Section 401 allows states and tribes to condition or deny federal permits (including CWA Section 404 permits) that may adversely impact state water quality. A state can increase its 401 certification authority by attaching stricter conditions to its certifications and/or denying projects with negative water quality impacts. The Texas Commission on Environmental Quality (TCEQ) is the lead for most Section 401 certifications, and the Railroad Commission of Texas issues 401 certifications for activities regarding oil and gas exploration, development, and production operations. In 2001, to streamline the permitting process and focus limited resources on the most significant wetland impacts, TCEQ and the Army Corps executed a Memorandum of Agreement establishing tiered procedures for Section 401 certifications. Currently, developers of wetlands smaller than 3 acres (Tier I projects) are not typically required to seek an individual 401 certification review as long as Best Management Practices (BMPs) are included in their permit application (TCEQ, 2011a). Some review participants considered this minimal oversight to be a programmatic stressor to coastal wetland protection (see additional information under next bullet). Ecologically significant jurisdictional wetlands such as pitcher plant bogs, bald cypress and tupelo gum swamps, and mangrove marshes are not eligible for Tier I processing and must be reviewed under the more intensive Tier II process. Some participants also believed the state could be doing more to protect wetlands that are not covered by the CWA (such as certain isolated wetlands) through the development of state regulations.
- **Incremental losses.** Some participants thought the tiered Section 401 certification process described above could be leading to incremental wetland acreage losses due to the large number of developments affecting less than three acres of wetlands. Similarly, one participant expressed concern that the use of CWA Section 404 nationwide permits (NWP) may allow incremental wetland losses due to numerous small development activities, each impacting jurisdictional wetlands without the benefit of public notice/review and a compensatory mitigation plan. Army Corps noted however that NWP are only meant to permit projects that contribute no more than minimal individual and cumulative adverse effects on aquatic resources. Additionally, a number of NWP have conditions that require pre-construction notification to the local Army Corps District and compensatory mitigation.
- **Mitigation.** Participants described a lack of mitigation site monitoring as a stressor in Galveston Bay. Unavoidable wetland acreage losses permitted under CWA Section 404 must be offset, to the extent appropriate and practicable, through compensatory mitigation (in order to prevent net wetland loss). However, participants expressed concern that mitigation is occurring outside the watershed where the impact occurs and therefore not truly replacing the loss. Additionally, some participants felt that uncompensated loss may be occurring when mitigation is not properly carried out and, therefore, additional monitoring and enforcement is needed. Note that compensatory mitigation requirements are designed to replace wetland functions, and therefore may not result in a one-to-one replacement of lost wetland acreage.
- **Unauthorized wetland loss.** Participants believed that illegal wetland fills may be occurring in the Galveston Bay watersheds due to lack of enforcement and a lack of knowledge on the developers' part. However, a portion of these fills may be occurring in wetlands outside the jurisdiction of the Clean Water Act or as a result of exempt activities, and therefore do not require authorization under CWA Section 404.
- **Rolling easement litigation.** Review participants noted that a Texas Supreme Court decision and ongoing litigation call into question the use of rolling easements to protect public beaches (see the "Tools and Strategies" section for a description of rolling easements), allowing them to potentially remain developed private property, and subject to armoring and other structures (ASWM, 2010). Results of the court decisions will potentially limit the ability to use rolling easements (in Galveston Bay and perhaps within the entire Gulf region) as a tool for protecting public interests in these dynamic coastal shorelines, which include important coastal habitats.



## Highlight: Clean Water Act Jurisdiction and Evidence of Surface Connectivity for Texas Gulf Coastal Depressional Wetlands

Within the Galveston Bay watershed, there are wetlands for which the applicability of CWA protections has been difficult to determine. EPA and the Army Corps are responsible for issuing regulations and guidance regarding CWA jurisdiction, such as which wetlands are federally protected under the scope of the Act. In April 2011, EPA and the Army Corps announced the release of the “Draft Guidance Identifying Waters Protected by the Clean Water Act” for public comment and review. The draft guidance clarifies which waters are protected by the CWA and implements the Supreme Court’s decisions in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* and *Rapanos v. United States*. These two court decisions have created uncertainty over which waters are protected by the CWA. Once final, the EPA/Army Corps guidance will replace previous guidance and provide more certainty and clarity to facilitate accurate field determinations.

The draft guidance includes several clarifications to current guidance documents:

- It clarifies “adjacent” wetlands as including ones in physical proximity to jurisdictional waters or ones with an unbroken surface or shallow sub-surface hydrologic connection.
- It clarifies that all wetlands within a wetland mosaic should be considered collectively when determining adjacency.
- It continues to include adjacent wetlands as per se jurisdictional where they are adjacent to either a traditional navigable water (TNW) or interstate water or where they abut a relatively permanent tributary of a TNW or interstate water.
- It continues to classify wetlands adjacent to non-relatively permanent tributaries as jurisdictional where they have a significant nexus to a TNW or interstate water.
- It clarifies that non-adjacent wetlands are jurisdictional where they individually have a significant physical, chemical, or biological nexus to a TNW water or interstate water.
- It clarifies that groups of waters (e.g., tributaries, adjacent wetlands, other waters) can be considered holistically on the watershed scale when evaluating significant nexus, rather than at a stream reach level.

Even with this EPA/Army Corps draft guidance for how to interpret recent Supreme Court cases, federal jurisdiction for certain waters, including wetlands, would need to be determined on a case-by-case basis to identify whether or not they have a significant nexus to a TNW or interstate water. To learn more about the guidance, visit <http://water.epa.gov/lawsregs/guidance/wetlands/CWAwaters.cfm>.

There has been ongoing research in Texas to address the nature of wetlands that became non-jurisdictional as a result of the court decisions. A recent study concluded that there are considerable hydrologic connections between certain Texas upper coast depressional wetlands and Galveston Bay and other navigable waters (Wilcox et al., 2011). The study quantified surface discharge characteristics of a wetland complex in the Armand Bayou Nature Preserve, southeast of Houston, on the Texas Gulf of Mexico Coastal Plain. It was found that surface runoff from the wetlands, although intermittent, occurred regularly and accounted for more than 17 percent of watershed precipitation over the 45-month study period. The wetland complex has a direct surface connection via a stream outlet to a tributary of Armand Bayou, a traditional navigable water. Due to this stream connection to Armand Bayou, the authors of this study have suggested that these wetlands should be considered “adjacent” wetlands, and thus could potentially be regulated under federal regulations, requiring a significant nexus evaluation. The results from the study are contrary to the “widespread perception that depressional wetlands on the Texas Gulf Coast are hydrologically isolated” (Wilcox et al., 2011). While exertion of federal jurisdiction upon wetlands must be determined on a case-by-case basis, field-based studies provide vital scientific support for these case-by-case determinations.



Figure 9. League City: example of a non-jurisdictional depressional-pimple-mound wetland complex surrounded by residential development. Source: USWFS.

**Hydrologic modifications.** Hydrologic modifications include the direct and indirect impacts associated with a number of activities, including freshwater diversions, channelizing streams to improve drainage, groundwater withdrawals, as well as extraction of other resources such as sand and gravel, gas, and oil. These activities can result in subsidence, as well as alterations of salinity and flow levels. Hydrologic modifications leading to saltwater intrusion can alter freshwater and forested wetlands and change wetland types. Some studies suggest that “many, and perhaps most, of Galveston Bay’s fringing wetlands have been lost to human-induced subsidence, with no corresponding migration of wetlands landward because of the abrupt slopes surrounding most of the Bay” (Jacob and Showalter, 2008).

- **Alterations in freshwater flows.** Reduced freshwater inflows occur as a result of groundwater pumping and surface water diversions. Participants indicated that a reduction in freshwater flows has affected the San Jacinto and Trinity River deltas and riparian wetlands by altering the salinity levels of the Bay. Increased salinities of freshwater and brackish wetlands allow invasive species to spread and flourish. This population shift can decimate native species, including commercially valuable ones such as oysters (Galveston Bay Foundation, n.d.[a]). Increased salinities can also result in major shifts in wetland types to more saline conditions, with potential ecological consequences such as loss of cypress swamp in the Trinity delta. This in turn causes refuge and land managers to opt for structural marsh management, which can restrict access to the marshes for transient marine species and may actually accelerate marsh loss over time (R. Swafford, personal communication, May 16, 2012). Decreased freshwater inflow can also alter the wetland ecosystem by exposing anaerobic soils. Over time, upland plants will out-compete wetlands plants in these altered soil conditions (Texas GLO, 2010a). Conversely, increased flows from diversions and runoff can also be a problem. Inundation can alter a wetland, changing it into an open water habitat that cannot support wetland vegetation. An example is the Addicks Reservoir in Harris County, which is inundated by a combination of natural flows and stormwater runoff, and has controlled releases that affect vegetation downstream in Buffalo Bayou (HCFCD, n.d.[a]).
- **Alterations in sediment.** Sediment budgets play a large role in wetland formation and maintenance. Both increased and decreased flow regimes can lead to changes in sediment budgets and the loss of coastal wetland area. Hydrologic modifications, such as dams, can decrease water flow and restrict sediment and nutrient deposition that normally replenishes and helps to maintain a thick organic soil layer—essential for healthy wetlands. A study on the sediment budgets in the Trinity River indicated that sediment restriction from Livingston Dam has been offset by erosion in the lower coastal plain, which maintains supply to the Bay (Phillips et al., 2004). However, this restriction may lead to coastal wetland acreage loss, since increased sediment supply will be needed to match the rate of sea level rise (Lester and Gonzalez, 2011). Conversely, alterations such as dredging and channelization can increase flow velocity, scouring, and erosion of adjacent wetlands. The response to erosion in Galveston Bay has been development of armored shorelines, which prevent wetlands from migrating inland (Lester and Gonzalez, 2011). In the Galveston Bay area, alterations to water circulation and sediment flows caused by the Houston Ship Channel, the Texas City Dike, and coastal highways have reduced sediment deposition in West Galveston Bay (Lester and Gonzalez, 2011).
- **Flood management practices.** Flood management projects implemented by entities such as the Harris County Flood Control District are designed to improve drainage and prevent flooding, but participants noted that these projects can also significantly impact natural riparian systems. To improve conveyance of water, channels are widened, deepened, and cleared of vegetation. Detention basins are often built adjacent to channels to allow for storage of stormwater. These types of alteration can significantly affect hydrologic regimes, which in turn have direct and indirect effects on wetlands. Additionally, participants noted that herbicides are applied to control riparian vegetation along these modified channels and mosquitoes are treated aerially in some locations, which could have significant effects on wetland habitat.
- **Dredging.** Dredging for navigation, which creates deeper and more distinct channels, can change sediment deposition patterns, increase erosion (where increases in flow velocity occur), and change the freshwater/saltwater regime. In addition, the dredged material needs to be disposed of and, depending on the method of disposal, can either negatively or positively impact coastal habitats. Participants noted the Houston Ship Channel as an example of dredging impacts that have significantly changed Bay circulation and salinity (Lester and Gonzalez, 2011). Additionally, sediment in certain areas of the Houston Ship Channel has been shown to contain hazardous chemicals, such as PCBs, dioxin, DDT, and heavy metals (EPA, 2007; Lester and Gonzalez, 2011).

There are areas of the Houston Ship Channel where sediments are not contaminated, as well as other navigation channels that are not contaminated. These sediments, when dredged, can be used for beneficial purposes—for example, enhancing existing resource areas by restoring wetlands, islands, and beaches.

- **Sand and gravel excavation.** Review participants commented that sand and gravel mining operations occurring within floodplains outside of the state-owned riverbed (e.g., West and East forks of the San Jacinto River) result in direct loss of forested wetlands through excavation. In addition, mining operations can lead to the suspension of fine sediments in adjacent water, which reduces water clarity and can cover wetlands, indirectly resulting in acreage loss. The sand and gravel excavation itself is not a regulated activity in Texas. However, any related deposition of sediments into nearby waters of the United States requires a National Pollutant Discharge Elimination System (NPDES) permit from TCEQ and/or a CWA Section 404 dredge and fill permit from the Army Corps. TCEQ found that about half of mining facilities it investigated in the state were operating without a discharge permit in 2004, and a number were not meeting permit requirements such as implementation of BMPs and monitoring (TCEQ, 2004). Participants believed a CWA Section 404 exemption related to sand and gravel mining may be leading mining operators to believe they do not need a permit, though this exemption is actually for a narrowly defined set of activities.<sup>2</sup>
- **Groundwater pumping.** Groundwater pumping is partly responsible for the subsidence experienced in Galveston Bay over the last 100 years (Texas GLO, 2010a). Subsidence can affect wetland habitats by drowning vegetation, increasing the frequency of saltwater inundation events, and modifying drainage patterns (Coplin and Galloway, n.d.). Participants noted that groundwater withdrawals have decreased significantly around the Bay, but there are still areas, such as Jersey Village, that experience subsidence from groundwater withdrawals (Lester and Gonzalez, 2002; Engelkemeir et al., 2010). The rate of subsidence of the land around the Bay as a whole has

decreased due to an increased use of surface water for municipal, agricultural, and industrial purposes (Texas GLO, 2010a).

- **Oil and gas extraction.** Oil and gas extraction historically caused localized land subsidence in upper Galveston Bay and the Bolivar Peninsula (Coplin and Galloway, n.d.). Some participants described how subsurface extraction led to more pronounced geologic faulting, specifically on the Bolivar Peninsula. With increased faulting land surface elevation dropped, and the marshes were left susceptible to inundation. Ten percent of the marsh habitat on the peninsula was lost from the 1950s through 2002 (White et al., 2004). Fluids (both oil and water) are still extracted from salt domes in the area, e.g., High Island. These domes often have wetland areas associated with them as the result of subsidence from faulting. Additionally, oil and gas extraction can introduce new erosive factors by removing established vegetative cover and introducing unimpeded hydrologic flow (e.g., installation of pipeline in an established marsh with a highly erosive substrate).
- **Seismic exploration.** Participants also identified impacts of seismic exploration as an ongoing problem. They observed a recent increase in frequency of these surveys within the study watersheds. Exploration can involve intersecting marshes with access roads, leading to fragmentation of the wetlands and a decrease in water and nutrient circulation and flow. The side cast borehole material covers vegetation and leads to marsh conversion. Three-dimensional seismic exploration is covered under a CWA Section 404 NWP and does not require pre-consultation with the Army Corps unless the activity is planned in a tidal area. Although Section 404 permitting for many survey activities is covered by NWP 6, a regional condition to the permit in the Army Corps' Galveston District requires that a permittee submit a pre-construction notification if three-dimensional seismic test discharges are to occur in the coastal zone.<sup>3</sup>

**Climate change and sea level rise.** Effects of climate change include inundation of coastal wetlands due to sea level rise, unpredictable or episodic nature of extremes

<sup>2</sup> The exemption pertains to discharge of dredged or fill material incidental to the emergency removal of sandbars, gravel bars, or other similar blockages that are formed during flood flows or other events, where such blockages close or constrict previously existing drainage ways and, if not promptly removed, would result in damage to or loss of existing crops or would impair or prevent the plowing, seeding, harvesting, or cultivating of crops on land in established use for crop production. Such removal does not include enlarging or extending the dimensions of, or changing the bottom elevations of, the affected drainage way as it existed before the formation of the blockage. Removal must be accomplished within a year of the discovery of such blockages in order to be eligible for exemption.

<sup>3</sup> For more information, see <http://www.swf.usace.army.mil/pubdata/enviro/regulatory/handouts/nwp%20rgnl%20cnd%20for%20tx.pdf>.



## Focal Watershed Review: East and West Galveston Bay, Texas (continued)

in weather, and an impact on wetlands from increasing intensity and frequency of storm events (e.g., sediment and debris deposition). Related threats such as changes in precipitation patterns, timing and delivery of water and sediments, increases in atmospheric carbon dioxide, and higher temperatures also affect wetlands (Scavia et al., 2002).

- **Sea level rise.** Galveston Bay experienced a 0.6 meter rise in relative sea level in the 20th century (Yoskowitz et al., 2009). Land subsidence in the Galveston Bay watershed is likely to increase the impact of sea level rise. The most severe effects of sea level rise are predicted to occur in the East and West Bays and the Trinity River Delta where the greatest amount of marsh and swamp erosion is predicted to occur (Warren Pinnacle Consulting, Inc., 2011a).
- **Limited estuarine marsh migration opportunities.** Estuarine marshes can migrate inland as sea level rises, which can help sustain coastal wetlands and provide a buffer for inland properties. However, as global sea levels rises, it is unclear to what extent coastal marshes will move inland due to the location and quantity of development landward of the marshes (Warren Pinnacle Consulting, Inc., 2011a). Shoreline hardening can prevent wetlands from migrating and therefore result in loss of wetland area due to inundation and erosion. A study of sea level rise in Galveston Bay, commissioned by the Harte Research Institute in 2010, shows a significant portion of the Galveston Bay shoreline would be inundated during a 100-year storm given a projected increase in sea level of approximately 0.69 meters (2.3 feet; based on the IPCC A1F1 scenario) (see Figure 10).
- **Impacts to black mangrove.** Galveston Island is currently the northern limit for the black mangrove species due to its strict temperature requirements, a quality which makes it a good indicator of climate change. Increasing temperatures are allowing black mangrove to become more established in Louisiana, and the range of black mangrove is expected to expand northward in Texas as well. Additionally, inundation from increased hurricanes and from sea level rise will expose mangroves to changes in salinity and increased erosion (Montagna et al., 2011).
- **Hurricanes and storms.** Storms have caused damage to Galveston's coastal wetlands and resulted in coastal erosion that is exacerbated by prevailing winds, channelization, and ship traffic. Hurricane Ike (September 13, 2008) hit the coast east of Galveston Bay, causing a 5-meter storm surge, which traveled up to 10 miles



Figure 10. Land inundation given a 0.69 meter rise in sea level and a 100-year flood. Source: Yoskowitz et al., 2009.

inland (USGS, 2009). In addition to causing erosion, storm surges inundate freshwater wetlands with saline water, which can destroy a significant amount of freshwater vegetation (Lester and Gonzalez, 2011). If, as predicted, the intensity of such storms increases due to climate change (USGCRP, 2009), wetland loss associated with hurricanes can be expected to increase.

**Oil spills.** Oil spills can negatively impact coastal wetlands and associated wildlife by coating the substrate and introducing toxins into the environment (Ober, 2010; Whigham et al., 2010). Although wetlands can recover from these spills, their ability to recover can be hindered by compounding stressors such as sea level rise and subsidence (Whigham et al., 2010).

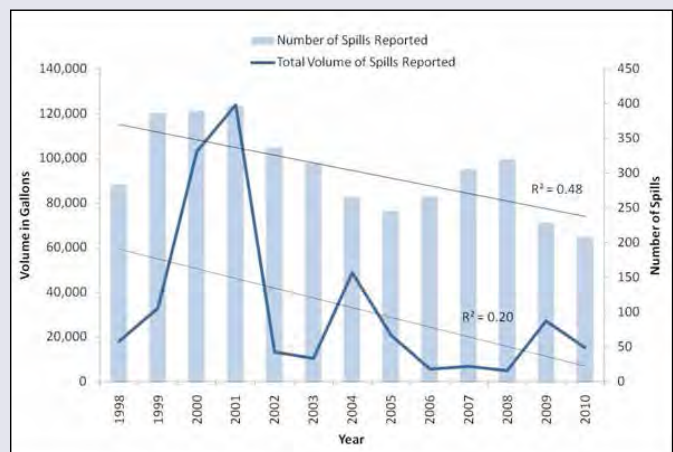


Figure 11. Number and volume of oil spills reported annually by the Texas General Land Office in the Lower Galveston Bay watershed, 1998–2010. Source: Gonzalez and Lester, 2012; Texas GLO, 2010b.



Participants noted that while oil spill data reported to the Texas General Lands Office (GLO) are available, there are probably more spills than are reported. Between 1998 and 2010, there were a total of 3,954 oil spills and over 431,000 gallons released in the Lower Galveston Bay watershed as reported by the Texas GLO with a trend of reduced spill incidents and volume over time (See Figure 11).

**Invasive species.** Participants described invasive vegetation as an important cause of coastal wetland functional loss in the review watersheds. Impacts include loss of species diversity, structural changes in the vegetation community, changes in nutrient cycling, and habitat changes. Participants noted that Chinese tallow tree (*Triadica sebifera*) is a species of particular concern since it has moved into freshwater marsh areas in great numbers within the Galveston Bay area. In addition, its spread has been documented throughout the upper Texas coast and down through other portions of the central coast (TexasInvasives.Org, 2011). A Houston urban forestry study using 2000 LANDSAT satellite data and 2002 field data showed that the Chinese tallow tree is the single most common species in the region, and represents a greater percentage of trees in the Houston area than all oak species combined (Nowak et al., 2005). The spread of such an aggressive species is a concern because it outcompetes native plants and can be a main cause of coastal wetland functional loss. Invasive vegetation can also cause changes in the types of fish and wildlife species present because of the changes in the type and abundance of food and shelter that the wetland vegetation provides. Deep-rooted sedge (*Cyperus entrerianus*) was noted as a plant that was once rare but now outcompetes native vegetation. Giant salvinia, water lettuce, and water hyacinth were mentioned as other examples of invasive vegetation impacting wetlands, along with invasive animals such as nutria and grass carp.

**Funding at cross-purposes.** Review participants noted some controversy around NRCS funding of projects that may result in unintentional wetland loss. Participants mentioned an instance where NRCS funded the Galveston County Consolidated Drainage District to remove downed trees from riparian zones of Dickson Bayou. Some participants viewed this activity as destruction of the riparian zone vegetation; others believed it restored the area to something closer to its natural state. Chambers County

also funded similar riparian zone clearing activities along Double Bayou.

### Tools and Strategies

In response to wetland losses, Texas uses several regulatory and non-regulatory programs to manage, protect and restore coastal wetlands. It primarily relies on Section 404 of the federal CWA (which regulates dredge and fill projects in waters of the United States) to protect its coastal and inland wetlands (see Appendix C for an explanation of CWA Section 404 authority and scope). In addition, TCEQ administers the state's Section 401 Certification Program. The program's goal is to ensure that activities requiring a federal permit (including CWA Section 404 permits) undergo state review for compliance with Texas' water quality standards. Since 1995, TCEQ has adopted a "no net loss" policy for preserving wetland functions and values, which is included in its water quality standards and mitigation policies. TCEQ is the lead state agency administering the Section 401 program; the Railroad Commission of Texas is responsible for overseeing oil and gas exploration activities, including issuance of Section 401 certifications for oil and gas development projects in wetlands.<sup>4</sup>

The Texas Coastal Management Program (CMP), within the Texas GLO, helps manage the state's coastal resources through interagency coordination and private/public partnerships. CMP activities include providing data on the health of Gulf waters, reviewing federal actions to ensure consistency with the state's CMP, and awarding grants (approximately \$2.2 million annually) for protection and restoration of coastal resources. The Texas Parks and Wildlife Code requires that a State Wetlands Conservation Plan be developed for coastal wetlands (state-owned coastal wetlands exclude most non-tidal wetlands; see Texas Natural Resources Code §33.203). Among other things, the plan must establish a no net loss goal, inventory coastal wetlands, and guide mitigation policies and long-range navigational dredging and disposal plans. The plan for state-owned coastal wetlands was drafted in 1994 and approved in 1997 (Texas Parks and Wildlife, 1997).

In addition to these overarching tools and strategies, a number of effective tools and strategies exist or are under development in the Galveston Bay watersheds to address the stressors discussed in the section above.

<sup>4</sup> For more information, see [http://www.tceq.texas.gov/nav/permits/water\\_qual.html](http://www.tceq.texas.gov/nav/permits/water_qual.html).

### Tools to address coastal development.

- **Compensatory mitigation for wetland impacts.** In order to receive a CWA Section 404 permit, developers and other applicants must compensate as appropriate and practicable for jurisdictional wetland loss that cannot be avoided. Compensatory mitigation in Texas, as required under the Army Corps CWA Section 404 program and TCEQ's CWA Section 401 certification program, is determined based on functional assessments or ratios as appropriate. Compensatory mitigation may occur through permittee-responsible on-site or off-site mitigation, mitigation banks, or in-lieu fee programs. For example, the Texas Department of Transportation (TxDOT) developed three wetland mitigation banks—the Anderson Tract with 2,243 acres, the Coastal Bottomlands Bank with 3,552 acres, and the Blue Elbow Swamp with 3,343 acres—in order to increase efficiency, to create long term ecological stability, and to site mitigation projects in high quality areas (FHWA, 2011).
- **Watershed plans.** Participants were enthusiastic about the potential to use watershed plans as a strategic tool for prioritizing problems and developing solutions to watershed-scale stressors. Participants particularly focused on the fact that these plans can serve to identify the location and type of projects that should be prioritized when there is a need for a compensatory wetland mitigation project within a given watershed. Watershed plans can be carefully designed to ensure that mitigation actions will address stressors that are currently degrading the aquatic resource and will sustain or improve the condition of aquatic resources in the watershed. Several participants were surprised and interested to learn that, according to the federal Compensatory Mitigation Rule (*Federal Register* Vol. 73, No. 70, April 10, 2008), watershed plans, where available, are to be considered as a factor in the Army Corps' mitigation decisions (once deemed appropriate by the Army Corps' District Engineer). They indicated that additional watershed plans should be developed to help guide mitigation decisions and noted that the Watershed Resources Assessment Team, a multi-agency state-federal partnership, may be able to help provide baseline information to inform watershed plan development. In the absence of a watershed plan, the Rule states that a watershed-based approach should still be used to determine appropriate compensatory mitigation for wetland impacts.

### Highlight: Accomplishments of the Galveston Bay Estuary Program, 1995–2012

The Galveston Bay Estuary Program has made significant progress in improving water quality, restoring wetlands, protecting unique habitats, and educating the public. Those achievements included:

- Restoring and protecting approximately 20,615 acres of wetlands and coastal habitats.
- Using dredged material to restore more than 2,500 acres of wetlands and coastal habitats.
- Cultivating up to a half million wetland plants annually for wetlands restoration projects.
- Forming the Galveston Bay Freshwater Inflows Group to develop management strategies to balance the multiple uses of the estuary, the Invasive Species Work Group to help manage invasive species management in the Bay, and the West Bay Initiative to target conservation opportunities in the West Bay Watershed.
- Implementing BMPs for conservation landscaping, vegetative buffers, and stormwater management, and conducting workshops with local governments and developers on sustainable development practices.
- Conducting over 350 presentations and exhibits for schools, local community events, and workshops and conferences, reaching nearly 25,000 adults and students since 1995.
- Dedicating \$10 million to resource conservation and education projects, leveraging an estimated \$82 million.

- » **Comprehensive Conservation and Management Plans.** One of the most significant watershed management plans for the area is the Galveston Bay Estuary Program's CCMP. The Galveston Bay Estuary Program, part of EPA's National Estuary Program, is implementing their CCMP, which guides the conservation and restoration of the estuary based on scientific research. The CCMP contains actions to acquire, manage, and protect wetlands, calling for improved coordination among the agencies involved in their management. It also includes measures to halt declines in coastal habitat quantity and quality, maximizing beneficial uses of dredged materials. In addition to and in support of the CCMP, the Galveston Bay Estuary Program, in

cooperation with TCEQ and the Houston Advanced Research Center, is undertaking a number of important initiatives to monitor, assess, and improve the health of the estuarine system, including publication of the “State of the Bay” report and a “Status and Trends” report, which included a number of indicators of the Bay’s overall health.<sup>5</sup>

- » **The Armand Bayou and Dickinson Bayou watershed plans.** The Armand Bayou Watershed Working Group, which was organized by the Texas Coastal Watershed Program in partnership with private organizations and the Texas Sea Grant program, was responsible for developing the Armand Bayou watershed plan. The plan examines the current state of the watershed, current management programs, and tools and strategies used to improve the ecological health of the watershed, including identification of habitat that could be designated as mitigation areas.
- **Total Maximum Daily Loads.** The CWA requires states to identify any waterbody that does not meet the water quality standards necessary to support its designated uses, and to create Total Maximum Daily Loads (TMDLs) for these waters. A TMDL is a calculation of the total amount of pollutant a waterbody can receive while still meeting water quality standards for the designated use of that waterbody, and how this budget will be divided between point and nonpoint sources. A state develops an implementation plan with strategies to meet the TMDL goal, which consists of both regulatory and non-regulatory programs. In 2009, TCEQ created fecal coliform TMDLs to meet water quality standards (for oyster water use) in six sub-bays of Galveston Bay. Fecal coliform, a type of bacteria, is an indicator of human and animal waste that can enter the Bay via wastewater discharges, stormwater runoff from urban areas, and other sources. TCEQ and the Galveston Bay Foundation have created a working group that develops and implements reduction measures such as public education campaigns, wastewater treatment facility improvements, and bans on boat discharges into the bay (Galveston Bay Foundation, 2012). This implementation plan contains strategies to minimize the impact that developed area has on surrounding resources.
- **Property buyouts.** Buyout programs are administered by the Federal Emergency Management Agency (FEMA) and funded by five different Hazard Mitigation Assistance Programs. Buyouts permanently keep land from redevelopment; land that is purchased with grant funds must remain as open space, recreational space, or managed wetlands. The Federal Hazard Mitigation Grant Program has a buyout program for municipalities, triggered by events such as natural disasters. Using FEMA funding, the Harris County Flood Control District implements buyouts for flood damage reduction programs (HCFCD, n.d.[b]). In 2009, Galveston County offered a property buyout and elevation program to specific flood-prone unincorporated areas in connection with Hurricane Ike. More than 700 parcels of land were bought out for more than \$70 million through this grant program (T. Leugemors, personal communication, Beck Disaster Recovery, Inc., 2011).

### Tools to address the limitations of regulations.

- **Research associated with federal jurisdiction.** Some recent research in Texas has been directed toward identifying hydrologic connections between geographically isolated wetlands and navigable or interstate waters (Forbes et al., 2010; Wilcox et al., 2011). Participants felt that these types of studies can provide a scientific basis for establishing federal protection for some “isolated” wetlands whose jurisdictional status was made uncertain by Supreme Court decisions.
- **Land management and conservation programs.** Some participants stated that existing regulations alone are insufficient to protect wetlands and that wetland acquisition and conservation programs are essential to slow coastal wetland loss. Land conservation was cited as one of the most effective strategies for protecting coastal wetlands in Texas. Special valuations, conservation easements, and the work of land trusts are all examples of programs designed to achieve this type of protection. Special valuation allows for landowners to pay property taxes based on significantly below market values. Texas offers special valuations for agricultural and open space lands, which can give landowners an incentive to maintain wetlands and other open areas rather than developing them (Dudensing and Jones, 2010).
  - » **Wetlands Reserve Program.** NRCS administers conservation easement programs and works with individual landowners and governing bodies, including the Farm and Ranch Lands Protection Program, the Grassland Reserve Program (GRP), and the Wetlands Reserve Program (WRP). These programs provide assistance for enhancing, creating, or maintaining wetlands,

<sup>5</sup> For more information, see <http://www.gbep.state.tx.us>.

riparian areas, and adjacent areas. The WRP is attractive to landowners along the upper Texas Coast because the program offers meaningful incentives and additional funds for wetland enhancements. In the Galveston Bay area, NRCS will pay up to \$2,000 per acre for a perpetual easement in GRP. Lifetime easements and enhancements offer larger financial reimbursements than shorter easements.

- » The bottomland hardwood forests of the upper Texas coast, known as the Columbia Bottomlands, occupy 72,000 hectares and provide critical stopover habitat for approximately 29 million migrant birds. A portion of the bottomlands has been protected through a land acquisition and conservation program administered by the USFWS, state agencies, and non-governmental partners. The Columbia Bottomlands Conservation Plan emphasizes cooperation with local conservation partners to promote private conservation efforts (Rosen et al., 2008). NRCS designated funds for the protection of the property with a conservation easement through the WRP (The Conservation Fund, 2012).
- » **Land use planning.** Land use planning can be used to proactively address coastal wetland conservation. It facilitates the identification of high-value wetlands and priority areas for protection. Review participants noted that widespread land use planning will require more broad-based public and political support than currently exists in Texas, where limited land use regulation and private property rights are highly valued.

Although this tool is not often used in Texas, some Texas cities could serve as models for planning in the Galveston Bay area. For example, Denton has specific rules protecting environmentally sensitive areas, including riparian areas. Austin has the Balcones Canyonlands Preserve, created as a community-based solution to protect habitat of endangered species threatened by a planned development in western Travis County (USFWS, 1996). And, though it is not strictly a land use plan, the Chambers County Greenprint Plan is a proactive attempt for the county (which is located in Galveston Bay) to establish conservation goals, while still promoting community development. This plan includes several maps related to land conservation priorities that recognize the importance of preserving coastal wetlands and their functions for

both the ecosystem's health and the county's economy (The Trust for Public Land, 2009).

- » **Eco-Logical habitat map.** The Houston-Galveston Area Council and Texas Sea Grant created an online interactive tool, based on a Federal Highway Administration project that provides ecosystem information for proposed transportation projects. The tool can identify quality habitat areas greater than 100 acres in size, which is useful for identifying areas of environmental concern and potential conflict during the transportation planning process.<sup>6</sup> One participant noted that it could also be useful for identifying high-quality mitigation sites.
- » **Conservation organizations.** Local land trusts and conservation organizations also contribute significantly to wetlands conservation through easements. The Bayou Land Conservancy has protected 188 acres of wetlands in its 544 acres of preserves and easements in the study watersheds. Similarly, the Galveston Bay Foundation holds conservation easements in the watershed, in addition to 3,000 acres of land that it owns outright.<sup>7</sup>
- » **Conservation grants.** There are a variety of opportunities to apply for conservation grants, including funds to protect wetlands, through various state and federal agencies. Some non-governmental organizations (NGOs) also provide funding streams through grants. Some conservation grants available for wetland conservation include:
  - The Coastal and Estuarine Land Conservation Program, administered by NOAA and the Texas GLO, offers funding for up to three projects per year at a maximum of \$3 million per project. This funding is available to state and local governments to acquire coastal and estuarine lands considered important for their ecological, conservation, recreational, historical, or aesthetic value. Lands and conservation easements acquired with the program's funds are protected in perpetuity.<sup>8</sup>
  - National Coastal Wetland Grant Program, administered by USFWS, offers funding to support state-led wetland conservation and restoration projects. Texas Parks and Wildlife Department and the Texas GLO have engaged multiple local partners to

<sup>6</sup> For more information, see <http://www.h-gac.com/go/eco-logical>.

<sup>7</sup> For more information, see [http://www.galvbay.org/conservation\\_landtrust.html](http://www.galvbay.org/conservation_landtrust.html).

<sup>8</sup> For more information, see <http://coastalmanagement.noaa.gov/land>.



receive funding for a substantial number of projects in Galveston Bay that have received regional and national recognition.

- The Coastal Erosion Planning and Response Act (CEPRA) program, administered by the Texas GLO, implements coastal erosion projects and studies to reduce the effects of and understand coastal erosion processes. When funding is appropriated, the CEPRA program provides funding on a biannual basis toward projects such as dune restorations, habitat protection, and beneficial uses of dredged materials for habitat restoration. Since 2000, CEPRA has received \$62 million in state funding and another \$62 million in matching funds to implement more than 200 coastal erosion projects.<sup>9</sup>
- The Coastal Impact Assistance Program (CIAP) is a federal program funded through royalties collected from offshore oil and gas leases. CIAP funds are specifically made available to areas that have been impacted by offshore exploration and development. Projects for the conservation, protection, or restoration of coastal areas, including wetlands, are one category of activities funded by CIAP in Texas. In 2010, the state received an allocation of \$35 million.<sup>10</sup>

» **Rolling easements.** Rolling easements, where land ownership boundaries migrate inland in response to natural events such as sea level rise, are a tool for protecting coastal wetlands. These easements ensure that beaches and vegetated dunes remain in public ownership, protect them from private development, and offer wetlands the opportunity to migrate inland with changing shorelines. The authority to implement rolling easements in Texas dates back to passage of the Texas Open Beaches Act (TOBA) in 1959. The Act was derived from common law “which recognized that Gulf beaches have been used by the public since ‘time immemorial’ and that barrier islands are constantly shifting” (Jacob and Showalter, 2007). TOBA requires maintenance of a rolling easement along Galveston Bay (and along most of the Texas Gulf shoreline) to protect public access to state-owned beaches. The state of Texas owns the shoreline that lies below mean high

tide, which includes the intertidal zone and the beaches that lie therein. TOBA prohibits construction of any structures on private property that would interfere with the normal coastal shoreline’s dynamic processes and would therefore impede public access should the beach shift inland. This restriction applies to buildings, which means that businesses and residences need to be removed or relocated if the shoreline changes to the extent that those buildings become an impediment to public access to the beach. The Texas courts and government are currently revising and refining how rolling easements apply to the coast (Titus, 2011).

### Tools to address impacts of hydrologic modifications.

- **Beneficial use of dredged materials.** Sediment that is dredged from waterways within the watershed, such as from the Houston Ship Channel, can be used for coastal marsh restoration and creation projects (Figure 12). The Beneficial Use Group, formed in the early 1990s by the Army Corps, evaluates the possible beneficial uses of dredged material from Houston-Galveston Bay. Though dredged material from the Houston Ship Channel has been used for marsh restoration, review participants noted that there are additional opportunities to use sediments from around the Bay for more widespread coastal



**Figure 12.** Dredged material was used to restore Goat Island, seen here in an intermediate stage of restoration. *Photo courtesy of Beneficial Use Group.*

<sup>9</sup> For more information, see <http://www.glo.texas.gov/what-we-do/caring-for-the-coast/coastal-erosion/index.html> and <http://www.glo.texas.gov/what-we-do/caring-for-the-coast/grants-funding/index.html>.

<sup>10</sup> For more information, see <http://www.glo.texas.gov/what-we-do/caring-for-the-coast/grants-funding/ciap/index.html>.

wetlands restoration projects. Since 1995, navigational dredge material has been used to restore over 2,000 acres of wetlands and 500 acres of seagrass (GBEP, 2009, as cited in Lester and Gonzalez, 2011). As a result of the discharge of sediments on seagrass beds in West Bay in December 2011 and January 2012 and subsequent comments about this practice from recreational fishermen, the Galveston Bay Foundation, and state and local resource agencies, the Army Corps Galveston District is forming an interagency coordination team to better assess and review dredged material management before projects are initiated.

- **Regional sediment management plans.** The Gulf of Mexico Foundation (GMF) and Gulf of Mexico Alliance (GOMA) Habitat Conservation and Restoration Team have completed a draft of the first regional sediment management plan for West Galveston Bay. The plan includes information on sediment sources and how sediment moves through the system, and 24 regional sediment management recommendations that would support sustainable restoration projects. The draft plan is currently under review and will be finalized in 2012.
- **Flow standards.** Minimum flow standards can help prevent water diversions from resulting in coastal wetland loss. TCEQ adopted environmental flow standards for Galveston Bay in April 2011 (TCEQ, 2011b). These standards outline minimum outflow levels for the San Jacinto and Trinity rivers. The Galveston Bay Foundation is concerned, however, that the new standards are not protective enough and create a stress on the estuarine ecosystem by limiting the freshwater flow into the Bay to levels that are too low for oysters and other organisms. They believe standards should allow for greater freshwater influx, should include standards for the other tributaries—which make up 18 percent of flows into the



**Figure 13.** Designed to reduce the risk of flooding, the Brays Bayou Flood Damage Reduction Project includes wetland creation to collect stormwater and improve water quality. *Photo courtesy of HCFCD.*

Bay—and should account for seasonal flow requirements (Galveston Bay Foundation, n.d.[a]).

- **Use of wetlands for stormwater management and flood damage prevention.** The Harris County Flood Control District (HCFCD) uses constructed wetlands to filter stormwater runoff and to provide flood control value within watersheds. HCFCD's Greens Bayou Wetland Mitigation Bank is a 1,400-acre wetland site that combines wetland creation and natural stormwater runoff treatment (HCFCD, 2010b). Additionally, the Army Corps is partnering with the HCFCD on Project Brays, a major flood damage reduction project (Figure 13). This project will use marsh creation as one strategy to reduce the risks associated with flooding in this heavily urbanized watershed (HCFCD, 2010a).
- **Subsidence districts.** The establishment of the Harris Galveston Subsidence District in 1975 restricted the rates of groundwater pumping in Harris and Chambers Counties. The goal of the district is to ensure that withdrawals do not exceed recharge rates. This district could be a model for other coastal areas with subsidence impacts.

#### Tools to address climate change and sea level rise.

- **Living shorelines.** This management practice addresses shoreline erosion through the strategic placement of vegetation, stone, sand, and other structural and organic materials along the shore, creating a natural buffer that can help protect coastal development from flooding



**Figure 14.** Galveston Island living shoreline. *Source: Galveston Bay Foundation, n.d.(b).*



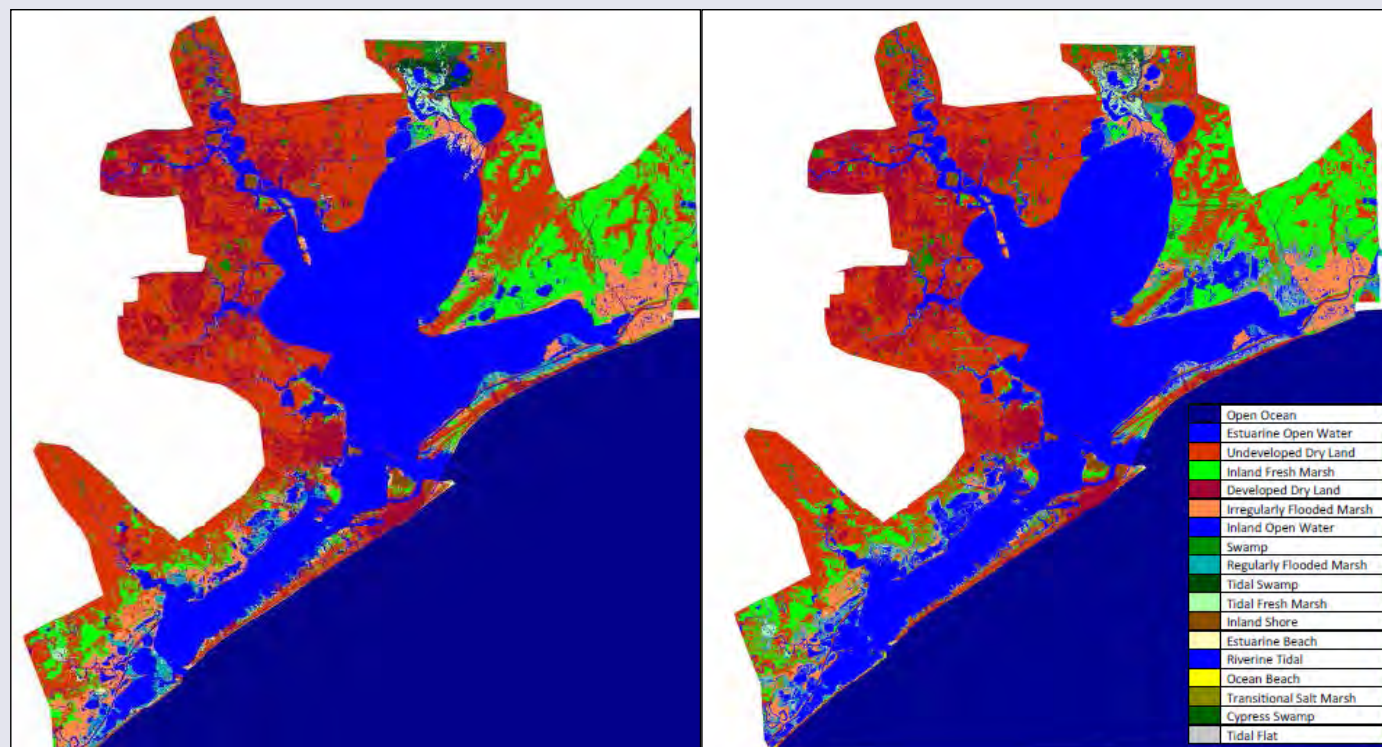


Figure 15. SLAMM for Galveston Bay. Initial conditions in 2004 (left) and under the 1 meter rise by 2100 scenario. Source: Warren Pinnacle Consulting, Inc., 2011a.

due to sea level rise (Figure 14). Living shorelines are a specific type of green infrastructure; they are considered to be a viable alternative to traditional shoreline stabilization techniques, which employ engineered structures such as seawalls, groins, and bulkheads. Participants indicated that incentives are needed to make green infrastructure and planning a priority. According to some participants, the use of living shorelines is not a common practice in Galveston Bay. Developers and their engineers have yet to embrace this design change, since they are familiar with more traditional shoreline armoring methods.

- **Modeling and habitat studies.** In 2010 and 2011, The Nature Conservancy and Warren Pinnacle Consulting, Inc., applied the Sea Level Affecting Marshes Model 6 (SLAMM) to assess the impacts of sea level rise on the marshes and other coastal habitats in Galveston Bay. Maps produced by the assessment show the effects predicted from specific sea level rise projections (see Figure 15). For example, the models predict a 67 percent loss of brackish (irregularly flooded) marsh area and an 84 percent loss of tidal swamp area under a projected 1 meter of sea level rise by 2100.<sup>11</sup> The data and maps produced by this SLAMM assessment can be used as a tool

to inform managers of where sea level rise is expected to have particular effects on coastal marshes and improve decision-making (Warren Pinnacle Consulting Inc., 2011a). In addition, a study has been proposed that will complement the Galveston Bay Estuary Program’s Status and Trends Report on wetlands by examining wetlands habitat changes from 1989 (published in a 1993 study) through 2009 using SLAMM outputs. The study will have a 50-year outlook.

#### Other tools to address coastal wetlands stressors.

- **Ecosystem services valuation.** The GMF/GOMA habitat team commissioned the Harte Research Institute (HRI) to conduct an analysis of how ecosystem services from marshes in Galveston Bay might be affected by sea level rise. The project will use the outputs from the SLAMM modeling project assessing sea level rise impacts to Galveston Bay marshes.
- **Revised shoreline classifications.** Texas GLO funded Texas A&M University and the HRI to work on a shoreline-mapping project of the upper Texas coast. The project will provide up-to-date, shoreline type classifications in the Environmental Sensitivity Index (ESI) ranking system, improving the accuracy and resolution

<sup>11</sup> 1-meter scenario was selected based on recommendation of a SLAMM model contact who believed this was a likely scenario for the watershed.

of the ESI data in the Texas GLO Oil Spill Planning and Response Atlas. The up-to-date shoreline classifications may also be used for shoreline change analysis and can be a tool for identifying changes in coastal wetland habitats, areas where erosion may be increasing, and areas that might be at greatest risk from sea level rise.

### What's Needed? What's Missing?

Despite the array of tools and strategies for addressing stressors to coastal wetlands in the East and West Galveston Bay watersheds, participants identified several gaps in resources and programs, both regulatory and non-regulatory. They expressed the need to address these gaps to enable more effective application of tools and strategies to protect and restore the watersheds' wetlands.

#### Improve planning to control impacts of coastal development.

- **Land use planning.** Participants noted that the Galveston Bay watersheds lack an overarching policy for managing natural resources in light of expected population growth and development, and that a comprehensive strategy is needed to successfully address growth-related impacts. Review participants felt that land use plans could better guide development to minimize impacts on wetlands. In particular, land use planning at the watershed scale would most benefit wetland protection. Mechanisms to support such development and implementation of plans are lacking.
- **Local and county involvement in wetland protection.** Participants noted the importance of conserving and/or protecting depressional wetlands and suggested that municipalities and counties could play a role in regulating these wetlands. For instance, local authorities could ensure that CWA Section 404 permits are received, as needed, before local building permits are issued or to place restrictions on activities in buffer areas around wetlands.
- **Green infrastructure.** Review participants noted the need for better tools to encourage the use of green infrastructure, which can provide shoreline protection while minimizing impacts on adjacent habitats. As noted in the "Tools and Strategies" section, the development community is not very familiar with living shorelines methods. Examples and visual demonstrations would raise awareness in the development community and encourage these practices.

- **Nonpoint Source Pollution Control Program.** The Texas State Soil and Water Conservation Board administers the Texas Coastal Nonpoint Source Pollution Control Program. Like other Gulf of Mexico states, though, Texas has not received full approval from NOAA and EPA for its program.

#### Strengthen wetland regulatory programs.

- **Enforcement.** Review participants mentioned the need for the following additional tools to strengthen enforcement of wetlands protection regulations:
  - » Press coverage on wetland enforcement cases to increase the effectiveness of enforcement as a deterrence mechanism and thereby reduce illegal wetland fill activities.
  - » While it is not a replacement for on-site investigations, increased use of available aerial photography may enhance enforcement by detecting changes in wetlands that may not easily be accessed from the ground.
  - » Expansion of the use of field-level agreements, such as those between TxDOT, EPA, and the Army Corps, to improve efficiency of enforcement activities and to include local and state agencies as well. Pursuant to a 1989 Memorandum of Agreement between EPA and the Army Corps, the two agencies share the responsibility for enforcement of the CWA Section 404 program, and the EPA takes the lead on particular unauthorized activities, such as those that are completed by knowing, willful, and flagrant violators.
- **Clarifying CWA jurisdiction.** Participants noted a lack of on-the-ground field staff to verify the jurisdictional status of wetlands on a case-by-case basis. Studies of hydrologic connectivity of so-called isolated depressional wetlands can be used to aid jurisdictional determinations, and could possibly result in more positive jurisdictional determinations and protection of depressional wetlands. While some hydrologic studies already exist, participants noted that additional studies are needed to clarify the hydrologic connectivity of geographically isolated wetlands, and better inform jurisdictional determinations.
- **Increasing compliance.** Participants thought that project proponents that received local and/or county building permits, but failed to file for wetland permits, have filled jurisdictional wetlands without authorization. Increased education of landowners and those issuing the building permits could improve compliance with federal wetland regulations.



- **Increased transparency of CWA Section 404 permitting.** According to participants, it is currently difficult for those outside the permitting process to get information about CWA Section 404 permits and compensatory mitigation. State and local managers believe this information would allow them to more effectively track and document wetlands acreage loss and causes of the loss, as well as increase public participation. Although there is a public notice process during the development of all general permits and during the evaluation of each standard individual permit application, participants noted that a Freedom of Information Act request is needed to obtain detailed information on permit analysis (such as hydrologic calculations), statements of findings, and final permit conditions. Participants also believed that determinations regarding cumulative impacts of multiple permit actions are not transparent and that increased transparency and information availability could lead to better tracking of wetland loss, increased compliance, and targeted enforcement.

A national-level spatial database, ORM2, has been used by all Army Corps Districts since July 2007. Districts had various degrees of success in converting pre-2007 data from many legacy systems; the Corps continues to refine the granularity and accuracy of the impact and mitigation data and has made significant advances since June 2009. Review participants suggested that all pertinent agencies—such as the Army Corps, EPA, and USFWS—should share one Section 404 permit tracking database, which should provide for applications to be submitted online and made publically accessible. They also suggested a mechanism for spatial tracking and assessment of permits (via GIS-based software) as part of this centralized system.

It was noted that the Army Corps' new Regulatory In Lieu Fee and Bank Information Tracking System (RIBITS),<sup>12</sup> provides improved transparency for mitigation by allowing public access to information on mitigation banking and in-lieu fee programs across the country. Further, the Corps and USFWS signed an interagency agreement on the use of RIBITS in August 2010, and under this agreement, RIBITS has been modified to also include information on FWS conservation banking activities.

- **Permit coordination.** Participants expressed a desire for more coordination between agencies participating in the permitting process. Previously, the Texas Coastal

Coordination Council had established a Permit Service Center and, through a pilot program, offered applicants the opportunity to take advantage of a joint permitting process, where a coordinated permit application could be submitted for a combination of state and federal wetlands permits. Permits eligible for the joint process were: TCEQ Section 401 certifications, Army Corps CWA Section 404 permits, and permits issued by the Texas Parks and Wildlife Department. The purpose of the joint permit application process was to better streamline and coordinate the wetland permitting process. The Coastal Coordination Council was phased out on August 30, 2011, and its powers were transferred to the Texas GLO and TCEQ. Regardless of whether this pilot program continues, participants suggested that before the issuance of local construction permits, applicants should be required to show they have consulted with the Army Corps to determine whether a CWA Section 404 permit is required.

- **Compensatory mitigation.** Review participants noted that the Compensatory Mitigation Rule (see Appendix C) establishes a preference for mitigation projects that focus on wetland restoration rather than preservation. However, they expressed a desire for more preservation of existing freshwater wetlands in circumstances where preservation may be preferred to restoration, such as when encroachment is likely to occur on high-quality wetlands or when the wetland function may be particularly difficult to restore (e.g., forested wetlands).

Participants expressed concern about mitigation occurring out-of-area and out-of-kind (i.e., a different type of wetland than the one impacted), and thought that strategic regional mitigation planning would maximize the effectiveness of mitigation by expediting the construction process and strengthening the quality of mitigation projects. The Galveston District and the Interagency Review Team are reviewing two mitigation banks that are proposed to provide compensatory mitigation credits for authorized losses of waters in this watershed and a watershed approach will be incorporated into the development of those banking instruments.

- **State programs.** Noting that current federal laws do not protect isolated wetlands, some participants felt this gap could be filled by adopting state wetland protection regulations, or by implementing incentive programs to encourage the avoidance of isolated wetlands. Some

<sup>12</sup> For more information, see [https://rsgis.crrel.usace.army.mil/rubits/f?p=107:2:3644572573481910::NO:RP:P27\\_BUTTON\\_KEY:9](https://rsgis.crrel.usace.army.mil/rubits/f?p=107:2:3644572573481910::NO:RP:P27_BUTTON_KEY:9).

participants also noted a need for TCEQ to implement a more rigorous CWA Section 401 certification process. This could include the development of stricter water quality standards, which could give the state a stronger basis on which to review and approve, condition, or deny federal permits that result in a discharge to state waters, including wetlands.

- **Cumulative impacts.** Participants suggested that the CWA Section 404 permit process could benefit from increased permit data availability and increased time for permit review in order to better address cumulative impacts. The Army Corps, however, indicated that cumulative effects are appropriately evaluated pursuant to the National Environmental Policy Act under the current permit process.

### Provide additional funding and collaboration for wetland programs (regulatory and non-regulatory).

- **Lack of funding.** Participants noted the lack of resources (both funding and staff) to adequately administer and enforce wetland laws, implement and fund more wetland restoration programs, and provide education and technical assistance to raise awareness and support for wetlands protection. An increase in CWA Section 401 certification fees would make more dedicated funds available to support coastal wetland restoration and protection activities; however, state legislation would be necessary to change the fee structure.
  - » **Conservation funding.** There is no state funding specifically and solely for conservation of coastal wetlands. Review participants noted that the current state legislature has shown little interest in supporting conservation despite public interest. Dedicated state funding for wetland conservation would allow Texas to compete more effectively for federal funds by providing non-federal match.
  - » **Flood control coordination.** Participants commented that flood control districts currently have limited authority to prevent hydrologic alterations that affect coastal wetlands. Cities have planning and zoning authority but are not required to comply with district plans (for example, League City allows development in the floodway and is not obligated to consider the Harris County Flood Control District plans). Participants felt that state funding should be tied to requirements that cities comply with flood control district plans. However, some participants noted that flood control districts can also cause hydrologic alterations that

negatively impact wetlands and suggested that municipal floodplain administrators could be better informed about the coastal wetland impacts of specific hydro-modification projects through more frequent interaction with wetland managers.

- » **NGO and government cooperation.** Review participants mentioned that the Houston area does not have enough engagement and cooperation between government agencies and NGOs, and that competition for funding between agencies and NGOs, rather than cooperation, can be problematic.

### Develop tools for climate change and sea level rise.

- **Sea level rise tools.** Participants mentioned a need to develop better tools to translate scientific knowledge regarding wetland loss (both area and function) to decision-makers and resource managers. Visualization and mapping tools that show expected sea level rise levels would be valuable. Active training about how to use available tools is also needed. In terms of regulation, some participants recommended revising the CWA Section 404 program to require consideration of the effects of sea level rise on coastal wetlands when evaluating permit applications. The Compensatory Mitigation Rule (*Federal Register* Vol. 73, No. 70, April 10, 2008) recognizes the importance of considering sea level rise when siting and designing mitigation projects. This would be of significance to the entire nation, but especially the Gulf coast.

### Other gaps and needs to address multiple wetland stressors.

- **Wetland mapping.** The National Wetland Inventory (NWI) is a web-based tool that the public can use to obtain information on wetland locations. Review participants mentioned that the NWI GIS database is a valuable tool, but has limitations such as the coarse scale of available imagery, difficulty detecting some wetland types, and the possibility that some imagery is out of date. To help address these limitations, users can cross-reference NWI data with other information, such as the NOAA C-CAP data, USDA soil surveys, and local wetland mapping data (if available). For the purposes of jurisdictional determinations under CWA Section 404, the Army Corps has the legal authority to verify wetland delineations and finalize wetland determinations.
- **Beneficial use of sediment.** There are regulatory barriers to beneficial use of dredged material; requirements

to dispose of material in the least costly manner (the federal standard for determining disposal options) do not account for environmental costs and benefits. The Gulf Coast Ecosystem Restoration Task Force has identified this issue in its Gulf Coast Ecosystem Restoration Strategy (EPA, 2011) and the Gulf of Mexico Alliance has also identified beneficial reuse as a priority (Gulf of Mexico Alliance, 2010).

- **Monitoring.** Review participants mentioned that expanded wetlands monitoring is a tool that can be used to better evaluate wetland function at mitigation and restoration sites. For example, participants suggested WRP sites could be monitored on a longer-term basis to identify changes in function. It was also suggested that third party monitoring by certified experts could bolster local, state, or federal agency monitoring.
- **Ecosystem valuation information.** Review participants indicated that effectively communicating quantifiable information related to the economic value of services that are provided by natural systems would allow decision-makers to make more informed choices and examine trade-offs of development or other projects. For example, quantifying the lost benefits associated with channelizing streams in terms of impacts on fish and wildlife habitat—and the subsequent diminution of recreational, aesthetic, and commercial values—could serve to demonstrate that wetlands are vital economic resources (Engle, 2011).
- **Education and incentives.** Review participants felt there is a need for more educational programs that focus on state and local decision-makers and property owners, since public education and outreach currently tends to focus solely on students in K-12 schools. In addition, there is a need to provide incentives, such as tax breaks, for private landowners in order to increase the likelihood that wetlands are preserved.
- **Habitat assessment gaps.** It is difficult to determine the functions and services of wetlands, particularly in urban watersheds. Participants believed there is a need for more guidance regarding what wildlife and habitat characteristics should be assessed, particularly in heavily developed watersheds. There is a nationwide tool that assesses the threat to fish habitat nationwide, compiled through the National Fish Habitat Action Plan<sup>13</sup> that may provide helpful data. EPA also conducts a national coastal condition report, including coastal wetlands, which could be helpful.<sup>14</sup>

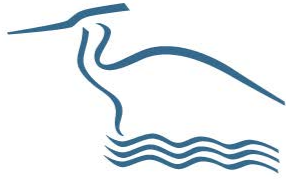
<sup>13</sup> For more information, see <http://www.fishhabitat.org>.

<sup>14</sup> For more information, see <http://water.epa.gov/type/oceb/assessmonitor/nccr/index.cfm>.

Attachment E







# GALVESTON BAY FOUNDATION

## Letter of Intent to hold Conservation Easement

Chocolate Bay Conservation Holdings, LLC  
c/o Brian Normanly,  
Eco-Capital Advisors, LLC  
3414 Peachtree Road NE, Suite 990,  
Atlanta, GA 30326

*Re: Frentress-Johnson West Bay Mitigation Bank*

Mr. Normanly:

Galveston Bay Foundation, Inc (“GBF”), a 501(c)(3) non-profit corporation organized under the laws of the State of Texas located at 1100 Hercules, Suite 200, Houston, TX 77058, intends to work with **Chocolate Bay Conservation Holdings, LLC**, an entity with a principal address located at 3414 Peachtree Road NE, Suite 990, Atlanta, GA 30326, in the establishment of the Frentress-Johnson West Bay Mitigation Bank. GBF intends to establish, hold, and steward a perpetual conservation easement on the subject property and provide third-party protections against land uses that are incompatible with the Mitigation Banking Instrument and conservation values listed in the Conservation Easement.

Galveston Bay Foundation, an Accredited Land Trust established in 1987, has perpetually conserved more than 8,000 acres in the Galveston Bay watershed. The Frentress-Johnson West Bay Mitigation Bank proposes to restore, enhance, and/or conserve coastal wetland habitats on important parcels of land located in Brazoria County, South of Alvin, TX and East of Freeport, TX. Habitat conservation efforts associated with this project will provide ecosystem services for the West Galveston Bay estuarine system and perpetual conservation of this land parcel will help promote GBF’s mission to preserve and enhance Galveston Bay and its watershed.

Due diligence for this project will include:

- **Baseline Inventory:** **Frentress-Johnson West Bay Mitigation Bank** will provide funding for GBF to draft a report of current conditions of the subject property. This report will describe conservation values found within, significant ecological features, wildlife habitats, plant communities, and any other information relevant to long-term protection of this property. Alternatively, **Frentress-Johnson West Bay Mitigation Bank** will provide GBF with an acceptable report to utilize as the baseline inventory.
- **Boundary Survey:** **Frentress-Johnson West Bay Mitigation Bank** will provide an acceptable property boundary survey at its cost, which will be used to determine the total

acreage, provide a legal description, and identify any existing features such as existing structures, fences, roads, and easements. (This has already been provided).

- **Legal Review & Property Inspection:** Prior to closing, sufficient time will be allowed for legal review of due diligence, title and existing encumbrances, and physical inspection of the subject property.
- **Approval:** The completion of the Conservation Easement is subject to approval of GBF's Board of Directors.

We are aware that this letter serves as an expression of intent and not a contractual obligation and either party may discontinue project involvement at any stage of the process.

Sincerely,



Bob Stokes, President  
Galveston Bay Foundation, Inc.



Attachment F



**Texas Parks and Wildlife Foundation**

**Managing Stewardship Endowments for Perpetual Conservation Purposes**



[tpwf.org](http://tpwf.org)

**Texas Parks and Wildlife Foundation  
2914 Swiss Avenue  
Dallas, Texas 75204**



## **Overview**

Texas Parks and Wildlife Foundation (TPWF) is a nonprofit organization qualified under the 501(c)3 of the Internal Revenue Code whose mission is to provide private support to Texas Parks and Wildlife Department to ensure that all Texans, today and in the future, can enjoy the wild things and wild places of Texas.

Since inception in 1991, TPWF has raised over \$170 million from foundations, corporations and individuals for high-impact, meaningful projects supported by sound science that include critical habitat restoration, support for native species and strategic land acquisition. TPWF leverages private philanthropy with dedicated public funding to magnify outcomes.

## **Land Conservation Expertise**

Since its founding, TPWF has conserved more than 170,000 acres of land in Texas to increase recreational opportunities and enhance native wildlife habitat. In the past five years, TPWF, along with private, state and federal funding, has enabled \$75 million in new land conservation projects in Texas. Today, the TPWF land conservation team of three professionals actively manages more than 21,000 acres of coastal prairie, cross-timbers and rolling plains habitat. TPWF is currently restoring 8,000 acres and increasing biological diversity with funding assistance from federal grant programs that have provided more than \$1 million in direct funding since 2014.

## **A Partner in Conservation**

In addition to providing direct financial and human capital assistance to Texas Parks and Wildlife Department, TPWF frequently supports conservation partners across the state. Since 2014, TPWF has granted over \$1.5 million to research institutions and nonprofit organizations to advance aligned conservation priorities. This history of collaboration has positioned TPWF as a trusted partner with an extensive network and knowledge of conservation best practices.

## **Endowment Fund Management**

TPWF works to ensure that Texas' rich natural resources and wildlife persist for future generations. This long-term commitment and stewardship ethic is a key distinction and qualification for TPWF to manage endowments that cover the perpetual costs of improving, conserving and protecting property that benefit endangered and at-risk species or wetland habitat in Texas.

Endowments for conservation and wetland banks require careful investment management and oversight to successfully meet their obligations. The endowment principal must be invested to generate earnings and increase in value in order to provide adequate funding for annual maintenance costs and to ensure that its real purchasing power does not decline over time due to inflation.

As Endowment Fund Manager, TPWF works closely with Bank Sponsors to understand the financial assumptions driving the calculated endowment amount. However, TPWF relies on US Army Corps of Engineers (USACE) and US Fish and Wildlife Service (USFWS) approval and the accuracy and validity of the species or land management plans and funding addressed in the Mitigation or Species Conservation Bank Instrument without independent verification.

TPWF's investments, which include, but are not limited to, endowments received for conservation stewardship purposes, are overseen by its Board of Directors through a Finance Committee comprised of professionals with business and investment experience. The Finance Committee establishes TPWF's Investment Policy, which sets the strategic asset allocation and performance objectives.

TPWF manages mitigation endowments in its Long-Term Investment Portfolio (see attached TPWF Investment Policy Statement for detail).

Northern Trust, a leading provider of asset management for institutional investors, corporations and affluent individuals worldwide, implements the policy through a diversified selection of external investment managers and funds. Northern Trust's Foundation & Institutional Advisors Group, a dedicated national practice serving the specialized needs of non-profit organizations, has extensive experience advising and working with endowment funds.

All parties responsible for managing TPWF's investments do so in good faith and in accordance with the Guidelines on Prudent Investing as established by the Uniform Prudent Management of Institutional Funds Act (UPMIFA).

### **Organizational Capacity**

Qualified personnel, robust operational infrastructure, technical competency and effective oversight are critical for successful management and administration of mitigation-related endowment funds. TPWF is administered by 10 full-time and 3 part-time staff members. The Conservation Finance Director has 8 years of financial industry experience and is responsible for overseeing management of mitigation endowments. Administration is conducted by TPWF's Controller, who is also a Certified Public Accountant (CPA), with support from a bookkeeper.

TPWF currently administers over 65 individual funds that support conservation properties and projects across Texas. Each fund is maintained as a separate, identifiable account on TPWF's books and records and all contributions, distributions and balances are recorded by The Financial Edge, a leading nonprofit accounting system. Annually, TPWF's bookkeeper completes over 200 payments (in the form of a grant or donation) to external parties. Detailed financial reports for each mitigation endowment are available through Northern Trust.

### **Accountability and Fiduciary Oversight**

TPWF is overseen by 19 trustees who share a commitment to safeguarding our state's natural resources. Trustees are elected by the board of directors or appointed by the Texas Parks and Wildlife Commission to support the mission of TPWF, raise awareness, and exercise fiduciary oversight.

TPWF is committed to accountability and transparency. TPWF undergoes an annual audit by a qualified, independent accounting firm using Generally Accepted Accounting Principles (GAAP). Its Form 990 demonstrates its careful and effective use of donation and investments funds, and TPWF is the proud recipients of both the coveted [four-star rating from Charity Navigator](#) and the [GuideStar Exchange Member Seal](#).

FOUNDATION & INSTITUTIONAL ADVISORS

# Customized Advisory Solutions



October 12, 2017

**Shannon Morton, CFA**  
Senior Portfolio Manager  
Foundation & Institutional Advisors  
713.284.1759  
shm5@ntrs.com

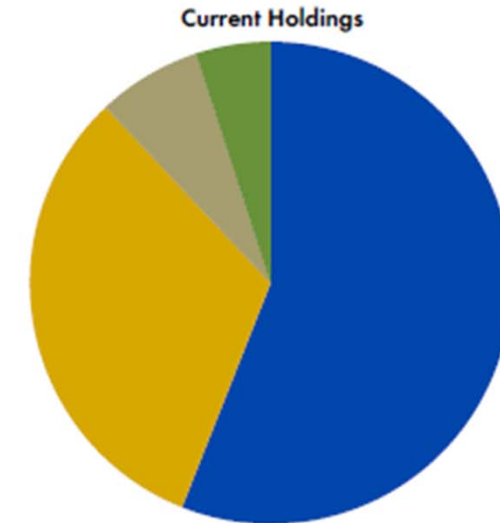


**NORTHERN TRUST**

# LONG-TERM PORTFOLIO

## Current Portfolio Foundation

Description	Percent
<b>Equity</b>	<b>56.0%</b>
Large Cap	26.0%
Mid Cap	4.0%
Small Cap	2.0%
International Developed	20.0%
International Emerging	4.0%
<b>Fixed Income</b>	<b>32.0%</b>
Corporate & Government	23.0%
High Yield	6.0%
Inflation-Linked	3.0%
<b>Real Estate</b>	<b>7.0%</b>
Global Real Estate and Infrastructure	7.0%
<b>Natural Resources</b>	<b>5.0%</b>
Natural Resources	5.0%
<b>Total</b>	<b>100.0%</b>



## Expected Portfolio Statistics\*

Average Return (pre-tax)	8.3%
Average Return	8.3%
Compound Return (pre-tax)	7.4%
Standard Deviation	14.3%
Sharpe Ratio (pre-tax)	0.35
Yield (pre-tax)	3.2%

\*See "Important Information Regarding Hypothetical Projections". Past performance does not guarantee future results. Total returns are before the deduction of fees.



# LONG-TERM PORTFOLIO

## HYPOTHETICAL PORTFOLIO AND BENCHMARK ALLOCATIONS

### Hypothetical Portfolio Allocation

Asset Class	Investment Composite Example	Allocation	Data Source *
US Large Cap Equity	S&P 500 Index	26.00%	Index
US Mid Cap Equity	Russell Midcap	4.00%	Index
US Small Cap Equity	Russell 2000	2.00%	Index
Developed ex-US Large Cap Equity	MSCI EAFE (Net)	20.00%	Index
MSCI Emerging Markets	MSCI Emerging Markets (Net)	4.00%	Index
Global Real Estate	FTSE EPRA/NAREIT Global	7.00%	Index
Commodities	Bloomberg Commodity Index	5.00%	Index
US Long Fixed Income	Barclays U.S. Aggregate Index	23.00%	Index
TIPS	Barclays US TIPS Index	3.00%	Index
US High Yield Fixed Income	Barclays US Corporate High Yield Index	6.00%	Index
		<b>100.00%</b>	

### Hypothetical Benchmark Allocation

Benchmark Composition	Allocation
MSCI ACWI Index	70.00%
Barclays U.S. Aggregate Index	30.00%
<b>100.00%</b>	

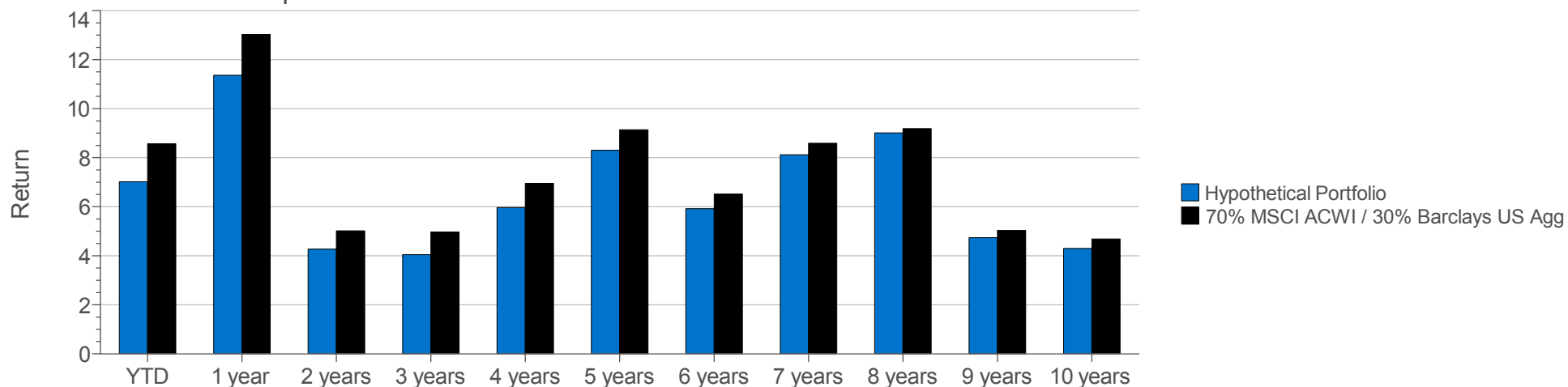
\*See "Hypothetical Portfolio Construction" page for description of Data Sources. Past performance is not a guarantee of future results.

# LONG-TERM PORTFOLIO

## HYPOTHETICAL ANNUALIZED RETURNS

For Illustrative Purposes Only: June 2007 - May 2017

Annualized Return Graph



Annualized Return Table

	YTD	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
Hypothetical Portfolio	7.02%	11.36%	4.27%	4.05%	5.97%	8.30%	5.92%	8.12%	9.01%	4.74%	4.30%
70% MSCI ACWI / 30% Barclays US Agg	8.57%	13.03%	5.02%	4.97%	6.95%	9.14%	6.52%	8.59%	9.19%	5.03%	4.68%

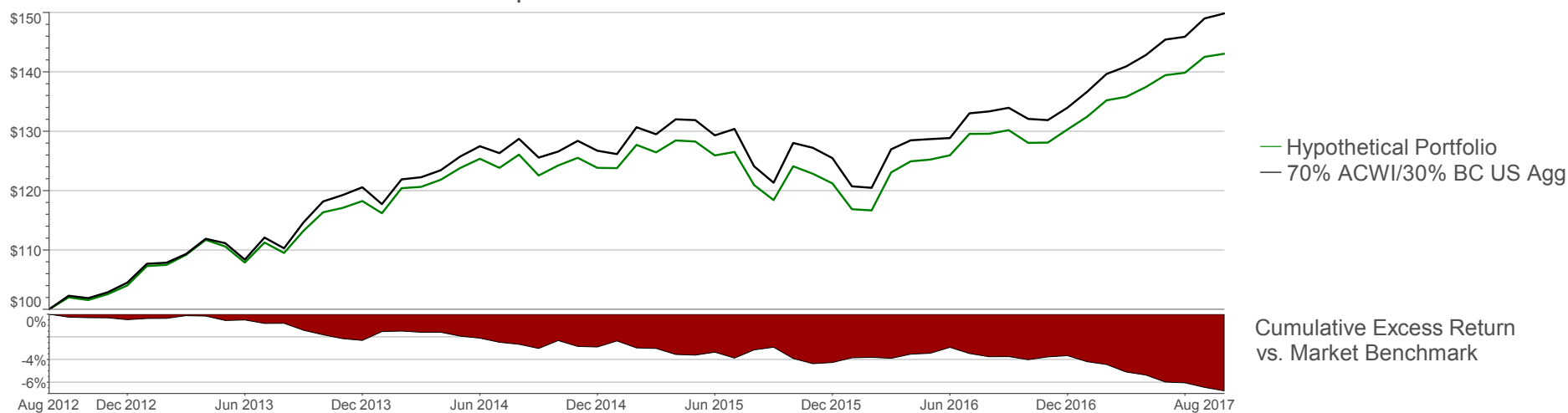
Hypothetical portfolio returns do not reflect those of an actual investment portfolio, but are a hypothetical combination of historical performance data sources for the components. Historical performance data is net of fees, and can be derived from hybrid composite, proxies, back-tested or actual portfolio data. Please see "Hypothetical Portfolio Allocation" for data sources. Your actual portfolio returns would be reduced by fees and expenses relating to the management of your account. Past performance is not a guarantee of future results. Please refer to the "Important Information" on the last pages.

# LONG-TERM PORTFOLIO

## HYPOTHETICAL PORTFOLIO PERFORMANCE - 5 YEARS

For Illustrative Purposes Only: September 2012 - August 2017

Portfolio Performance - Growth of \$100 Graph



Statistical Summary Table

	Return (%)	Cumulative Return (%)	Standard Deviation (%)	Sharpe Ratio	Excess Return vs. Market (%)	Tracking Error vs. Market (%)	R-Squared vs. Market
Hypothetical Portfolio	7.42	43.05	6.72	1.08	-1.00	0.94	98.41
70% ACWI/30% BC US Agg	8.42	49.83	7.08	1.16	0.00	0.00	100.00

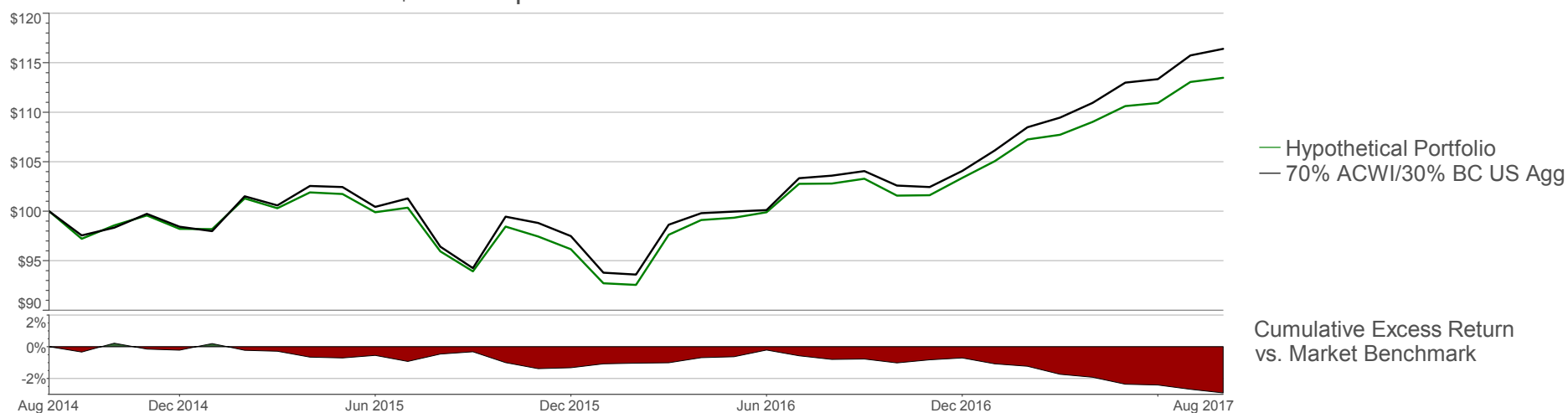
Hypothetical portfolio returns do not reflect those of an actual investment portfolio, but are a hypothetical combination of historical performance data sources for the components. Historical performance data is net of fees, and can be derived from hybrid composite, proxies, back-tested or actual portfolio data. Please see "Hypothetical Portfolio Allocation" for data sources. Your actual portfolio returns would be reduced by fees and expenses relating to the management of your account. Past performance is not a guarantee of future results. Please refer to the "Important Information" on the last pages.

# LONG-TERM PORTFOLIO

## HYPOTHETICAL PORTFOLIO PERFORMANCE - 3 YEARS

For Illustrative Purposes Only: September 2014 - August 2017

Portfolio Performance - Growth of \$100 Graph



Statistical Summary Table

	Return (%)	Cumulative Return (%)	Standard Deviation (%)	Sharpe Ratio	Excess Return vs. Market (%)	Tracking Error vs. Market (%)	R-Squared vs. Market
Hypothetical Portfolio	4.31	13.48	7.14	0.57	-0.89	1.04	98.31
70% ACWI/30% BC US Agg	5.19	16.40	7.55	0.65	0.00	0.00	100.00

Hypothetical portfolio returns do not reflect those of an actual investment portfolio, but are a hypothetical combination of historical performance data sources for the components. Historical performance data is net of fees, and can be derived from hybrid composite, proxies, back-tested or actual portfolio data. Please see "Hypothetical Portfolio Allocation" for data sources. Your actual portfolio returns would be reduced by fees and expenses relating to the management of your account. Past performance is not a guarantee of future results. Please refer to the "Important Information" on the last pages.



# HYPOTHETICAL PORTFOLIO CONSTRUCTION

The hypothetical portfolio data does not represent results of an actual investment portfolio but reflects actual or representative historical performance of the strategies, funds or accounts listed herein, which were selected with the benefit of hindsight. Historical performance data used in calculating the hypothetical portfolio data in this section may include the following sources: registered investment fund performance, composite performance of accounts managed by managers on the Northern Trust Investment Solutions Platform, external composite performance of managers as reported by third party data providers, and private fund performance as reported by the fund manager.

Hypothetical portfolio returns assume a consistent asset allocation (rebalanced quarterly) for the entire time period shown. Historical performance data is net of fees. This portfolio analysis does not incorporate all fees and expenses in an actual portfolio. The performance of the hypothetical portfolio is not indicative of the future performance of any actual investment portfolio. There is no guarantee that any actual investment portfolio will be successful in the future.

The data sources for each product are listed on the “Hypothetical Portfolio and Benchmark Allocations” section of the Important Information pages.

- Hybrid Composite data for separately managed accounts is a composite of the manager’s external product track record and the Northern Trust program manager returns.
- Proxy data for passively managed products is the product’s benchmark return stream used in the illustration for the entire analysis period due to a short product track record.
- Actual data for products are the products’ full return stream since inception. Sources will be Morningstar or the Fund Manager.

See “Important Information – Historical Performance Data” for more information regarding the data source for each hypothetical portfolio component included herein. For one-on-one use only.

# Glossary, Index Descriptions and Important Information

---

# GLOSSARY

**Annualized Return:** The annualized return is the geometric mean of the returns with respect to one year.

**Calendar Return:** Individual annual returns for the time periods shown.

**Cumulative Return:** The cumulative return is simply the compound return of the series.

**Excess Return:** The value added of the managers performance versus their benchmark. A positive excess return signifies that the manager outperformed the benchmark. Please note, return measures may, in part, be gross of fees. Please refer to the “Important Information” to understand more about performance returns.

**IPC:** Acronym for Investment Policy Committee of Northern Trust.

**Return (%):** Represents the annualized return for the time period shown.

**R-Squared:** The R-Squared of a manager versus a benchmark is a measure of how closely related the variance of the mgr. returns and the variance of the benchmark returns are.

**Sharpe Ratio:** The Sharpe ratio of a manager series is the quotient of the annualized excess return of the manager over the cash equivalent and annualized standard deviation of the manager return. The Sharpe ratio is the risk-adjusted measure of return using standard deviation to represent risk.

**Standard Deviation:** The standard deviation of the return series is the square root of the variance. Standard deviation of return measures the average deviations of a return series from its mean, and is often used as a measure of risk. A large standard deviation implies that there have been large swings in the return series of the manager.

**Tracking Error:** Also known as the standard deviation of excess return. Tracking Error is simply the variance and standard deviation applied to the excess return series and measures the deviations of the excess return series from its mean.

# INDEX DESCRIPTIONS

- Barclays 1-5 Year Blend Municipal Bond Index, Barclays 5Yr Muni Bond Index, Barclays 65/35 Inv Grade HY Index, Barclays 7Yr Muni Bond Index, Barclays CA Intermediate Municipal Bond Index, Barclays CA Municipal Bond Index, Barclays Intermediate Muni Bond Index, Barclays Intermediate US Govt Bond Index, Barclays Intermediate US Govt/Credit Index, Barclays US Aggregate Bond Index, Barclays US Corporate HY Index, Barclays US Govt/Credit Index, Barclays US Muni Bond Index, Barclays US Treasury TIPS Index - Barclays Capital is a leading provider of fixed income benchmarks and strategic customized indices. Barclays Capital provides a number of bond indices covering a large part of the global bond market. Using standard rules based index methodology and market capitalization weighting these indices accurately reflect the performance and characteristics of the underlying markets and also provide a basis for a wide range of customized indices. For more details on Barclays' family of indices, please visit [www.barcap.com](http://www.barcap.com).
- Dow UBS Commodity Index - The DJ-UBSCI Index is composed of futures contracts on physical commodities that are traded on U.S. exchanges, with the exception of aluminum, nickel and zinc, which trade on the London Metal Exchange (LME).
- FTSE KLD Global Sustainability - The FTSE KLD Global Sustainability Index (GSIN) is a broadly diversified, sector-neutral global benchmark based on environmental, social and governance (ESG) rankings.
- FTSE/NAREIT Global REIT Index - The FTSE EPRA/NAREIT Global Real Estate Index Series is designed to represent general trends in eligible real estate equities worldwide. Relevant real estate activities are defined as the ownership, disposure and development of income-producing real estate.
- Gold London PM Fixing Index - The members of The London Gold Market Fixing Limited consist of Barclays Capital, Scotia Mocatta, Deutsche Bank, Societe Generale, and HSBC Investment Banking Group. The fix is carried out twice a day, at 10:30 a.m. and 3:00 p.m. London local time via telephone by the 5 members.
- HFRI Equity Hedge (Total) Index, HFRI Event Driven (Total) Index, HFRI Fund of Funds Composite Index, HFRI Macro (Total) Index, HFRI Relative Value (Total) Index - The HFRI Monthly Indices (HFRI) are equally weighted performance indexes, utilized by numerous hedge fund managers as a benchmark for their own hedge funds. The HFRI are broken down into 4 main strategies, each with multiple sub-strategies. All single-manager HFRI Index constituents are included in the HFRI Fund Weighted Composite, which accounts for over 2000 funds listed on the internal HFR Database. For more details on HFRI Indices, please visit [www.hedgefundresearch.com](http://www.hedgefundresearch.com).
- MSCI ACWI Ex U.S., MSCI EAFE Index, MSCI EAFE Small Cap Index, MSCI Emerging Markets Index - MSCI designs and calculates global equity indices, which, over the last 40 years, have become the most widely used global equity benchmarks by institutional investors. MSCI's benchmark indices contribute to the investment process by serving as relevant performance benchmarks and effective research tools, and as the basis for various investment vehicles. MSCI consistently applies its index construction and maintenance methodology across developed, emerging and frontier markets. This consistent approach makes it possible to aggregate individual country and industry indices to create meaningful composite, regional, sector and industry benchmarks. For more details on MSCI's family of indices, please visit [www.msциbarra.com](http://www.msциbarra.com).
- Russell 1000 Index, Russell 2000 Index, Russell 2500 Index, Russell 3000 Index, Russell Mid Cap Index - Russell Indices were built to create a more accurate and comprehensive set of equity indices, and the U.S. indices represent approximately 99% of the U.S. equity market. Russell's modular index construction allows investors to track current and historical market performance by specific market segment. All sub-indexes roll up to the Russell 3000® index with no gaps or overlaps in coverage. For more details on all of the Russell U.S. Indices, please visit [www.russell.com](http://www.russell.com).
- S&P 500 Index - The S&P 500® Index is a commonly recognized, market capitalization weighted index of 500 widely held equity securities, designed to measure broad U.S. equity performance.



# IMPORTANT INFORMATION

Discretionary Investment Management Services - Northern Trust provides discretionary investment management to wealthy clients and institutions. Our investment professionals create customized portfolios that reflect your particular investment goals based on the financial information you share with us. Your dedicated portfolio manager makes the day-to-day decisions regarding your investments in a disciplined manner that is consistent with your investment objectives, risk parameters, and other specific preferences.

For One-on-One Use Only. The preceding information is intended for one-on-one use with current or prospective clients of Northern Trust. Information is confidential and may not be duplicated in any form or disseminated without the prior consent of Northern Trust. Northern Trust and its affiliates may have positions in, and may effect transactions in, the markets, contracts and related investments described herein, which positions and transactions may be in addition to, or different from, those taken in connection with the investments described herein.

Past performance is no guarantee of future results. Index performance returns do not reflect any management fees, transaction costs or expenses. It is not possible to invest directly in any index. There are risks involved in investing including possible loss of principal. There is no guarantee that the investment objectives of any fund or strategy will be met. Risk controls and models do not promise any level of performance or guarantee against loss of principal. Periods greater than one year are annualized except where indicated. Returns reflect the reinvestment of dividends and other earnings and are net of fees. Your actual portfolio returns are reduced by fees and expenses relating to the management of your account and may vary from the historical performance as a result. For additional information on fees, please consult your Northern Trust Representative.

This material is directed to eligible counterparties and professional clients only and should not be relied upon by retail investors. The information in this report has been obtained from sources believed to be reliable, but its accuracy and completeness are not guaranteed. Opinions expressed are current as of the date appearing in this material only and are subject to change without notice. This report is provided for informational purposes only and is not intended to be and should not be construed as an offer, solicitation or recommendation with respect to any transaction and should not be treated as legal advice, investment advice or tax advice. It should not be assumed that any investments were or will prove to be profitable. Clients should under no circumstances rely upon this information as a substitute for obtaining specific legal or tax advice from their own professional legal or tax advisors. Indices and trademarks are the property of their respective owners. All rights reserved

Hypothetical Projections - If you have an existing discretionary investment management account with Northern Trust, your current portfolio information has been provided for you. Otherwise, hypothetical and proposed portfolio information in this report reflects actual or representative performance of strategies, funds or accounts listed herein, which were selected by Northern Trust based on information you have provided. Where hypothetical portfolio data is presented, the portfolio analysis assumes the hypothetical portfolio maintained a consistent asset allocation (rebalanced quarterly) for the entire time period shown. Historical performance data used in calculating the hypothetical portfolio data presented herein may include the following sources: registered investment fund performance, composite performance of accounts managed by managers on the Northern Trust Investment Solutions Platform, external composite performance of managers as reported by third party data providers, and private fund performance as reported by the fund manager. All information is assumed to be accurate and complete but is not guaranteed.

# IMPORTANT INFORMATION

Hypothetical portfolio data contained herein does not represent the results of an actual investment portfolio but reflects the historical composite performance of the funds or accounts which were selected with the benefit of hindsight. Components of the hypothetical portfolio were selected primarily based on expected market and economic assumptions projected by Northern Trust's Investment Policy Committee and/or modeling utilizing historic market risk and return data. If the hypothetical portfolio would have been actively managed, it would have been subject to market conditions that could have materially impacted performance and possibly resulted in a significant decline in portfolio value.

During the periods shown herein, Northern Trust did not necessarily manage any investment portfolio with an allocation similar to that of the hypothetical portfolio. The hypothetical portfolio is not indicative of the future performance of any actual investment portfolio. There is no guarantee that any actual investment portfolio will be successful in the future.

Historical Performance Data - Data used in calculating the Hypothetical Portfolio performance data may include the following sources:

- Hybrid Composite data for separately managed accounts is a composite of the manager's external product track record and the Northern Trust program manager returns if the Northern Trust composite
- Proxy data for passively managed products is the product's benchmark return stream used in the illustration for the entire analysis period due to a short product track record.
- Registered investment fund performance information is based on data reported by Morningstar. Such information has not been independently verified by Northern Trust. Past performance is no guarantee of future results. There is no guarantee that the investment objectives of any fund will be met. Registered investment fund performance reflects the deduction of internal fees and expenses. You should consider the investment objectives and policies, risk considerations, charges and expenses of each registered investment fund carefully. This and other information is set forth in the fund's prospectus or summary prospectus. This presentation is not an offer to sell shares of any registered investment fund.
- Private fund performance information is based on data reported by each private fund's manager. Such information has not been independently verified by Northern Trust. Past performance is no guarantee of future results. Performance of private funds may vary greatly from year to year. There is no guarantee that the investment objectives of any fund will be met. [Private fund performance reflects the deduction of internal fees and expenses.] However, many private funds may pay performance based fees which may cause the fees payable by such funds to fluctuate significantly. For additional information about a private fund's past performance, fees and strategy consult the accompanying Fund Research Profile. Private funds involve a high degree of risk. See "Important Information – Alternatives Investments Risk Considerations."

# IMPORTANT INFORMATION

*Products offered through Northern Trust Securities, Inc. are not FDIC insured, not guaranteed by any bank, and are subject to investment risk including loss of principal amount invested. This communication is for informational purposes only. It is not intended as an offer or solicitation for the purchase or sale of any financial instrument or as an official confirmation of any transaction. All market prices, data and other information are not warranted as to completeness or accuracy and are subject to change without notice. Any attached research reports containing the Northern Trust logo or trademark were prepared solely by employees of Northern Trust Investments, Inc., an affiliate of Northern Trust Securities, Inc.*

Index Performance – Index returns are set forth as representative of asset class performance and as benchmark rates of return. Index performance is not representative of the returns of any fund, account or strategy. Index performance is presented for illustrative or comparative purposes only and reflect the reinvestment of dividends or other earnings and do not deduct investment advisory or transaction fees, which reduce actual returns. It is not possible to invest directly in an index. Indexes are the property of their respective owners, all rights reserved. See “Index Descriptions.”

Zephyr Style Advisor – Zephyr's StyleADVISOR® is a returns-based style analysis and performance software that is used by investment professionals to analyze investment managers, mutual funds, financial markets, and investment portfolios.

Alternative Investments Risk Considerations - Alternative investments, including hedge funds and private equity funds, involve a high degree of risk. These investments often engage in leverage or other aggressive investment strategies that may increase the risk of investment loss. Alternative investments can be highly illiquid, may not be required to provide periodic pricing or valuation to investors, and may involve complex tax structures and delays in distribution of important tax information. They often are not subject to the same regulatory requirements, charge higher fees and may have limited opportunity for early redemption or transference of interests. Each investor should consult his own advisors regarding the legal, tax, and financial suitability of alternative investments. Unregistered funds are available only to investors who meet certain financial criteria described in the private placement memorandum for each such fund.

Commodities Risk Considerations – The risk of loss in trading commodity futures contracts can be substantial. Commodity prices are volatile because they respond to many unpredictable factors: weather, labor strikes, inflation, foreign exchange rates, government monetary policies, etc. Even a small move against a commodities position may result in a large loss. Each investor should carefully consider whether such trading is suitable for them in light of their financial condition

Diversified Strategist Portfolios – Investment portfolios are constructed using Northern Trust Proprietary Exchange Traded Funds and Mutual Funds.

# IMPORTANT INFORMATION

*Investment solutions used in client accounts are carefully selected through an initial and ongoing review process by Northern Trust investment committees. These investment solutions may include products managed by Northern Trust or third-party (unaffiliated) investment managers. Northern Trust investment management and advisory services may be provided to clients on a discretionary or nondiscretionary basis.*

*From an approved list of products, our portfolio management teams select those that we believe meet a client's investment objectives. In general, Northern Trust utilizes its own investment products because they align with Northern Trust's forward-looking views, its familiarity with the investment and operational processes, as well as a shared risk and compliance philosophy. It is expected that the proportion of Northern Trust investment products held in client accounts may be high (in fact, up to 100 percent) subject to client-specific considerations or restrictions and applicable law. Northern Trust will receive more overall compensation when Northern Trust managed products are used.*

*Northern Trust has general oversight, including review, over third-party investment managers it selects, and Northern Trust monitors compliance by the third-party investment managers with investment guidelines through regular governance reviews. Client restrictions and special instructions relating to investment strategies, sectors or securities apply only to direct investments through a locally managed or separately managed account and do not restrict Northern Trust or a third-party investment manager from investing in mutual funds, exchange-traded funds or other pooled investment vehicles that may invest in a client restricted instrument, sector or security.*

*Northern Trust provides fiduciary and investment management services to various types of client accounts including discretionary separately managed accounts, registered and unregistered investment funds, and bank commingled funds. The investment advice given to one client account may differ from the investment advice given to another client account and transactions may be effected for the account of any client at prices, in amounts, or relating to securities that are not purchased or sold for other client accounts.*

Index returns are obtained through Morningstar.





NORTHERN  
TRUST

## LONG-TERM FUNDING AGREEMENT

AN AGREEMENT (the “**Agreement**”) by and between \_\_\_\_\_, with an address at \_\_\_\_\_ (the “**Grantor**”), and the Texas Parks and Wildlife Foundation, with an address at 2914 Swiss Avenue, Dallas, TX 75204 (the “**Foundation**”) (collectively, the “**Parties**”).

WHEREAS, the Grantor is the bank sponsor of approximately \_\_\_\_ acres of real property (the “**Property**”) located in \_\_\_\_\_, Texas as more completely described in Exhibit “A” attached hereto; and

WHEREAS, the United States Army Corps of Engineers [enter name of district office] District (“USACE”) and the Grantor have entered into the \_\_\_\_\_ Mitigation Bank Instrument (the “**Mitigation Bank Instrument**”), dated \_\_\_\_\_, 20\_\_ and incorporated herein by reference, wherein the USACE agreed to Grantor’s establishment and operation of the \_\_\_\_\_ Mitigation Bank (the “**Mitigation Bank**”) on the Property; and

WHEREAS, as a condition of the Mitigation Bank Instrument and pursuant to the Conservation Easement of \_\_\_\_\_, on the Property, Grantor agreed and is obligated to manage and maintain the Property in perpetuity to improve, conserve, and/or protect the aquatic resources, habitat and other ecological values of the Bank Property (“Long-Term Management Plan”). The Bank Property, comprised of approximately [insert acreage] acres, including [insert type of aquatic resources/habitat/species] will be managed in accordance with the Mitigation Bank Instrument and associated Long-Term Management Plan.

WHEREAS, as a condition of the Mitigation Bank Instrument, the Grantor agreed and is obligated to establish and maintain a separate non-wasting endowed account (the “**Endowment Fund**” or “**Fund**”), which shall be funded with, among other things, a portion of the proceeds from the sale and/or conveyance of Mitigation Credits on the Property (as defined in the Mitigation Bank Instrument); and

WHEREAS, in order to satisfy its obligations to establish and maintain the Endowment Fund, the Grantor enters in this Agreement, on the terms set forth herein.

NOW, THEREFORE, in consideration of the foregoing and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as provided herein:

1. Transfer of Assets. In accordance with the Mitigation Bank Instrument, the Grantor further agrees to transfer an amount equal to \_\_\_\_\_ Dollars (\$\_\_\_\_\_.00) of the proceeds from the sale or conveyance of each Mitigation Credit to the Foundation for deposit into the Fund. The Grantor shall transfer the previously mentioned portion from the sale or conveyance of each Mitigation Credit to the Foundation for deposit into the Fund until such time as the principal amount in the Fund totals \_\_\_\_\_ Dollars (\$\_\_\_\_\_.00) (the “**Target Amount**” as defined in the Mitigation Bank Instrument). The amounts from the sale or conveyance of each Mitigation Credit shall be collectively referred to as the “**Donation**”.

2. Fund Designation. The Donation shall be designated on the books of the Foundation and in its publications sufficient to identify the assets and activities of the Fund. The Grantor grants to the Foundation permission to honor the Grantor and to express the appreciation of the Foundation publicly in the form of news announcements, both internal and external.

3. Management of the Fund. The assets of the Fund shall be the property of the Foundation held by it in its corporate capacity and shall not be deemed a trust fund held by it in a trustee capacity. The assets of the Fund shall be wholly-owned, invested and managed by the Foundation in accord with the Long-Term Strategy of its Investment Policy, the current form of which is attached as Exhibit "B" hereto. The Grantor shall have no right or responsibility with respect to the investment or financial management of the Fund under this Agreement or otherwise. The Foundation also shall have full right and power to commingle and co-invest the assets of the Fund with other investment assets of the Foundation and to delegate investment management of the assets of the Fund. In the event the assets of the Fund are commingled with other Foundation assets, the Foundation shall maintain at all times separate records and books of account so as to specifically identify the assets and intents of the Fund from time to time. All income generated from the assets in the Fund as well as all gains and losses, realized and unrealized, thereon shall be credited to the Fund as appropriate. The Foundation shall not be liable to the USACE, the Grantor, or any other entities or persons for losses arising from investment of funds in the Fund that is consistent with this Agreement.

4. Fees and Expenses. The Foundation shall, in its sole discretion, assess against the Fund, pro rata along with all other similarly situated funds of the Foundation, appropriate and reasonable costs for the administration of the Fund, including but not limited to reasonable investment fees, custodian fees and taxes (if any), and 0.75% annually of the fair market value of the Fund computed and assessed either quarterly, based on the previous quarter-end market value, or annually, in either case at the Foundation's election. The Foundation shall collect the fees and expenses referenced in this Section 4 by deducting same from the balance of the Fund.

5. Designation of Purposes. The Fund shall at all times be used exclusively for charitable purposes as defined under Sections 501(c)(3) and 170 of the Internal Revenue Code of 1986, as amended (the "**Code**"), and in accordance with the Mitigation Bank Instrument. No part of the net income or assets of the Fund shall inure to the benefit of the Grantor or the Foundation, its officers or board members, or to any private person except as explicitly set forth herein. The Foundation acknowledges that the purposes are consistent with and further the purpose and mission of the Foundation.

6. Distributions. In accordance with the Mitigation Bank Instrument, the Foundation is authorized to make distributions and disbursements from the Fund to pay costs and expenses reasonably incurred in and related to the management of the Property, including, but not limited to, property taxes, contracts, equipment, materials, and signage.

Generally, distributions from the Fund will be made in accordance with a spending policy ("**Amount**") established by the Foundation's Board of Directors from time to time. Distributions are calculated by multiplying the Amount by the preceding rolling 12-quarter average of the Fund market value. For a fund in existence for fewer than three years, the fair

market value of the fund must be calculated for the period the fund has been in existence. Distributions in excess of the Amount may be made to the Mitigation Bank based on written request by the Grantor. In making the determination to distribute in excess of the Amount, the Foundation will consider needs with respect to both annual operating and maintenance requirements and expenditures for long-term replacement of capital improvements (collectively “**Annual Expenditures**”).

Distributions in excess of the projected Annual Expenditures for the Mitigation Bank may be authorized if such distributions pay costs and expenses for management activities outlined in the Mitigation Bank Instrument and protect the financial viability of the Fund. Distributions in excess of the projected Annual Expenditures for the Mitigation Bank for management costs and expenses not outlined in the Mitigation Bank Instrument shall be authorized only if such exceptions are approved in writing by the USACE, serve to advance the land stewardship goals of the Mitigation Bank Instrument, and protect the financial viability of the Fund.

7. Foundation’s Reliance on Information.

A. The Foundation is expressly entitled to rely on the validity of the USACE approval and the accuracy and validity of the land management plan and funding addressed in the Mitigation Bank Instrument without independent verification. The Foundation shall not be liable in any respect to the USACE, the Grantor, or to any other party, for errors, omissions, inaccuracies, or other elements of the land management plan or the funding related to same, whether contained therein or omitted therefrom, including but not limited to the sufficiency or adequacy of the Fund, as established in the Mitigation Bank Instrument.

B. If, at any time, the plan for managing the Mitigation Bank as set forth in the Mitigation Bank Instrument is amended or otherwise modified in accordance with the terms of the Mitigation Bank Instrument, the Grantor shall immediately notify the Foundation in writing of such amendment or modification and transmit written documentation memorializing such modification executed by the USACE. Grantor and the Foundation agree and acknowledge that the Foundation shall be entitled to rely upon a modification or change agreed to by Grantor and the USACE.

8. Duration of the Fund. It is the Grantor and the USACE’s intention that the Fund will last in perpetuity to fund the costs and expenses associated with the management and maintenance of the Property and that these obligations shall continue in perpetuity as covenants running with the land. If the purposes for which the Fund is created have been accomplished or so frustrated that the Fund serves no purpose or should the Foundation: (i) become insolvent or file for bankruptcy; (ii) no longer be classified as a public charity under Code Section 509(a); (iii) commit an act or omission with respect to the Fund which is grossly negligent or willful misconduct; or (iv) cease to exist or conduct its operations, any Party as well as the USACE, after providing written notice to the other Party and the USACE, and with the USACE written concurrence, may petition a court of competent jurisdiction for the dissolution of the Fund. In any of the instances set forth above, with the USACE written approval, the Fund may be distributed to: (a) a conservation organization that is determined by the Internal Revenue Service to be tax exempt for one or more purposes within the



meaning of Section 501(c)(3) of the Internal Revenue Code or corresponding section of any future federal tax code and that agrees to use the Fund for a public conservation purpose in the State of Texas; (b) a governmental entity that agrees to hold and disburse the Fund for a USACE -approved conservation purpose in the State of Texas; or (c) to a USACE selected and approved non-governmental entity that agrees to hold and disburse the Fund to and/or as prescribed by the USACE for a public conservation purpose in the State of Texas. Any such written determination shall be delivered to the Foundation by the USACE.

9. Accountings. The Foundation shall render periodic accounts of the administration of the Fund to the Grantor. In no event, however, shall the accounting be rendered less than once each fiscal year (beginning January 1 through December 31). The accounting shall consist of annual reports regarding expenditures and reimbursements as well as income, contributions and the Donation. If requested, the Foundation shall also provide to the USACE a copy of its most recent financial statement as prepared by an independent auditor.

10. Amendment. Provisions of this Agreement may be amended, modified or deleted with the written mutual consent of the Foundation, the Grantor or its legally or duly appointed agent or attorney-in-fact or the personal representative of the Grantor's estate. Any such amendments, modifications, or deletions shall be recorded in a written signed addendum, which shall become part of this Agreement.

11. No Preferential Treatment. Grantor acknowledges that in entering into this Agreement Grantor is dealing exclusively with the Foundation. Neither the fact, nor the terms, of this Agreement shall create or imply any type of preferential treatment or obligation on behalf of the Texas Parks and Wildlife Department ("TPWD") in its review of the Mitigation Banking Instrument and other documents related to the Property. Grantor agrees it shall not seek any such preferential treatment in connection with TPWD or otherwise seek to trade on its relationship with the Foundation created under this Agreement.

12. Entire Agreement. This Agreement, along with any exhibits hereto, contains the entire understanding of the Parties with respect to the subject matter herein and is subject to the laws of the State of Texas, without regard to its conflict of laws rules. This Agreement supersedes all other agreements and understandings, both oral and written, between the Parties relating to the Fund. If any provision of this Agreement is determined to be invalid or unenforceable, the remaining provisions hereof shall nevertheless remain in effect.

13. Independent Parties. Each of the Parties is acting in its independent capacity in entering into and carrying out this Agreement and not as an agent, employee, or representative of the other Party.

14. Waiver. Any waiver by either Party of any term or provision of this Agreement shall be given in writing. No waiver shall be construed as a waiver of any other provision of this Agreement, nor shall such waiver be construed as a waiver of such provision respecting any other event or circumstance.

15. Headings. The headings used in this agreement are for convenience only and shall not determine or limit the interpretation, construction or meaning of this Agreement.

16. Third-Party Beneficiary. This Agreement shall not be the basis of any claims, rights, causes of action, challenges, or appeals by any person not a Party to this Agreement, except that the Parties acknowledge that the USACE shall have the rights expressly assigned to it hereunder.

17. Notice. Any notice required or permitted to be given under this Agreement shall be sufficient if in writing and delivered by certified or registered mail, return receipt requested, postage prepaid, at the address set forth below, or to such other person or at such other place as either Party may designate in a notice. Notice shall be sent as follows:

To Grantor:

To Foundation:

To USACE:

18. Counterparts. This Agreement may be executed in identical counterparts, and each counterpart shall be deemed to be an original document. All executed counterparts together shall constitute one and the same document, and any counterpart signature pages may be attached and assembled to form a single original document.

19. Assignment. Grantor may assign its rights and obligations under this Agreement to any party to whom Grantor transfers long-term management responsibilities in accordance with the Mitigation Bank Instrument. Foundation may assign its rights and obligations under this Agreement, including ownership of the Fund, only with the written agreement of the Grantor, the Foundation, and the USACE and as provided in the Mitigation Bank Instrument.

IN WITNESS WHEREOF, the Grantor and the Foundation have executed this Agreement as of the date last signed below.

[GRANTOR]

TEXAS PARKS AND WILDLIFE FOUNDATION

By: \_\_\_\_\_

By: \_\_\_\_\_

Its: \_\_\_\_\_

Its: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

**Exhibit "A"**

**PROPERTY DESCRIPTION**

Approximately \_\_\_\_\_ acres located in \_\_\_\_\_ County, Texas as more particularly described as:

**LEGAL DESCRIPTION:**

PROPERTY TAX IDENTIFICATION NUMBER: \_\_\_\_\_

LEGAL DESCRIPTION:

**Exhibit “B”**

**INVESTMENT POLICY**



**Investment Policy**  
**For**  
**Texas Parks and Wildlife Foundation**

**Adopted October 6, 2010**

**Revised July 16, 2018**

**Investment Policy**  
**For**  
**Texas Parks and Wildlife Foundation**

**Table of Contents**

1. Introduction
2. The Foundation's Mission and Portfolio
3. Investment Objectives
4. Responsibilities
  - a. Investment Committee
  - b. Investment Advisor
  - c. Foundation Staff
5. Restrictions on Investments
6. Guidelines on Prudent Investing
  - a. Standard of Care
  - b. Prudence Considerations
  - c. Delegation Standards
7. Spending Policy
8. Asset Allocation
9. Rebalancing and Cash Flows
10. Performance Benchmarks
11. Reporting and Oversight
12. Revisions

EXHIBIT A: Asset Allocation and Performance Benchmarks

## **1. Introduction**

The purpose of Texas Parks and Wildlife Foundation's (the "Foundation") Investment Policy (this "Policy") is to provide guidelines for the prudent management of the Foundation's investment assets (the "Portfolio") and is intended to assist the Foundation's Board of Trustees (the "Board") in supervising and monitoring the Portfolio. The Policy defines the Foundation's investment objectives and the responsibilities of and standards applicable to those involved in the investment and management of the Portfolio.

It is recognized that from time to time the Board's attitudes, expectations and objectives may change. Therefore, this Policy is intended to be used as a guideline rather than a rigid statement of policy from which there can be no deviation. This Policy is intended to be a summary of an investment philosophy and the procedures that provide guidance for the Foundation, Board, Investment Committee and Investment Advisor.

## **2. The Foundation's Mission and Portfolio**

The Foundation was established in 1991 as a non-profit corporation under the laws of the State of Texas and is governed by the Board. The Foundation has been recognized by the Internal Revenue Service as exempt from federal income tax under section 501(c)(3) of the Internal Revenue Code of 1986, as amended (the "Code") and is classified as a public charity. The Foundation's mission is to provide private support to the Texas Parks and Wildlife Department to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing, and outdoor recreation opportunities for the use and enjoyment of present and future generations. In furtherance of its mission, the Foundation is dedicated to funding conservation projects, internships and scholarships to directly conserve Texas' natural resources and raise awareness of conservation issues.

The Portfolio consists of funds that are intended to be used for near term-program and operating expenses, and funds to support future or long-term program support. The Portfolio is designed to ensure long-term financial security to the Foundation and to provide a source of funding for the Foundation's activities.

## **3. Investment Objectives**

The Foundation's investment objectives are to safeguard and preserve the real purchasing power of the Portfolio while earning investment returns that are commensurate with the Foundation's risk tolerance and sufficient to meet its operational requirements. The specific investment objectives are set forth below.

### **Intermediate-Term Portfolio**

The Intermediate-Term Portfolio shall be invested with the primary objective of capital preservation, liquidity and inflation hedging while seeking an appropriate level of investment return.

More specifically, the investment objectives and constraints for the Intermediate-Term Portfolio include the following:

- Preservation of Purchasing Power. The Foundation aims to at least preserve the real purchasing power of the assets by seeking returns on its investments that are equal to the rate of inflation.
- Growth. The Foundation seeks to achieve modest growth in assets in excess of inflation.
- Time Horizon. The total return is evaluated on a three-year rolling basis. It is recognized that not every three-year period will meet the Foundation's objectives, but the Foundation aims to attain its objectives over a series of three-year periods.
- Risk Tolerance. The Foundation seeks to control risk and reduce volatility to equal or below a 5% standard deviation through a conservative asset allocation framework that will invest primarily in fixed income securities with limited exposure to equities and other higher volatility assets.
- Liquidity Requirements. The Foundation seeks to maintain adequate liquidity to meet its obligations, including planned periodic expenditures as determined by the Board. The Board will inform the Investment Advisor of any anticipated need for liquidity as such need becomes known. The Investment Advisor will presume no liquidity needs other than those provided by this Policy or the Board or Investment Committee.

### **Long-Term Portfolio**

The Long-Term Portfolio shall be invested with the primary object to grow purchasing power in perpetuity with a time horizon not less than five years.

More specifically, the investment objectives and constraints for the Long-Term Portfolio include the following:

- Preservation of Purchasing Power. The Foundation aims to at least preserve the long-term real purchasing power of its assets over time by seeking returns on its investments that are in excess of the sum of (a) the spending rate (described below) and (b) the rate of inflation.
- Long-Term Growth. The Foundation seeks to achieve growth in its assets in excess of inflation by emphasizing long-term investment fundamentals in structuring its investments.
- Time Horizon. The Foundation intends to invest for the long-term, with the total return evaluated on a five-year rolling basis. It is recognized that not every five-year period will meet the Foundation's objectives, but the Foundation aims to attain its objectives over a series of five-year periods.
- Risk Tolerance. The Foundation seeks to control risk and reduce the volatility through diversification. However, short-term volatility is characteristic of the securities markets and will be tolerated if such volatility is consistent with the volatility of similar investment portfolios (such as the volatility of performance benchmarks, described below). The Foundation recognizes and acknowledges that some risk must be assumed in order to achieve the long-term investment objectives of the Portfolio. In establishing its risk tolerance, the Foundation's ability to withstand short- and intermediate-term variability, as well as the statistical probability of loss for a given period of time, is evaluated periodically by the Board.

- Liquidity Requirements. The Foundation seeks to maintain adequate liquidity to meet its obligations, including planned periodic expenditures as determined by the Board. The Board will inform the Investment Advisor of any anticipated need for liquidity as such need becomes known. The Investment Advisor will presume no liquidity needs other than those provided by this Policy or the Board or Investment Committee.

#### **4. Responsibilities**

The Board, or such members of the Board as so designated, has the responsibility for investing and managing the Portfolio as well as the responsibility for establishing and modifying this Policy, including establishing the asset allocation for the Portfolio. The Board has delegated to the Investment Committee these responsibilities.

The Investment Committee, the Foundation's designated staff and the Foundation's Investment Advisor are charged with implementing this Policy. Their respective responsibilities are set forth below.

##### **a. Investment Committee**

The Investment Committee is responsible for:

- Establishing, reviewing periodically, and modifying this Policy and its appendices from time to time, and reporting any changes to the Board.
- Establishing the asset allocation targets and ranges for the Portfolio, and modifying them from time to time.
- Implementing this Policy, with input from Foundation staff and the Investment Advisor.
- Overseeing the Portfolio and reporting on the status of the Portfolio to the Board at least two times per year.
- Engaging the Investment Advisor to assist the Investment Committee in carrying out its investment responsibilities and to implement the investment strategy and decisions of the Investment Committee.
- Continuing or terminating the Investment Advisor and monitoring its performance.
- Engaging and continuing or terminating the Investment Advisor's bank custodian, and monitoring its performance.
- Monitoring the fees and other expenses associated with the management and administration of Portfolio.

##### **b. Investment Advisor**

The Investment Advisor, The Northern Trust Company, is responsible for:

- Recommending the strategic asset allocation of the Portfolio to the Investment Committee.



- Recommending any tactical strategy that seeks to take advantage of market dislocations (*i.e.*, underweight/overweight specific sectors) to the Investment Committee.
- Implementing the Portfolio's asset allocation through the selection, continuation, and termination of Investment Managers.
- Implementing rebalancing on a periodic basis, or when otherwise appropriate, to ensure the Portfolio is in compliance with the asset allocation ranges established by the Investment Committee.
- Selecting, continuing, or terminating Investment Managers based on appropriate criteria, including the following: investment philosophy, historical performance, experience of key personnel, and financial viability or changes in these factors. In selecting each Investment Manager, the Investment Advisor will take reasonable measures to assess the independence of the Investment Manager, including any conflicts of interest that the Investment Manager may have. (This Investment Manager selection responsibility also includes the ongoing monitoring of the Investment Managers for adherence to this Policy and his, her, or its stated investment strategy.)
- Reviewing Investment Managers, establishing the scope and terms of the delegation to Investment Managers, and monitoring their performance and compliance with the scope and terms of the delegation.
- Monitoring, analyzing the performance of, and recommending performance benchmarks for each Investment Manager.
- Requiring each Investment Manager to promptly report to any material adverse determinations against the firm or its principals, either by a court, the Securities Exchange Commission, or any other regulatory authority.
- Requiring each Investment Manager to promptly communicate significant changes in the Investment Manager's firm, including: changes in senior management or high-level personnel; changes in the Investment Manager's ownership; and changes in the Investment Manager's investment strategy and/or style.
- Preparing investment reports monthly for the Investment Committee's review that contain the information necessary for the Investment Committee to exercise its judgment and carry out its investment responsibilities prudently.
- Attending meetings in person or by telephone conference with the Investment Committee and the Foundation's staff as requested.
- Providing necessary information to and cooperating with the Investment Committee, Foundation staff, and the Foundation's external auditors.
- Providing feedback regarding changes to this Policy when requested by the Board or the Investment Committee and proposing corresponding amendments to the relevant account documents, if necessary.

c. Foundation Staff

Foundation staff is responsible for assisting the Investment Committee with all components of this Policy, including coordination of outside professionals involved in supporting the investment and management of the Portfolio.

## **5. Restrictions on Investments**

The Investment Advisor and Investment Manager(s) shall adhere to the following restrictions on investments:

- All purchases of securities must be for cash and there will be no leveraged purchasing or margin transactions except for pooled investment vehicles.
- No short sales.
- No investment in hedge funds or private equity funds will be made, except upon approval of the Investment Committee.
- Issuer concentration shall not exceed 5% within the investment portfolio of each investment manager.
- No more than 20% of the market value of the Portfolio shall be concentrated in any one industry.

These above restrictions will not be applied to the underlying holdings of any investments in commingled vehicles such as mutual funds.

## **6. Guidelines on Prudent Investing**

### **a. Standard of Care**

Each person responsible for managing and investing the Foundation's assets will do so in good faith with the care that an ordinarily prudent person in a like position would exercise under similar circumstances, and will consider both the purposes of the Foundation and the goals of the Portfolio.

A person with special skills or expertise, or selected in reliance upon his or her representation that he or she has special skills or expertise, will use those skills or that expertise in managing and investing the Foundation's Portfolio.

In managing the Portfolio, the Foundation will incur only those costs that are appropriate and reasonable in relation to the Portfolio, the purposes of the Foundation, and the skills available to the Foundation. The Foundation will use reasonable efforts to verify facts relevant to the management and investment of the Portfolio.

### **b. Prudence Considerations**

In managing and investing the Portfolio, the following factors, if relevant, will be considered:

- general economic conditions;
- the possible effect of inflation or deflation;
- the expected tax consequences, if any, of investment decisions or strategies;
- the role that each investment or course of action plays within the overall Portfolio;
- the expected total return from income and the appreciation of investments;
- other resources of the Foundation;

- the needs of the Foundation and of particular funds in the Portfolio to make distributions and to preserve capital;
- an asset's special relationship or special value, if any, to the purpose of the Foundation;
- the requirement of diversification;
- liquidity considerations;
- the impact of management or administration costs; and
- risk management.

Management and investment decisions about an individual asset will be made not in isolation but rather in the context of the Portfolio as a whole and as part of an overall investment strategy having risk and return objectives reasonably suited to the Portfolio and the Foundation.

The Foundation will diversify the assets in the Portfolio unless it prudently determines that, because of special circumstances, the Portfolio is better served without such diversification.

c. Delegation Standards

The Investment Committee will delegate to the Investment Advisor the management and investment of the Portfolio to the extent that it can prudently delegate under the circumstances, and will act in accordance with the standard of care described above in selecting, continuing, or terminating the Investment Advisor, establishing the scope and terms of the delegation, and monitoring the Investment Advisor's performance and compliance with the scope and terms of the delegation.

The Investment Committee will take reasonable measures to assess the independence of the Investment Advisor, both before and after the Investment Advisor is engaged. Investment Advisors will be selected based on competence, experience, past performance, and proposed compensation, without regard to business or personal relationships. Any actual or potential conflicts of interest possessed by a member of the Board or the Investment Committee must be disclosed and resolved in accordance with the Foundation's conflict of interest policy.

**7. Spending Policy**

The Foundation's spending policy is consistent with its investment objective of achieving long-term real growth in its assets. In order to achieve such long-term real growth, the Foundation's expenditures should be less than the Foundation's total inflation-adjusted return on investments. Subject to a donor's intent expressed in a gift instrument, the Board will establish an annual spending policy which is between 3% and 5.5% of a moving average and is consistent with the Foundation's long-term investment objectives. Consistent with the Foundation's long-term investment objectives, the Foundation's current spending policy is to multiply 4% times the preceding rolling 12-quarter average market value of the Portfolio. The Board is responsible for setting this spending rate from time to time on the recommendation of its Investment Committee.

## **8. Asset Allocation**

The Foundation targets a level of risk equivalent to a benchmark portfolio consisting of market indices representing performance benchmarks (described below) corresponding to the asset allocation targets established by the Investment Committee. The Investment Committee will establish in writing the Foundation's asset allocation, including minimum and maximum allocations for each asset class in the Portfolio, and will modify it from time to time, with recommendations from the Investment Advisor.

The Investment Committee will seek to achieve a diversified Portfolio, unless it prudently determines that, because of special circumstances, the Portfolio or a particular fund or funds within the Portfolio are better served without diversification.

## **9. Rebalancing and Cash Flows**

The Investment Committee and/or the Investment Advisor, as the case may be, should consider rebalancing at least once a quarter or more frequently, if necessary (e.g., large market moves). Rebalancing of the Portfolio may be delayed if, for example, prevailing market conditions are such that rebalancing may be detrimental to the Foundation's long-term goals for the Portfolio.

The Investment Committee will identify the destination of all cash flows, including additional contributions to the Foundation's assets, consistent with this Policy. The Foundation's net cash flows may be used to implement the rebalancing activities in order to minimize transaction costs.

## **10. Performance Benchmarks**

Performance benchmarks are used by the Investment Committee to properly measure and evaluate the success of the Investment Advisor and the Investment Managers. The performance benchmarks selected by the Investment Committee (with recommendations from the Investment Advisor) should be representative of the Foundation's long-term return objectives and risk tolerance and be calculated over the same time period as the returns on the Portfolio with which the performance benchmark is being compared. These performance benchmarks are intended as targets only and are no guarantee or assurance of the performance of any investment or of the Portfolio.

## **11. Reporting and Oversight**

The Investment Committee will review the reports made available each month by the Investment Advisor, and will meet quarterly (in person or by telephone conference) to evaluate the performance of the Portfolio and adherence by the Investment Advisor to this Policy. The performance of the Portfolio will be measured relative to appropriate and agreed upon performance benchmarks (described above). The Investment Committee will also make periodic reports to the Board at least two times per year regarding the Foundation's investment performance.

## **12. Donor-Advised Funds**

At the written recommendation of the donor and subject to approval of the Finance Committee, assets in donor-advised funds at the Foundation may be managed separately from the Foundation's investment assets and be subject to different investment objectives, investment restrictions, or asset allocations than otherwise outlined in Sections 3, 5 and 8 of this Policy.

### **13. Revisions**

The Investment Committee will review this Policy periodically and recommend revisions to the Board for approval as needed. In conducting such review, the Investment Committee may consult with the Investment Advisor regarding the performance of the Foundation's investments, the current asset allocation, the Foundation's overall investment strategy, general economic and market conditions, and any other relevant information that may bear on this Policy.



## EXHIBIT A

### Asset Allocation

**May 4, 2018**

#### **Intermediate-Term Portfolio**

<u>Asset Class</u>	<u>Lower Limit</u>	<u>Upper Limit</u>	<u>Strategic Target</u>
Cash & Equivalents	0%	10%	3%
<u>Fixed Income</u>			
IG Corporate and Government US	62%	90%	69%
Non-IG Corporate US	0%	6%	5%
Inflation Linked	0%	10%	6%
	<b>68%</b>	<b>100%</b>	<b>80%</b>
<u>Real Assets</u>			
Real Estate & Infrastructure	0%	3.5%	1.5%
Commodities & Natural Resources	0%	3.5%	1.5%
	<b>0%</b>	<b>7%</b>	<b>3%</b>
<u>Equities</u>			
US Large Cap	0%	20%	7.5%
US Small and Mid-Cap	0%	3%	1.0%
International Developed Markets	0%	7%	3.5%
International Emerging Markets	0%	4%	2.0%
	<b>0%</b>	<b>20%</b>	<b>14%</b>
<b>Total</b>			<b>100%</b>

#### **Long-Term Portfolio**

<u>Asset Class</u>	<u>Lower Limit</u>	<u>Upper Limit</u>	<u>Strategic Target</u>
Cash & Equivalents	0%	10%	0%
<u>Fixed Income</u>			
IG Corporate and Government US	12%	47%	23%
Non-IG Corporate US	0%	10%	6%
Inflation Linked	0%	5%	3%
	<b>27%</b>	<b>47%</b>	<b>32%</b>
<u>Real Assets</u>			
Real Estate & Infrastructure	0%	9%	7%
Commodities & Natural Resources	0%	6%	5%
	<b>0%</b>	<b>15%</b>	<b>12%</b>
<u>Equities</u>			
US Large Cap	20%	35%	26%
US Small and Mid-Cap	5%	20%	6%
International Developed Markets	10%	25%	20%
Emerging Markets	0%	7%	4%
	<b>40%</b>	<b>65%</b>	<b>56%</b>
<b>Total</b>			<b>100%</b>

## Performance Benchmarks

<b>Asset Class</b>	<b>Weight</b>		<b>Benchmark</b>
	<b>Intermediate-Term</b>	<b>Long-Term</b>	
Cash Equivalents	3%	0%	Citigroup 3 Month Treasury Bill
IG Corporate and Government US FI	69%	23%	BC US Aggregate Index
Non-IG Corporate US FI	5%	6%	BC US Corp High Yield 2% Capped
Inflation-Linked Securities	6%	3%	Barclays US TIPS Index
Real Estate & Infrastructure	1.5%	7%	50% FTSE EPRA/50% S&P Global Infrastructure
Commodities & Natural Resources	1.5%	5%	50% Bloomberg Futures Commodity TR Index/50% S&P Global Natural Resource Index
US Large Cap Equities	7.5%	26%	S&P 500 Index
US Small-Mid Cap Equities	1.0%	6%	66.66% Russell Midcap/33.34% Russell 2000 Index
International Developed Markets Equities	3.5%	20%	MSCI EAFE Index
International Emerging Markets Equities	2.0%	4%	MSCI Emerging Market Index
<b>Total</b>	<b>100%</b>	<b>100%</b>	

Attachment G



**SUBCHAPTER B: TRINITY AND SAN JACINTO RIVERS, AND  
GALVESTON BAY**  
**§§298.200, 298.205, 298.210, 298.215, 298.220, 298.225, 298.230, 298.240**  
**Effective May 15, 2011**

**§298.200. Applicability and Purpose.**

This subchapter contains the environmental flow standards for the Trinity and San Jacinto rivers, their associated tributaries, and Galveston Bay. In case of a direct conflict, provisions of this subchapter control over any provisions of Subchapter A of this chapter (relating to General Provisions) for purposes of environmental flow standards and regulation in the Trinity and San Jacinto rivers, their associated tributaries, and Galveston Bay.

Adopted April 20, 2011

Effective May 15, 2011

**§298.205. Definitions.**

The following words or phrases have the following meanings, in this subchapter, unless the context clearly indicates otherwise:

(1) **Galveston Bay**--the estuary system consisting of Galveston Bay and Trinity Bay, along with smaller associated bays including East Bay and West Bay.

(2) **Fall**--the period of time September through November, inclusive.

(3) **Spring**--the period of time March through May, inclusive.

(4) **Sound ecological environment**--a resilient, functioning ecosystem characterized by intact, natural processes, and a balanced, integrated, and adaptive community of organisms comparable to that of the natural habitat of a region.

(5) **Summer**--the period of time June through August, inclusive.

(6) **Winter**--the period of time December through February, inclusive.

Adopted April 20, 2011

Effective May 15, 2011

**§298.210. Findings.**

(a) The Trinity and San Jacinto rivers, their associated tributaries, Galveston Bay, and the associated estuaries are healthy and sound ecological environments.

(b) The commission finds that these sound ecological environments can best be maintained by a set of flow standards that implement a schedule of flow quantities that contain subsistence flow, base flow, and one level of high flow pulses at defined measurement points. Minimum flow levels for these components will vary by season and by year since the amount of precipitation and, therefore, whether a system is in subsistence or base flow conditions, will vary from year to year and within a year from season to season, and the number of pulses protected will also vary with the amount of precipitation.

Adopted April 20, 2011

Effective May 15, 2011

**§298.215. Set-Asides and Standards Priority Date.**

The priority date for the environmental flow standards and set-asides established by this subchapter is December 1, 2009. The priority date for the environmental flow standards will be used in the water availability determination for a new appropriation or for an amendment to an existing water right that increases the amount of water authorized to be stored, taken, or diverted and has no other purpose.

Adopted April 20, 2011

Effective May 15, 2011

**§298.220. Schedule of Flow Quantities.**

(a) The environmental flow standards adopted by this subchapter constitute a schedule of flow quantities made up of subsistence flow, base flow, and one level of high flow pulses. Environmental flow standards are established at six separate measurement locations in §298.225 of this title (relating to Environmental Flow Standards).

(b) Subsistence flow. The applicable subsistence flow standard varies depending on the seasons as described in §298.205 of this title (relating to Definitions). For a water right holder to which an environmental flow standard applies, at a measurement point that applies to the water right, the water right holder may not store or divert water unless the flow at the measurement point is above the applicable subsistence flow standard for that point. If the flow at the measurement point is above the subsistence flow standard but below the applicable base flow standard, then the water right holder may divert or store water according to its permit, subject to senior and superior water rights, as long as the flow at the measurement point does not fall below the applicable subsistence flow standard.

(c) Base flow. The applicable base flow standard varies depending on the seasons as described in §298.205 of this title. For a water right holder to which an environmental flow standard applies, at a measurement point that applies to the water right, the water right is subject to a base flow standard. For a water right holder to which an environmental flow standard applies, at a measurement point that applies to the



water right, when the flow at that point is above the applicable base flow standard, and below the applicable high flow pulse trigger level, the water right holder may store or divert water according to its permit, subject to senior and superior water rights, as long as the flow at the measurement point does not fall below the applicable base flow standard.

(d) High flow pulses. High flow pulses are relatively short-duration, high flows within the watercourse that occur during or immediately following a storm event.

(1) Two pulses per season are to be passed (i.e., no storage or diversion by an applicable water right holder) if the flows are above the applicable base flow standard, and if the applicable high flow pulse trigger level is met at the measurement point. The water right holder shall not divert or store water except during times that streamflow at the applicable measurement point exceeds the applicable high flow pulse trigger level and until either the applicable volume amount has passed the measurement point or the applicable duration time has passed since the high flow pulse trigger level occurred.

(2) If the applicable high flow pulse trigger level does not occur in a season, then the water right holder need not stop storing or diverting water to produce a high flow pulse. The water right holder is not required to store water to be released later to produce a high flow pulse.

(3) With the exception of summer and fall, which are treated as a single season for purposes of pulse flow compliance, each season is independent of the preceding and subsequent seasons with respect to high flow pulse frequency.

(e) A water right owner that has stored water in accordance with the terms and conditions of its water right, including any applicable environmental flow requirement in effect at the time the water was stored, may divert, release, or use this water, even if the applicable environmental flow requirement is not met at the time of the subsequent diversion, release, or use of that stored water.

Adopted April 20, 2011

Effective May 15, 2011

### **§298.225. Environmental Flow Standards.**

(a) A water right application in the Trinity or San Jacinto river basins, , which increases the amount of water authorized to be stored, taken or diverted as described in §298.10 of this title (relating to Applicability), shall not reduce the long-term frequency on either a seasonal or annual basis at which the volumes of freshwater inflows, to Galveston Bay, as described in the figure in this subsection, occur.

Bay and Estuary Freshwater Inflow Standards for the Galveston Bay System

<b>Basin</b>	<b>Annual Inflow Quantity (af)</b>	<b>Annual Target Frequency</b>	<b>Winter Inflow Quantity (af)</b>	<b>Winter Target Frequency</b>	<b>Spring Inflow Quantity (af)</b>	<b>Spring Target Frequency</b>	<b>Summer Inflow Quantity (af)</b>	<b>Summer Target Frequency</b>	<b>Fall Inflow Quantity (af)</b>	<b>Fall Target Frequency</b>
<b>Trinity</b>	2,816,532	50%	500,000	40%	1,300,000	40%	245,000	40%	N/A	N/A
	2,245,644	60%	250,000	50%	750,000	50%	180,000	50%	N/A	N/A
	1,357,133	75%	160,000	60%	500,000	60%	75,000	60%	N/A	N/A
<b>San Jacinto</b>	1,460,424	50%	450,000	40%	500,000	40%	220,000	40%	200,000	40%
	1,164,408	60%	278,000	50%	290,000	50%	100,000	50%	150,000	50%
	703,699	75%	123,000	60%	155,000	60%	75,000	60%	90,000	60%

af = acre-feet

(b) The freshwater inflow standards are subject to adjustment, in accordance with Texas Water Code, 11.147(e-1). The adjustment for each inflow level is calculated by adding the volumes for all of the seasons in that inflow level for the entire year and multiplying that annual total volume by 12.5% to generate the maximum adjustment amount. The maximum adjustment, including the effect of any previous adjustments, cannot increase the total volume for that inflow level above the sum of the annual total of the original volume requirement for that level plus the 12.5% adjustment.

(c) The following environmental flow standards are established for the following described measurement points:

(1) West Fork Trinity River near Grand Prairie, Texas, generally described as United States Geological Survey (USGS) gage 08049500, and more specifically described as Latitude 32° 45' 45"; Longitude 96° 59' 40".

United States Geological Survey (USGS) Gage 08049500, West Fork Trinity River near Grand Prairie

Season	Subsistence	Base	Pulse
Winter	19 cfs	45 cfs	Trigger: 300 cfs Volume: 3,500 af Duration: 4 days
Spring	25 cfs	45 cfs	Trigger: 1,200 cfs Volume: 8,000 af Duration: 8 days
Summer	23 cfs	35 cfs	Trigger: 300 cfs Volume: 1,800 af Duration: 3 days
Fall	21 cfs	35 cfs	Trigger: 300 cfs Volume: 1,800 af Duration: 3 days

cfs = cubic feet per second  
 af = acre-feet

(2) Trinity River at Dallas, Texas, generally described as USGS gage 08057000, and more specifically described as Latitude 32° 46' 29"; Longitude 96° 49' 18".

United States Geological Survey (USGS) Gage 08057000, Trinity River at Dallas

Season	Subsistence	Base	Pulse
Winter	26 cfs	50 cfs	Trigger: 700 cfs Volume: 3,500 af Duration: 3 days
Spring	37 cfs	70 cfs	Trigger: 4,000 cfs Volume: 40,000 af Duration: 9 days
Summer	22 cfs	40 cfs	Trigger: 1,000 cfs Volume: 8,500 af Duration: 5 days
Fall	15 cfs	50 cfs	Trigger: 1,000 cfs Volume: 8,500 af Duration: 5 days

cfs = cubic feet per second  
 af = acre-feet

(3) Trinity River near Oakwood, Texas, generally described as USGS gage 08065000, and more specifically described as Latitude 31° 38' 54"; Longitude 95° 47' 21".

USGS Gage 08065000, Trinity River near Oakwood

Season	Subsistence	Base	Pulse
Winter	120 cfs	340 cfs	Trigger: 3,000 cfs Volume: 18,000 af Duration: 5 days
Spring	160 cfs	450 cfs	Trigger: 7,000 cfs Volume: 130,000 af Duration: 11 days
Summer	75 cfs	250 cfs	Trigger: 2,500 cfs Volume: 23,000 af Duration: 5 days
Fall	100 cfs	260 cfs	Trigger: 2,500 cfs Volume: 23,000 af Duration: 5 days

cfs = cubic feet per second  
 af = acre-feet

(4) Trinity River near Romayor, Texas, generally described as USGS gage

08066500, and more specifically described as Latitude 30° 25' 30"; Longitude 94° 51' 02".

United States Geological Survey Gage 08066500, Trinity River at Romayor

<b>Season</b>	<b>Subsistence</b>	<b>Base</b>	<b>Pulse</b>
Winter	495 cfs	875 cfs	Trigger: 8,000 cfs Volume: 80,000 af Duration: 7 days
Spring	700 cfs	1150 cfs	Trigger: 10,000 cfs Volume: 150,000 af Duration: 9 days
Summer	200 cfs	575 cfs	Trigger: 4,000 cfs Volume: 60,000 af Duration: 5 days
Fall	230 cfs	625 cfs	Trigger: 4,000 cfs Volume: 60,000 af Duration: 5 days

cfs = cubic feet per second  
 af = acre-feet

(5) East Fork San Jacinto River near Cleveland, Texas, generally described as USGS gage 08070000, and more specifically described as Latitude 30° 20' 11"; Longitude 95° 06' 14".

United States Geological Survey Gage 08070000, East Fork San Jacinto River near Cleveland

<b>Season</b>	<b>Subsistence</b>	<b>Base</b>	<b>Pulse</b>
Winter	22 cfs	33 cfs	Trigger: 400 cfs Volume: 4,500 af Duration: 8 days
Spring	18 cfs	31 cfs	Trigger: 600 cfs Volume: 5,000 af Duration: 6 days
Summer	9 cfs	18 cfs	Trigger: 200 cfs Volume: 1,300 af Duration: 4 days



Fall	9 cfs	18 cfs	Trigger: 200 cfs Volume: 1,300 af Duration: 4 days
------	-------	--------	--

cfs = cubic feet per second  
 af = acre-feet

(6) West Fork San Jacinto River near Conroe, Texas, generally described as USGS gage 08068000, and more specifically described as Latitude 30° 14' 40"; Longitude 95° 27' 25".

United States Geological Survey Gage 08068000, West Fork San Jacinto River near Conroe

Season	Subsistence	Base	Pulse
Winter	23 cfs	42 cfs	Trigger: 400 cfs Volume: 3,500 af Duration: 7 days
Spring	24 cfs	52 cfs	Trigger: 1,100 cfs Volume: 12,000 af Duration: 9 days
Summer	10 cfs	19 cfs	Trigger: 200 cfs Volume: 1,300 af Duration: 3 days
Fall	10 cfs	22 cfs	Trigger: 200 cfs Volume: 1,300 af Duration: 3 days

cfs = cubic feet per second  
 af = acre-feet

Adopted April 20, 2011

Effective May 15, 2011

**§298.230. Water Right Permit Conditions.**

(a) For water right permits with an authorization to store or divert more than 10,000 acre-feet per year in the Trinity and San Jacinto River basins, and to which the environmental flow standards apply, that are issued after the effective date of this subchapter, the water right permit or amendment shall contain flow restriction special conditions that are adequate to protect the environmental flow standards of this subchapter.

(b) For water right permits with an authorization to store or divert 10,000 acre-feet or less per year in the Trinity and San Jacinto river basins and to which the environmental flow standards apply, that are issued after the effective date of this subchapter, the water right permit or amendment shall contain flow restriction special conditions that are adequate to protect the environmental flow standards of this subchapter; however, no special conditions are necessary to preserve or pass high flow pulses.

Adopted April 20, 2011

Effective May 15, 2011

**§298.240. Schedule for Revision of Standards.**

The environmental flow standards or environmental flow set-asides adopted herein for the Trinity and San Jacinto rivers, their associated tributaries, and Galveston Bay may be revised by the commission through the rulemaking process. The final revised rules shall be effective no sooner than ten years from the effective date of this rule, unless the Trinity and San Jacinto basin and bay area stakeholder committee submits a work plan approved by the advisory group under Texas Water Code, §11.02362(p), that provides for a periodic review to occur more frequently. In that event, the commission may provide for the rulemaking process to be undertaken in conjunction with the periodic review if the commission determines that schedule to be appropriate. The rulemaking process shall include participation by a balanced representation of stakeholders having interests in the Trinity and San Jacinto Rivers, their associated tributaries, and Galveston Bay.

Adopted April 20, 2011

Effective May 15, 2011