# Inventory of Conservation, Restoration and Protection Sites: San Antonio Bay System – Phase II

**Publication CBBEP – 82**
**Project Number – 1205**
**August 2012**

**Prepared by**

Nicole A. Davis and Elizabeth H. Smith, International Crane Foundation

In conjunction with:

James A. Dodson, San Antonio Bay Partnership

International Crane Foundation
c/o Texas A&M University-Corpus Christi
USFWS Mailstop 5837
6300 Ocean Dr.
Corpus Christi, TX 78412
361-543-0303
esmith@savingcranes.org

Submitted to:
**Coastal Bend Bays & Estuaries Program**
1305 N. Shoreline Blvd. Ste 205
Corpus Christi, Texas 78401

# INVENTORY OF

# CONSERVATION, RESTORATION, AND PROTECTION SITES:

## SAN ANTONIO BAY SYSTEM - PHASE II

PREPARED BY

NICOLE A. DAVIS
&
ELIZABETH H. SMITH
INTERNATIONAL CRANE FOUNDATION

IN CONJUNCTION WITH

JAMES A. DODSON
SAN ANTONIO BAY PARTNERSHIP

PREPARED FOR

COASTAL BEND BAYS & ESTUARIES PROGRAM, INC.
ROSARIO MARTINEZ, PROJECT MANAGER

31 AUGUST 2012

# Inventory of Conservation, Restoration, and Protection Sites: San Antonio Bay System - Phase II


Prepared by

The International Crane Foundation, in conjunction with the San Antonio Bay Partnership, under a contract with the Coastal Bend Bays & Estuaries Program

31 August 2012

TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

# PREFACE

Funding for this project provided for the continuation of a preliminary study that focused on both developing a methodology and compiling an inventory of potential sites in San Antonio Bay system. Our involvement in both phases of this project has been educational and has also provided continuity in the process. The strongest asset in this project has been the stakeholder presence and involvement in each of the monthly meetings and on field site visits. The International Crane Foundation was pleased to be a part of this project, as the diversity of conservation and management interests captured in this report convey a holistic, multi-dimensional approach to coastal conservation.

This report should be cited as:

Davis, N.A. and E.H. Smith. 2012. Inventory of conservation, restoration, and protection sites: San Antonio Bay system- Phase II. Coastal Bend Bays and Estuaries Program Publication CBBEP-XX. pp. 1-94.

# INTRODUCTION

This report represents efforts by the San Antonio Bay Partnership stakeholders to refine and add to an inventory of potential wetland projects presented in a Phase I report to the Coastal Bend Bays & Estuaries Program (CBBEP) in 2011 (Davis and Smith, 2011). In the San Antonio Bay System, projects aimed at wetlands protection, restoration and enhancement to protect/expand essential wildlife and fishery habitat would provide a means to maintain stakeholder involvement. The project team provided various input into compiling scientific and technical information, identifying priority issues, and identifying sites in need of "intervention" due to threatened impairment of wetland quality and function. Ultimately, the results of both phases will be beneficial in producing a management plan for the San Antonio Bay system.

The San Antonio Bay System is located between Matagorda and Aransas bays along the Texas coast and at the terminus of the San Antonio and Guadalupe river watersheds. This bay system exchanges water with Matagorda and Aransas-Copano bays systems to the northeast and southwest, respectively. Marine water is exchanged between the Gulf of Mexico and the estuarine system through Pass Cavallo and Matagorda Ship Channel, through Cedar Bayou (when open), and Aransas Pass, via Aransas Bay. The San Antonio Bay System project area is composed of Espiritu Santo, Hynes, Guadulape, Mesquite, Carlos, Ayres bays and Mission and Pringle lakes (Fig. 1). More detailed information about the project area is located in Phase I report (Davis and Smith, 2011).


Figure 1. Google Earth v6 map outlining the study project area (red line) within the San Antonio Bay system.

Overview of Phase I Report

The preliminary inventory of potential wetland projects developed in 2011 included sites aimed at wetland protection, restoration, and enhancement within the San Antonio Bay System (Davis and Smith, 2011). The recommended sites were mapped and made accessible to stakeholders via the open access Google Earth Program (Google, 2010). Partners and participants in the project included the Center for Coastal Studies, Texas A&M University-Corpus Christi (CCS), International Crane Foundation (ICF), San Antonio Bay Partnership (SABP), Coastal Bend Bays & Estuaries Program, Inc. (CBBEP), Texas Parks & Wildlife (TPW), U.S. Fish & Wildlife Service (FWS), Texas State Soil and Water Conservation Board (TSSWCB), Coastal Conservation Association (CCA), De-Go-La Resource Center Conservation and Development, Inc., Ducks Unlimited (DU), San Antonio River Authority (SARA), Guadalupe-Blanco River Authority (GBRA), Guadalupe-Blanco River Trust (GBRT), and San Antonio Bay Foundation (SABF). Monthly meetings were organized to accomplish each task over a four-month period (April-July), and the final report was completed in August 2011. The effort resulted in a total of 53 recommended sites representing a range of conservation, restoration, and education strategies as well as a range of geomorphological types. The site locations and strategies were discussed and prioritized for each geomorphic assemblage within the San Antonio Bay system, which resulted in a two-page summary developed for each of the chosen 16 of the 53 sites. It was the intent of the project to provide a framework that could be expanded to include additional sites as more information becomes available. Funding from FY2012 CBBEP afforded the continuation of this project.

Overview of Phase II Report Approach

Generally, the Phase II approach followed the sequence of activities developed in the Phase I project, with the following modifications. In Phase I we provided stakeholders with an overview of how to use Google Earth with the option to use and submit information on potential sites as ".kmz" files. In Phase II, we dedicated a workshop on 17 April 2012 to present a tutorial on using Google Earth, then provided hands-on learning on computers to enable stakeholders to identify additional sites. These sites were submitted electronically at the conclusion of the workshop. We also organized two workshops on the prioritization process to identify the information necessary to query the database in order to develop information for specific grant proposals. In the first prioritization workshop on 22 May 2012, we developed a list of key terms that would be added to the database in MS Excel. Prior to the second prioritization workshop on 19 June 2012, we standardized the descriptions within each site and added key terms. In the second workshop we used a sample proposal to illustrate the utility of the database for prioritization. The SABP stakeholder group agreed that prioritization should only occur when an opportunity for potential funding is identified, and that the Phase II report should include all sites identified to date, without any type of ranking. We then conducted field trips on 11 January 2012, 10 July 2012, 14-16 August 2012, and 21 August 2012 to visit each site not visited in Phase I in order to obtain digital photos documenting current conditions, gaining access to private sites whenever possible (Fig. 2).

Figure 2. Stakeholder participants of the San Antonio Bay system field trip held on 10 July 2012.

A total of 67 sites are included in this report; the report is organized with one page per site in order to provide more detailed information than was included in the Phase I report. Information is organized into a portfolio by landform with a Google Earth image, field photo, coordinates, site number and name, habitat type based on National Wetland Inventory (NWI), and database information (phase, location, conservation strategy, potential partners, target species, and key terms). Furthermore, site descriptions were limited to a standardized format to provide a searchable database (MS Excel database file as Appendix I). However, more detailed descriptions are provided in the Google Earth file, which can be found on the Coastal Bend Bays & Estuaries Program's website or by hyperlinks throughout the report.

## OVERVIEW MAP OF ALL SITES

The project area and San Antonio Bay system were depicted using Google Earth Pro software (Fig. 3). The image displays all sixty-seven sites recommended as part of the San Antonio Bay habitat inventory project process and provides a prospective of conservation, restoration, and protection priorities along the Texas coast. Site names associated with each recommended site are listed in Table 1.


Figure 3. Overview map showing all 67 recommended sites[1] within the San Antonio Bay system project area using Google Earth Pro software.

[1] Locations of demarcated sites are approximate and do not encompass the full area recommended in order to increase resolution quality.

Table 1: List of all 67 recommended conservation, restoration, and protection sites within the San Antonio Bay system, including which phase the site was recommended and its designated number and name within the report.

| Phase | Site # | Site Name |
|---|---|---|
| I | 1 | Sand Pit |
| I | 2 | Marthijohnni Swamp |
| I | 3 | Linn Lake |
| I | 4 | Linn Lake South |
| I | 5 | Bald Cypress Swamp |
| I | 6 | Rookery off Barge Canal |
| I | 7 | Guadalupe Fields |
| I | 8 | Green Lake |
| I | 9 | Carbide Colony |
| I | 10 | Marsh Ranch |
| I | 11 | NE Mission Lake |
| I | 12 | Guadalupe Delta Swamp Colony |
| I | 13 | Traylor's Cut |
| I | 14 | Kamey Island Rookeries |
| I | 15 | Guadalupe Delta Shoreline |
| I | 16 | Swan Point Ranch |
| I | 17 | Guadalupe Delta |
| II | 18 | San Antonio River Golden Orb Habitat |
| II | 19 | River Pasture 2 |
| II | 20 | River Pasture 1 |
| II | 21 | McFaddin New Ranch Flat |
| II | 22 | McFaddin New Ranch |
| I | 23 | Log Jams |
| I | 24 | ANWR Shoreline Erosion |
| I | 25 | ANWR Mustang Lake Wetlands |
| I | 26 | ANWR Sundown Bay Wetlands |
| I | 27 | ANWR Dunham Bay Wetlands |
| I | 28 | Welder Flats |
| I | 29 | Arapaho Holdings |
| I | 30 | North Seadrift-Port O'Connor Ridge Shoreline Wetlands |
| II | 31 | Welder Ditch |
| II | 32 | Boggy Bayou Drainage |
| I | 33 | Dunham Island Wetlands |
| I | 34 | Grass Island |
| I | 35 | ANWR S. Bludworth Island Wetlands |
| I | 36 | ANWR N. Bludworth Island Wetlands |
| I | 37 | Roddy Island Wetlands |
| I | 38 | Rattlesnake Island Wetlands, some in ANWR |
| I | 39 | Shoalwater Bay Wetlands |
| I | 40 | Dewberry Island Wetlands |
| I | 41 | Blackberry Island Wetlands |

| Phase | Site # | Site Name |
|---|---|---|
| I | 42 | Bayucos Island Wetlands |
| I | 43 | Seadrift Island 609-280C |
| II | 44 | Seadrift Island 609-280B and Chain |
| I | 45 | Second Chain Islands |
| I | 46 | Big Bird Island |
| I | 47 | South Pass Islands |
| II | 48 | Victoria Barge Canal Island |
| II | 49 | Turnstake Island Complex |
| I | 50 | Chester Island |
| I | 51 | Chicken Foot Oyster Reef |
| II | 52 | Upper-San Antonio Bay Oyster Reefs |
| II | 53 | Mission Lake-Guadalupe Bay Rangia Clams |
| II | 54 | Hynes Bay Tire Removal |
| I | 55 | Cedar Bayou Pass |
| I | 56 | St. Joe Marsh/Tidal Flat |
| I | 57 | S. Matagorda Island Tidal Fan Wetlands |
| I | 58 | Panther Point Back Barrier Wetlands |
| I | 59 | Long Lake Entrance |
| I | 60 | S. Pass Lake Entrance |
| I | 61 | Vandeveer Island S. Back Barrier Wetlands |
| I | 62 | Pringle Lake Entrance |
| I | 63 | Back Bay Wetlands |
| I | 64 | Sunday Beach |
| I | 65 | Army Hole Entrance |
| II | 66 | Pelican Island at Pass Cavallo |
| II | 67 | Oil Well Cuts Saluria Bayou |

GUADALUPE-SAN ANTONIO RIVER/DELTA

The Guadalupe River (250 mi), the San Antonio River (180 mi), and their associated watersheds provide freshwater inflows to the San Antonio Bay system. The Guadalupe River is one of the most popular rivers in Texas, known for having sufficient flows for in-stream recreational use, particularly in its upper reaches, whereas the San Antonio River is slow moving during normal conditions and known to have log jams in its lower reaches (TPWD, 2009). Both rivers provide instream habitats as well as riparian forest habitat essential for various colonial waterbirds and waterfowl. The Guadalupe Delta, including the lower floodplains of both the San Antonio and Guadalupe rivers, is a dominant feature of the San Antonio Bay system (Tremblay and Calnan, 2011) and is located in southern Victoria County, eastern Refugio County, and western Calhoun County along the Texas coast. Texas Parks and Wildlife Department (TPWD) acquired portions of the Delta as a wildlife management area (WMA); areas in the WMA include four units (Fig. 4): Mission Lake Unit (4,447.62 acres), Hynes Bay Unit (1007.72 acres), Guadalupe River Unit (1138 acres), and the San Antonio Unit (818 acres) (TPWD, 2009). The habitats supported within the Guadalupe Delta range from coastal marsh, estuarine marsh, and natural and manmade wetlands to uplands. Additional lands within the delta that provide essential estuarine wetlands are private ranches located adjacent to Hynes Bay and Guadalupe Bay: Swan Point Ranch lies between the two bays and Marsh Ranch is North of Hynes Bay.

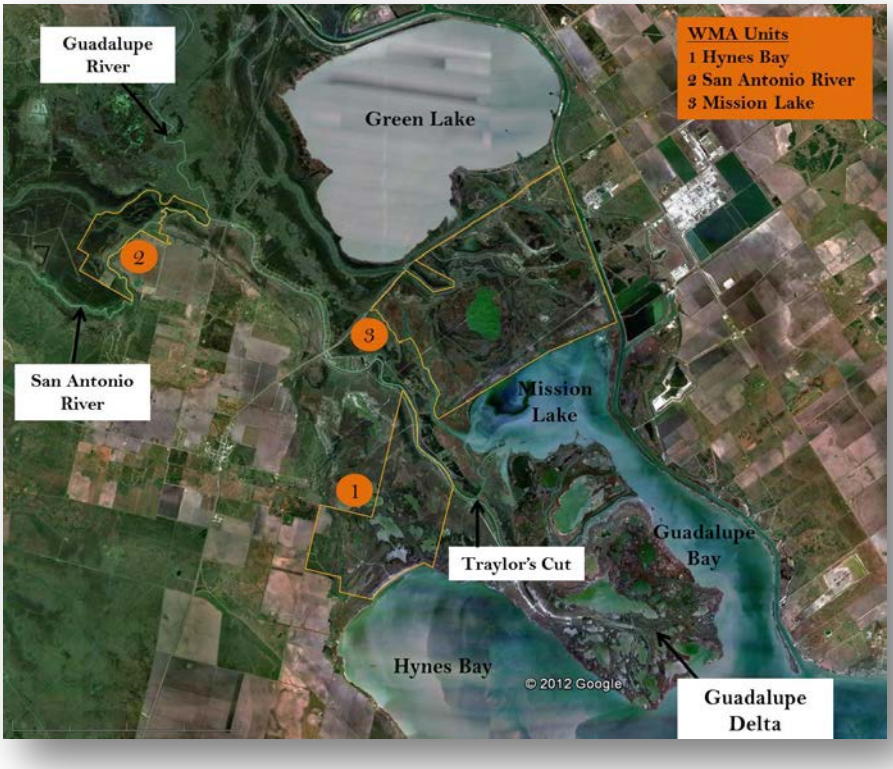



Figure 4. Google Earth Pro imagery of the San Antonio-Guadalupe River Delta, three TPWD wildlife management areas (WMA), and other bodies of water.

The Guadalupe Delta formed as a result of the San Antonio and Guadalupe rivers depositing sediments at the mouth of the Guadalupe River where it enters San Antonio Bay. Historically, the delta gradually enclosed an open bay area, forming what is now Green Lake, and more recently the delta is in the process of filling in and around Mission Lake. Traylor's Cut, on the Guadalupe River, was excavated in 1935 and effectively diverts water and sediment under normal and high flows into Mission Lake and Guadalupe Bay. Under overbank conditions, water and sediment will flood the entire delta; however, this diversion has limited delta maintenance and erosion along the delta shoreline has resulted (Tremblay and Calnan 2011).

A diversity of estuarine and freshwater marsh complexes occur throughout the Guadalupe Delta, as well as shallow fresh-water lakes and flats. Sea-level rise and subsidence in the delta area has resulted in increased inundation by bay waters; over time, habitats are shifting toward estuarine habitats (White and Morton, 1987). Recent assessments indicate that palustrine habitats have been converted to estuarine habitat types, and that estuarine marshes and open water have increased while tidal/algal flats have decreased (Tremblay and Calnan 2011).

The Guadalupe Delta is subdivided into large areas of private and state-owned parcels; Guadalupe Delta Wildlife Management Area encompasses several large tracts and is managed primarily for waterfowl habitat using impoundments and water diversions. Private tracts are used for ranching, although some tracts are becoming available for sale and potential development. The lower Guadalupe River section around the Hwy 35 crossing is subdivided into small riverfront parcels, and more development is occurring adjacent to these areas. Upstream of the confluence of the rivers, the land is primarily used for ranching and farming, although some tracts are for sale and there is an increasing potential for development outside the floodplain.

Twenty-three sites within the Guadalupe-San Antonio River/Delta were recommended during this project (Fig. 5). Conservation strategies associated with these sites included: Management (11), Restoration, (8), and Protection (7), Education (4), Enhancement (4), and Monitoring (2).

GUADALUPE-SAN ANTONIO RIVER/DELTA SITES

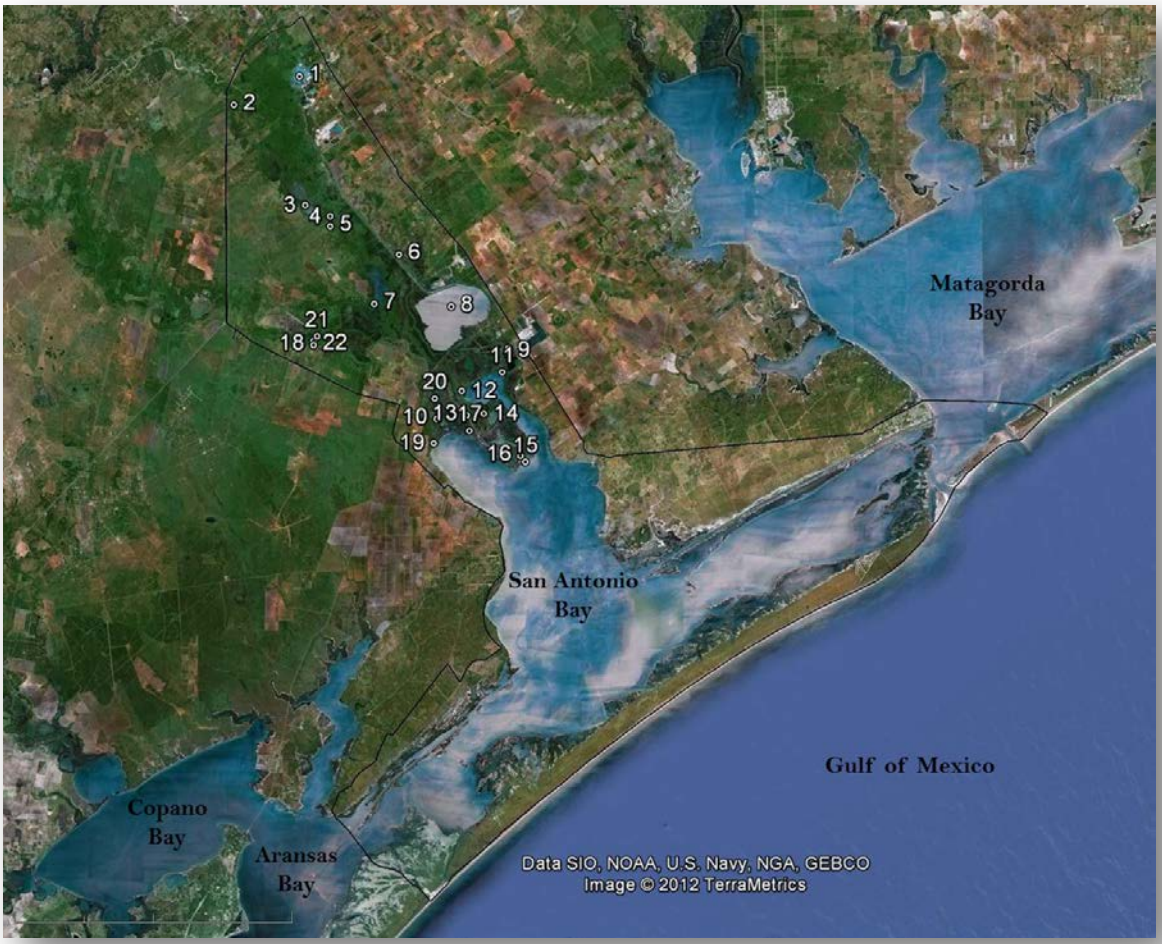
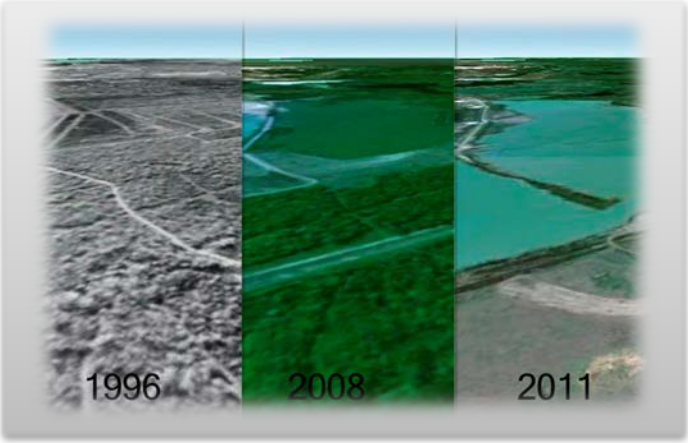



Figure 5. The location of twenty-three recommended sites within the Guadalupe-San Antonio River Delta within the river/delta geomorphic section of the San Antonio Bay system using Google Earth Pro software.


SAND PIT

Site Number: 1
Approximate Latitude: 28°43’7.46” N
Approximate Longitude: 96°58’43.00” W
Habitat Type: Listed as PEM1Cx on the 2008-2009 National Wetland Inventory, a freshwater emergent wetland, and designated as marsh habitat for this project.




## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Restore habitat from disturbance**
- **Potential Partners:**
- **Species: Colonial waterbirds including nesting Least Terns (*Sternula antillarum athalassos*)**
- **Key Terms: Bird, Restoration, Rookery, Migration, Marsh**


MARTHIJOHNNI SWAMP

Site Number: 2
Approximate Latitude: 28°41'37.51" N
Approximate Longitude: 97°2'13.03" W
Habitat Type: Listed as PAB3H and PEM1C by the 2008-2009 National Wetland Inventory, a freshwater pond and freshwater emergent wetland, respectively, and designated as pond/basin and marsh habitats for this project, respectively.

Example species of wildlife

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop restoration and management plans to keep rookery wet during nesting season**
- **Potential Partners: Landowner, TPWD, USFWS**
- **Species: Approximately 8,000 nesting pairs of Herons, Egrets, Ibis, and other nesting waterbirds**
- **Key Terms: Birds, Management, Restoration, Rookery, Protected Species, Migration, Marsh, Pond**


# LINN LAKE

Site Number: 3
Approximate Latitude: 28°36’54.76” N
Approximate Longitude: 96°58’23.10” W
Habitat Type: Listed as L1UBH by the 2008-2009 National Wetland Inventory, a lake, and designated as lake habitat for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Maintain overflow basin from siltation and local industry modification**
- **Potential Partners: Landowner, Local industry, TPWD, USFWS**
- **Species: Colonial waterbirds, nesting waterfowl, and Bald Eagle (*Haliaeetus leucocephalus*) nest nearby**
- **Key Terms: Bird, Management, Rookery, Protected Species, Migration, Lake**


LINN LAKE SOUTH

Site Number: 4
Approximate Latitude: 28°36'22.21" N
Approximate Longitude: 96°57'1.10" W
Habitat Type: Listed as PFO1F by the 2008-2009 National Wetland Inventory, a freshwater forest/shrub wetland, and designated as forested/scrub-shrub floodplain habitat for this project.

Example of inland rookery

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Conservation easement or land acquisition**
- **Potential Partners:**
- **Species: Nesting herons**
- **Key Terms: Bird, Rookery, Protected Species, Forest/Scrub-Shrub Wetland**


BALD CYPRESS SWAMP

Site Number: 5
Approximate Latitude: 28°35'53.42" N
Approximate Longitude: 96°57'0.88" W
Habitat Type: Listed as PUBH and PFO1A by the 2008-2009 National Wetland Inventory, a freshwater pond and freshwater forest/shrub wetland, respectively, and designated as pond/basin and forest/scrub-shrub floodplain habitat for this project, respectively.

**Example Bald Cypress**

## *Database Information*

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Maintain southernmost bald cypress swamp rookery in Texas from siltation and modification; educate landowner on biological importance**
- **Potential Partners: Landowner, TPWD, USFWS**
- **Species: Yellow-crowned night heron *(Nyctanassa violacea)*, Anhinga *(Anhinga anhinga)*, Great blue heron *(Ardea herodias)*, Bald cypress *(Taxodium distichum)***
- **Key Terms: Education, Bird, Management, Rookery, Protected Species, Cypress, Riparian, Pond, Forest/Scrub-Shrub Wetland**


ROOKERY OFF BARGE CANAL

Site Number: 6
Approximate Latitude: 28°34'31.57" N
Approximate Longitude: 96°53'14.30" W
Habitat Type: Listed as PUBH by the 2008-2009 National Wetland Inventory, a freshwater pond, and designated as pond/basin habitat for this project.

**Example species of wildlife supported**

## *Database Information*

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Determine ownership, develop a rookery management plan, and enhance the rookery from Victoria Barge Canal modifications. Site is an island in a former bayou**
- **Potential Partners: CBBEP, Navigation District, NRCS, SABP, TPWD, USFWS, Westside Calhoun County**
- **Species: Approximately 2,000 mixed pairs of nesting birds including colonial waterbirds**
- **Key Terms: Education, Bird, Management, Enhancement, Rookery, Protected Species, Migration, Pond**


GUADALUPE FIELDS

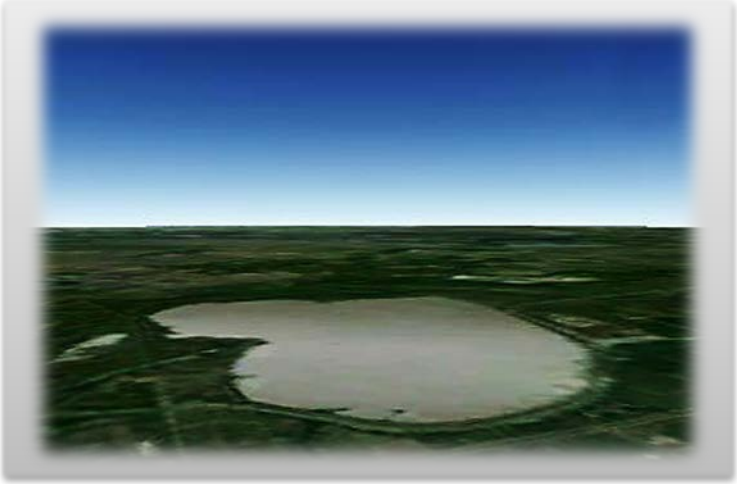
Site Number: 7
Approximate Latitude: 28°32'9.10" N
Approximate Longitude: 96°54'35.39" W
Habitat Type: Listed as L2USCh, PAB4H, PFO1A and PFO1C by the 2008-2009 National Wetland Inventory, a lake, freshwater pond, and freshwater forest/shrub wetland, respectively, and designated as lake, pond/basin, and forest/scrub-shrub floodplain habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Restore hydrology of wetlands and swamp to remain wet during droughts and enhance the swamps by planting bald cypress trees (*Taxodium distichum*)**
- **Potential Partners: Landowner, NRCS, TAMUK, TPWD, USFWS**
- **Species: Approximately 10,000 nesting colonial waterbirds, waterfowl, and freshwater dependent organisms/ wetland communities**
- **Key Terms: Bird, Restoration, Enhancement, Rookery, Protected Species, Commercial Species, Bald cypress, Hydrology, Lake, Pond, Forest/Scrub-Shrub Wetland**



Site Number: 8
Approximate Latitude: 28°32'1.29" N
Approximate Longitude: 96°50'22.46" W
Habitat Type: Listed as L1UBH by the 2008-2009 National Wetland Inventory, a lake, and designated as lake habitat for this project.



### *Database Information*

- **Nominated in: Phase I and II**
- **Land Ownership: Calhoun County (purchase pending at time of report)**
- **Conservation Strategy: Develop management plan to ensure waterbird nesting, recreational use, conservation of sensitive areas, and water level management. Also, spread awareness of natural resources and acquire land**
- **Potential Partners: Calhoun County, CIAP, CBBEP, GBRA, ICF, Local industry, SABP, TPWD, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*), shorebirds, and nesting colonial waterbirds; and, with management may produce abundant waterfowl food and have an enhanced freshwater fishery**
- **Key Terms: Education, Recreation, Land Acquisition, Fish, Bird, Management, Enhancement, Rookery, Migration, Protected Species, Commercial Species, Endangered Species, Lake**


CARBIDE COLONY

Site Number: 9
Approximate Latitude: 28°30'0.34" N
Approximate Longitude: 96°47'15.03" W
Habitat Type: Listed as PAB3Hh and PABFh by the 2008-2009 National Wetland Inventory, freshwater ponds, and designated as pond/basin habitats for this project.

Example species of wildlife supported

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop management plan to ensure waterbird nesting**
- **Potential Partners: CBBEP, Local industry, SABP, TPWD, USFWS**
- **Species: Several thousand pairs of colonial nesting waterbirds**
- **Key Terms: Bird, Management, Rookery, Protected Species, Migration, Pond**


MARSH RANCH

Site Number: 10
Approximate Latitude: 28°26'45.17" N
Approximate Longitude: 96°51'11.77" W
Habitat Type: Listed as E2EM1P, E2US/EM1P, and E1UBL by the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine marine deepwater, respectively, and designated as tidal marsh, tidal marsh/flats mix, and open water habitats for this project, respectively.

Example species of wildlife supported

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop conservation easement or land acquisition**
- **Potential Partners: NRCS, TNC, TPWD, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*), waterfowl, Egrets, Herons, Avocets, Ibis, etc.**
- **Key Terms: Bird, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Wetlands, Tidal Marsh, Tidal Marsh/Flats Mix, Open Water**


NE MISSION LAKE

Site Number: 11
Approximate Latitude: 28°28'51.84" N
Approximate Longitude: 96°47'35.32" W
Habitat Type: Listed as E2SS3N by the 2008-2009 National Wetland Inventory, estuarine and marine wetland, and designated as forested/scrub-shrub floodplain habitat for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Calhoun County Westside Navigation District**
- **Conservation Strategy: Develop management plan for nesting birds and predators**
- **Potential Partners: CBBEP, SABP, TPWD, USFWS**
- **Species: Nesting colonial waterbirds and predators**
- **Key Terms: Bird, Management, Rookery, Predators, Protected Species, Forested/Scrub-Shrub Floodplain**


GUADALUPE DELTA SWAMP COLONY

Site Number: 12
Approximate Latitude: 28°27'57.86" N
Approximate Longitude: 96°49'48.13" W
Habitat Type: Listed as PEM1/SS3C PEM1C, PEM1A, PEM1F, and PUBH by the 2008-2009 National Wetland Inventory, freshwater emergent wetlands and freshwater pond, respectively, and designated as marsh/scrub-shrub mix, marshes, and pond/basin habitats for this project, respectively.

**Example species of wildlife supported**

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TPWD and Private**
- **Conservation Strategy: Develop management plan**
- **Potential Partners: CBBEP, SABP, TPWD, USFWS**
- **Species: Approximately 2,000 pairs of nesting colonial waterbirds**
- **Key Terms: Bird, Management, Rookery, Protected Species, Migration, Marsh/Scrub-Shrub Mix, Marsh, Pond**


TRAYLOR'S CUT

Site Number: 13
Approximate Latitude: 28°26'47.78" N
Approximate Longitude: 96°49'30.99" W
Habitat Type: Listed as R2UBH by the 2008-2009 National Wetland Inventory, riverine, and designated as river habitat for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Restore flow to Guadalupe Delta, reduce siltation where the river is diverted toward Mission Lake, away from the old river channel, and control invasive species**
- **Potential Partners: TPWD, NRCS, USFWS, GBRA**
- **Species: Wetland Communities**
- **Key Terms: Restoration, Invasive Species, Riverine Hydrology, River**


## KAMEY ISLAND ROOKERIES

Site Number: 14
Approximate Latitude: 28°26'52.07" N
Approximate Longitude: 96°48'35.49" W
Habitat Type: Listed as PEM1Ch, PSS3Ch, PABHh, and PUBHh by the 2008-2009 National Wetland Inventory, freshwater emergent wetland, freshwater forested/scrub-shrub wetland, and freshwater ponds, respectively, and designated as marsh, forested/scrub-shrub floodplain, and ponds/basins habitats for this project, respectively.

Example of inland rookery

### Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop management plan and recognition of colonial waterbird colonies**
- **Potential Partners: CBBEP, NRCS, SABP, TPWD, USFWS**
- **Species: Colonial waterbirds, waterfowl, and songbirds in riparian woodlands**
- **Key Terms: Education, Bird, Management, Rookery, Riparian, Protected Species, Commercial Species, Marsh, Forested/Scrub-Shrub Floodplain, Ponds**


GUADALUPE DELTA SHORELINE

Site Number: 15
Approximate Latitude: 28°24’32.56” N
Approximate Longitude: 96°46’19.62” W
Habitat Type: Listed as E2EM1N and E2EM1P by the 2008-2009 National Wetland Inventory, estuarine and marine wetland, and designated as tidal marsh habitats for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Restore eroding shoreline and develop management plan for lack of siltation from flooding and natural resources**
- **Potential Partners: ACOE, CBBEP, NRCS, SABP, TPWD, USFWS**
- **Species: Sensitive marsh communities, waterfowl, and endangered Whooping cranes (*Grus americana*)**
- **Key Terms: Bird, Management, Restoration, Endangered Species, Protected Species, Commercial Species, Wetlands, Tidal Marsh**


# Swan Point Ranch

Site Number: 16
Approximate Latitude: 28°24'49.84" N
Approximate Longitude: 96°46'35.64" W
Habitat Type: Listed as E2EM1N, E2ABN, E2ABM, and E1UBL by the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, respectively, and designated as tidal marsh, seagrass, and open water habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop a conservation easement or acquire land**
- **Potential Partners: NRCS, TNC, TPWD, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl, Egrets, Herons, Avocets, Ibis, etc.**
- **Key Terms: Bird, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Wetlands, Tidal Marsh, Seagrass, Open Water**


GUADALUPE DELTA

Site Number: 17
Approximate Latitude: 28°26'42.67" N
Approximate Longitude: 96°49'19.44" W
Habitat Type: Listed as E2EM1P, E2EM1N, E2US/EM1P, E2ABN, E2USN, and E1UBL on the 2008-2009 National Wetland Inventory, an estuarine and marine wetlands and deepwater, respectively, and designated as tidal marsh, tidal marsh/flats mix, seagrasses, sandbars/flats, and open water habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop a conservation easement or acquire land and restore marsh communities**
- **Potential Partners: NRCS, TNC, TPWD, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*) waterfowl, egrets, herons, avocets, ibis, etc.; and wetland communities**
- **Key Terms: Bird, Restoration, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Tidal Marsh/Flats Mix, Seagrasses, Sandbars/flats, Open Water**

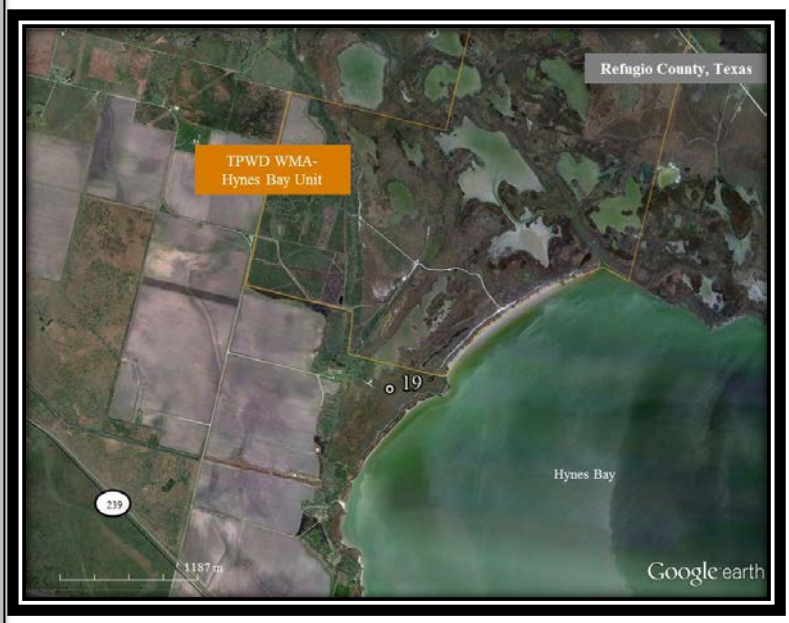

## San Antonio River Golden-Orb Habitat

Site Number: 18
Approximate Latitude: 28°30'16.62" N
Approximate Longitude: 96°57'56.42" W
Habitat Type: Not listed on the 2008-2009 National Wetland Inventory but, designated as riverine habitat for this project.

**Representative species**

### Database Information

- **Nominated in: Phase II**
- **Land Ownership: SARA**
- **Conservation Strategy: Monitoring habitat and density of potentially threatened species**
- **Potential Partners: SARA**
- **Species: Golden-Orb Mussel**
- **Key Terms: Monitoring, Riverine, Threatened Species, Freshwater Hydrology, Riverine**




RIVER PASTURE 2

Site Number: 19
Approximate Latitude: 28°25’27.10” N
Approximate Longitude: 96°51’19.80” W
Habitat Type: Listed as E2EM1P on the 2008-2009 National Wetland Inventory, an estuarine and marine wetland, and designated as tidal marsh habitat for this project.

**Example species of wildlife supported**

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: Private**
- **Conservation Strategy: Acquire land for the Texas Parks and Wildlife’s Wildlife Management Area (WMA)- Hynes Bay unit**
- **Potential Partners: CCA, DU, NRCS, TPWD, USFWS**
- **Species: Waterfowl, shorebirds, and wetland communities**
- **Key Terms: Bird, Land Acquisition, Protected Species, Commercial Species, Wetland, Tidal Marsh**


RIVER PASTURE 1

Site Number: 20
Approximate Latitude: 28°27'35.59" N
Approximate Longitude: 96°51'16.75" W
Habitat Type: Listed as E2EM1P and E2EM1N on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, and designated as tidal marsh habitats for this project.

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: Private**
- **Conservation Strategy: Acquire land for the Texas Parks and Wildlife's Wildlife Management Area (WMA)-Hynes Bay Unit**
- **Potential Partners: CCA, DU, NRCS, TPWD, USFWS**
- **Species: Waterfowl, shorebirds, and wetland communities**
- **Key Terms: Bird, Land Acquisition, Protected Species, Commercial Species, Wetland, Tidal Marsh**


McFaddin New Ranch Flat

Site Number: 21
Approximate Latitude: 28°30'35.93" N
Approximate Longitude: 96°57'43.13" W
Habitat Type: Listed as PEM1A, PEM1C, PSS1A, and PFO1A on the 2008-2009 National Wetland Inventory, freshwater emergent wetlands and freshwater forested/scrub-shrub wetlands, respectively, and designated as marsh and forested/scrub-shrub floodplains habitats for this project.

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: Private**
- **Conservation Strategy: Control invasive species and excavate shallow depressions for wetland development**
- **Potential Partners: DU, NRCS, TPWD, USFWS**
- **Species: Waterfowl, shorebirds, and wetland communities**
- **Key Terms: Bird, Enhancement, Protected Species, Commercial Species, Invasive Species, Riparian, Marsh, Forested/Scrub-Shrub Floodplain**


## McFaddin New Ranch

Site Number: 22
Approximate Latitude28°30'22.19" N
Approximate Longitude: 96°57'55.36" W
Habitat Type: Listed as PFO1A and PEM1C on the 2008-2009 National Wetland Inventory, freshwater forested/scrub-shrub wetlands and freshwater emergent wetland, and designated as forested/scrub-shrub floodplains and marsh habitats for this project.

### Database Information

- **Nominated in: Phase II**
- **Land Ownership: Private**
- **Conservation Strategy: Restore the riparian corridor and control invasive species and erosion**
- **Potential Partners: DU, NRCS, TPWD, USFWS**
- **Species: Waterfowl, colonial waterbirds, and wetland communities**
- **Key Terms: Bird, Restoration, Riparian, Protected Species, Commecial Species, Invasive Species, Forested/Scrub-Shrub, Marsh**


## San Antonio River Log Jams

Site Number: 23
Approximate Latitude: 28°30'12.79" N
Approximate Longitude: 96°58'33.48" W
Habitat Type: Not listed on the 2008-2009 National Wetland Inventory but, designated as riverine habitat for this project.

### Database Information

- **Nominated in: Phase I**
- **Land Ownership: Public and Private**
- **Conservation Strategy: Develop management plan to provide riparian and upland habitat for wildlife while also protecting human lives along the river**
- **Potential Partners: GBRA, GBRT, Landowners, SABF, SARA**
- **Species:**
- **Key Terms: Management, Restoration, Monitoring, Hydrology, Riverine**

# SAN ANTONIO BAY PENINSULAS

Two peninsulas border the San Antonio Bay system, Blackjack and Seadrift-Port O'Connor Ridge peninsulas. These peninsulas are part of the relict Pleistocene barrier strandplain (Tremblay and Calnan, 2011). Seadrift-Port O'Connor Ridge Peninsula is located on the northwest side of Espiritu Santo Bay and contains Seadrift and Port O'Connor communities. Blackjack Peninsula is located on the northwest side of Carlos, Mesquite, and Ayres bays. The peninsula is owned by the USFWS and is managed as part of the Aransas National Wildlife Refuge complex, which is renowned for providing wintering habitat for the last wild flock of endangered Whooping Cranes (*Grus americana*).

Blackjack and Seadrift-Port O'Connor Ridge peninsulas encompass the northern extent of the Pleistocene Ingleside Barrier Strandplain (Otvos and Howat, 1996). These linear landforms formed when sea level was about 6 meters higher than present. As sea-levels decreased, rivers flowing to the Gulf of Mexico incised the historic shoreline and separated the peninsulas. Although the ridge-and-swale topography ranges from 4-9 m in elevation, much of Blackjack and Seadrift-Port O'Connor Ridge peninsulas are less than 5 and 4 m, respectively (March and Smith, 2011).

The original sand ridges are still present on higher elevations and low, flood-susceptible shorelines occur along the peninsulas. The Ingleside Barrier Strandplain contains a diversity of habitats, including coastal prairie, freshwater depressional wetlands, and live oak mottes on the uplands, grading into brackish and salt marshes to subtidal seagrass beds in the estuarine waters of the bays. From 1956-2009, estuarine marsh increased primarily from upland to salt marsh conversion along the Gulf Intracoastal Waterway (GIWW). Additionally salt marsh in 2009 was located further inland than those documented earlier from salt marsh migrating to other wetlands habitats (Tremblay and Calnan, 2011).

Development pressure is minor on Blackjack Peninsula as the Aransas National Wildlife Refuge covers most of the landform. The refuge affords protection for the endangered Whooping Crane habitat. More development has occurred on Seadrift-Port O'Connor Ridge at the north-eastern point (Port O'Connor) and southern point (Seadrift); however, development speculation is high as all, or portions, of some large land holdings along the Gulf Intracoastal Waterway and Victoria Barge Canal are being sold to developers and sub-divided.

Nine sites along Blackjack and Seadrift-Port O'Connor Ridge peninsulas were recommended during this project (Fig. 6). Conservation strategies associated with these sites included: Management (7), Protection (4), and Restoration (3), Education (2), Monitoring (1), and Enhancement (1).

BLACKJACK AND SEADRIFT-PORT O'CONNOR RIDGE PENINSULAS


Figure 6. The location of nine recommended sites along Blackjack and Seadrift-Port O'Connor Ridge peninsulas within the peninsula geographic section of the San Antonio Bay system using Google Earth Pro software.


ANWR SHORELINE EROSION

Site Number: 24
Approximate Latitude: 28°16'22.62" N
Approximate Longitude: 96°47'52.79" W
Habitat Type: Listed as E2USN on the 2008-2009 National Wetland Inventory, an estuarine and marine wetland, and designated as sandbars/flats habitat for this project.

## Database Information

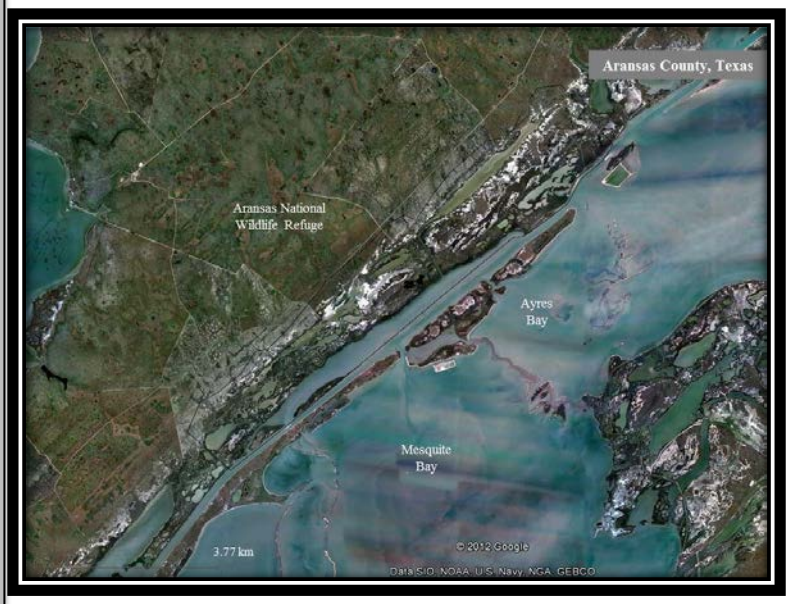
- **Nominated in: Phase I**
- **Land Ownership: U.S. Fish and Wildlife Service Aransas National Wildlife Refuge (ANWR)**
- **Conservation Strategy: Restore eroded shoreline and develop plan to maintain shoreline**
- **Potential Partners: USFWS**
- **Species: Oak trees**
- **Key Terms: Management, Restoration, Monitoring, Hydrology, Sandbars/Flats, Uplands**


ANWR
MUSTANG LAKE
WETLANDS

Site Number: 25
Approximate Latitude: 28°13'34.82" N
Approximate Longitude: 96°48'15.59" W
Habitat Type: Listed as E2EM1N, E2USN, E1UBL, E1AB3L, and PEM1A on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, and freshwater emergent wetlands, respectively, and designated as tidal marsh, sandbars/flats, open water, seagrasses, and marsh habitats for this project, respectively.

### Database Information

- **Nominated in: Phase I**
- **Land Ownership: U.S. Fish and Wildlife Service Aransas National Wildlife Refuge (ANWR)**
- **Conservation Strategy: Maintain the shoreline from GIWW wave erosion; and manage mangrove development**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl and shorebirds**
- **Key Terms: Bird, Management, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Sandbars/Flats, Open Water, Seagrasses, Marsh**




ANWR
SUNDOWN BAY
WETLANDS

Site Number: 26
Approximate Latitude: 28°11’13.95” N
Approximate Longitude: 96°51’23.15” W
Habitat Type: Listed as E2EM1N, E2USN, E1UBL, E1AB3L, and PEM1A on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, and freshwater emergent wetlands, respectively, and designated as tidal marsh, sandbars/flats, open water, seagrasses, and marsh habitats for this project, respectively.

### *Database Information*

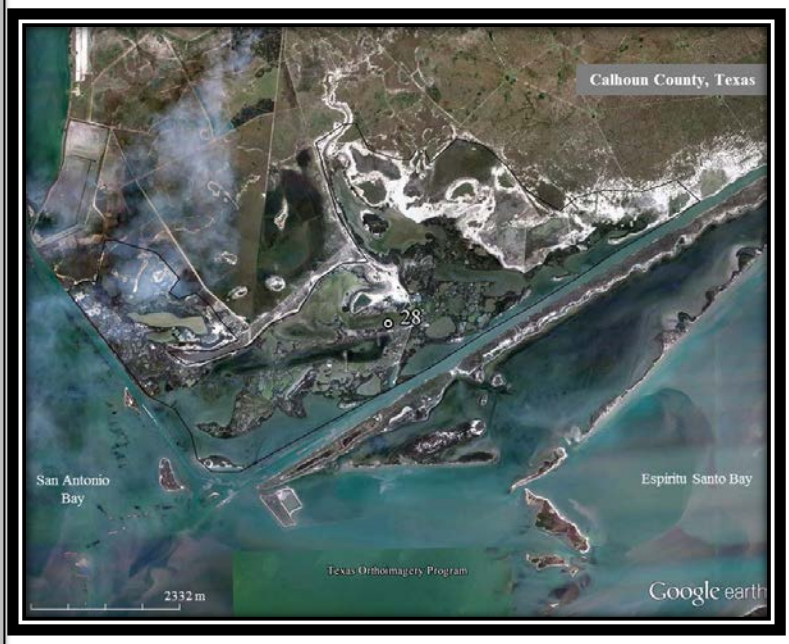
- **Nominated in: Phase I**
- **Land Ownership: U.S. Fish and Wildlife Service Aransas National Wildlife Refuge (ANWR)**
- **Conservation Strategy: Maintain the shoreline from GIWW wave erosion; manage mangrove development; and, develop management plan and education to share land with wintering Whooping cranes**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl and shorebirds**
- **Key Terms: Education, Bird, Management, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Sandbars/Flats, Open Water, Seagrasses, Marsh**


ANWR
DUNHAM BAY
WETLANDS

Site Number: 27
Approximate Latitude: 28°8’15.94” N
Approximate Longitude: 96°55’18.12” W
Habitat Type: Listed as E2EM1N, E2USN, E1UBL, E1AB3L, and PEM1A on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, and freshwater emergent wetlands, respectively, and designated as tidal marsh, sandbars/flats, open water, seagrasses, and marsh habitats for this project, respectively.

### *Database Information*

- **Nominated in: Phase I**
- **Land Ownership: U.S. Fish and Wildlife Service Aransas National Wildlife Refuge (ANWR)**
- **Conservation Strategy: Maintain the shoreline from GIWW wave erosion; manage mangrove development; and, develop management plan and education to share land with wintering Whooping cranes**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl and shorebirds**
- **Key Terms: Education, Bird, Management, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Sandbars/Flats, Open Water, Seagrasses, Marsh**




## WELDER FLATS

Site Number: 28
Approximate Latitude: 28°20'16.65" N
Approximate Longitude: 96°38'55.31" W
Habitat Type: Listed as E2EM1N, E2EM1P, E2USN, E2EM1/USN, E2EM1/USP, E2EM1/SS3P, E1UBL, E1AB3L, and PEM1A on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, and freshwater emergent wetlands, respectively, and designated as tidal marsh, sandbars/flats, tidal marsh/flats mix, tidal marsh/mangrove mix, open water, seagrasses, and marsh habitats for this project, respectively.

### Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop conservation easement or acquire land; restore hydrology; maintain the shoreline from GIWW wave erosion; manage mangrove development; brush control; and prescribed burning (some conservation mechanisms are already in place)**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl, and shorebirds**
- **Key Terms: Bird, Management, Restoration, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Sandbars/Flats, Tidal Marsh/Flats Mix, Tidal Marsh/Mangrove Mix, Open Water, Seagrasses, Marsh, Uplands**


ARAPAHO HOLDINGS

Site Number: 29
Approximate Latitude: 28°24'37.72" N
Approximate Longitude: 96°31'57.56" W
Habitat Type: Listed as E2EM1P, E2USN, E2US/EM1P, PEM1A, PEM1C, PEM1/SS3A, PEM1/SS3J on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and freshwater emergent wetlands, respectively, and designated as tidal marsh, sandbars/flats, tidal marsh/flats mix, marsh, and marsh/scrub-shrub mix habitats for this project, respectively.

### Database Information

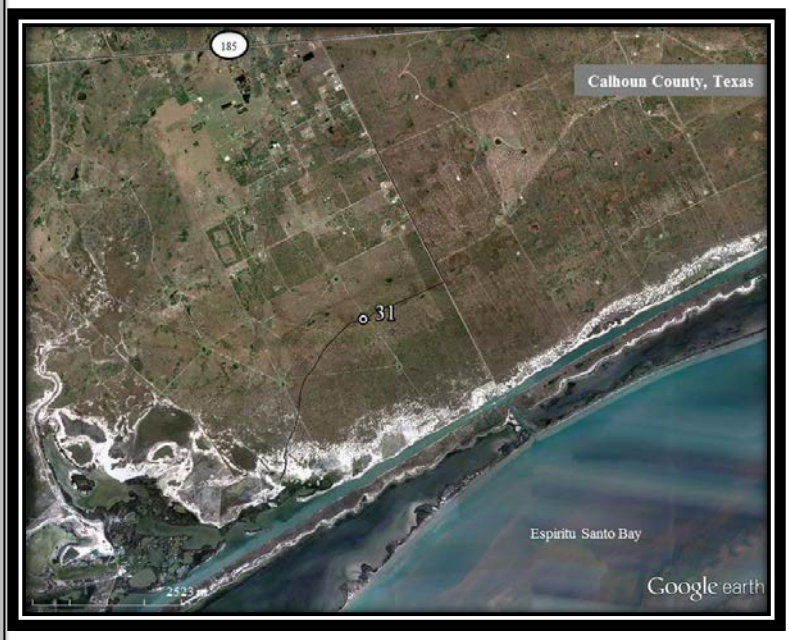
- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop conservation easement or acquire land to prevent development; maintain the shoreline from GIWW wave erosion; manage brush; and, prescribed burning; Upland wetlands were determined jurisdictional by the EPA (some conservation mechanisms are already in place)**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*), waterfowl, and shorebirds**
- **Key Terms: Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Sandbars/flats, Tidal Marsh/Flats Mix, Marsh, Marsh/Scrub-Shrub Mix, Uplands**


# North Seadrift-Port O'Connor Ridge Shoreline Wetlands

Site Number: 30
Approximate Latitude: 28°23'43.66" N
Approximate Longitude: 96°31'4.96" W
Habitat Type: Listed as E2EM1N, E2USN, E2ABM, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, and designated as tidal marsh, sandbars/flats, seagrasses, and open water habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop conservation easement or acquire land to prevent development; maintain the shoreline from GIWW wave erosion; manage brush; and, prescribed burning**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*), waterfowl, and shorebirds**
- **Key Terms: Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, , Migration, Tidal Marsh, Sandbars/Flats, Seagrasses, and Open Water, Uplands**




# WELDER DITCH

Site Number: 31
Approximate Latitude: 28°22’37.10” N
Approximate Longitude: 96°36’7.55” W
Habitat Type: Listed as PEM1A and PEM1C on the 2008-2009 National Wetland Inventory, freshwater emergent wetlands, and designated marsh habitats for this project, respectively.

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: Private**
- **Conservation Strategy: Restore natural freshwater inflows to the estuary**
- **Potential Partners: ICF, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*), shorebirds, and wetlands communities**
- **Key Terms: Bird, Restoration, Endangered Species, Protected Species, Migration, Marsh**


## Boggy Bayou Drainage

Site Number: 32
Approximate Latitude: 28°26'21.86" N
Approximate Longitude: 96°26'56.05" W
Habitat Type: Listed as E2EM1N, E2USN, E1UBL, PSS3/EM1A, and PEM1C on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, freshwater forested /shrub wetland, and freshwater emergent wetlands, and designated as tidal marsh, sandbars/flats, open water, marsh/scrub-shrub mix, and marsh habitats for this project, respectively.

### Database Information

- **Nominated in: Phase II**
- **Land Ownership: Private and Calhoun County**
- **Conservation Strategy: Develop conservation easement or acquire land and enhance water quality**
- **Potential Partners: Calhoun County, TGLO, TPWD, USFWS**
- **Species: Shorebirds and wetland and estuarine communities**
- **Key Terms: Bird, Enhancement, Conservation Easement, Land Acquisition, Protected Species, Water Quality, Migration, Tidal Marsh, Sanbars/Flats, Open Water, Marsh/Scrub-Shrub Mix, and Marsh**

# SAN ANTONIO BAY

The project area consists of multiple open water bays, with San Antonio Bay being the largest waterbody. The entire bay complex also includes Hynes Bay, Guadalupe Bay, and Mission Lake, secondary bays encompassing the Guadalupe Delta; Espiritu Santo Bay, located to the north of the mouth of the San Antonio Bay; and Mesquite Bay, located south of the San Antonio Bay.

Open bays includes open estuarine waters, oyster reefs, bay islands (often used rookery islands), natural passes, and dredged material islands. Open bay habitats encompass a majority of the project area and is characterized by deeper water (> 6 ft), unvegetated bay bottoms, and well-mixed water column. Oyster reefs are generally oriented perpendicular to the shorelines and historically bisected sections of open bays. Natural bay islands typically are exposed oyster reefs where shell hash accumulated at higher elevation, therefore allowing salt-tolerant vegetation to establish.

Dredged material islands (DMIs) were constructed from excavated material obtained when constructing and maintaining navigational waterways, the most prominent being the Gulf Intracoastal Waterway (GIWW) and Victoria Barge Canal. These islands have changed hydrodynamic patterns in the bay system. Many are still reserved for use by United States Army Corps of Engineers (USACE) as containment levees for GIWW maintenance. While these islands have changed hydrologic patterns in the bay system, some DMIs have been used beneficially for marsh creation and enhancement, and, in some scenarios, to create additional habitat for Whooping Cranes.

Rookery islands are used seasonally by colonial nesting waterbirds, including herons, egrets, spoonbills, terns, skimmers, and gulls. These habitats are essential to maintain the coastal populations of these species. Depending on the size and habitat complexity of a rookery island in the estuary, up to 24 species can nest during the season (generally January-August). The larger birds typically use the brush habitat, whereas the smaller species use the unvegetated shell and sandy shorelines. Additional rookeries are located in the riverine and freshwater marshes of the project area, and can harbor hundreds of pairs of herons and egrets as well as some other key species.

Each season, nesting and fledging success at rookeries is dependent on isolation from predation and human disturbance. Most mammalian predators will impact rookeries when access, such as shallow waters or reefs connecting to the mainland or developed areas, is available. Predation also occurs by gulls and other birds if human activity near or on the rookery forces the breeding adults away from the nests. Over the long-term scale, estuarine rookeries can diminish in size and habitat complexity from the effects of erosion and sea-level rise. In addition, wave energy from passing watercraft along navigational waterways can increase erosion effects.

Oyster reefs provide essential habitat for estuarine aquatic species and are commercially important in Texas bays. Oysters are harvested from public reefs and privately leased reefs throughout Texas bays. The largest portion of public reef areas harvested commercially and recreationally is located in bays with freshwater inflows; Galveston, Matagorda, and San Antonio Bay systems (TPWD, 2011). However, no public leases are issued outside of Galveston Bay (Norman Boyd, personal communication, August 19, 2011). Additionally, oyster reefs are important filter-feeders that aid in maintaining bay and estuary water quality.

Oysters reach optimum growth, reproduction, and survival at water temperatures between 68 to 86$^{o}$ F and salinities between 10 to 30 ppt. However, oysters can survive in temperatures ranging from 28 to 97$^{o}$ F and salinities ranging from 2 to 40 ppt. Although oysters can survive at these sub-optimal temperatures and salinities, oyster health can be impacted by disease and parasites.

Twenty-two sites within the open water bays of the San Antonio Bay system were recommended during this project (Fig. 7). Conservation strategies associated with these sites included: Management (11), Protection (10), and Education (9), Restoration (9), Monitoring (3), Enhancement (2), and Creation (1).

SAN ANTONIO BAY- ISLANDS, ROOKERIES, AND REEFS


Figure 7. The location of twenty-two recommended sites within the open bays geomorphic section of the San Antonio Bay system using Google Earth Pro software.


## DUNHAM ISLAND WETLANDS

Site Number: 33
Approximate Latitude: 28°7'33.78" N
Approximate Longitude: 96°54'48.84" W
Habitat Type: Listed as E2EM1Ns, E2USPs, E2USNs, and E1AB3L on the 2008-2009 National Wetland Inventory, estuarine and marine, and designated as tidal marsh, sandbars/flats, and seagrasses habitats for this project, respectively.

### *Database Information*

- **Nominated in: Phase I**
- **Land Ownership: ACOE, TGLO**
- **Conservation Strategy: Develop conservation easement or acquire land; develop management plan to share land with wintering Whooping cranes; and manage shoreline erosion and mangrove development**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Sandbars/Flats, Seagrasses**


# GRASS ISLAND

Site Number: 34
Approximate Latitude: 28°7’53.88” N
Approximate Longitude: 96°54’59.82” W
Habitat Type: Listed as E2EM1N and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, and designated as tidal marsh, and open water habitats for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO**
- **Conservation Strategy: Develop a new island using dredge spoil to enhance the present island**
- **Potential Partners: ACOE, CBBEP, SABP, TGLO**
- **Species: Colonial waterbirds**
- **Key Terms: Bird, Enhancement, Rookery, Protected Species, Migration, Tidal Marsh, Open Water**


ANWR South Bludworth Island Wetlands

Site Number: 35
Approximate Latitude: 28°7'57.29" N
Approximate Longitude: 96°54'25.39" W
Habitat Type: Listed as E2EM1N, E2AB3L, and E2USPs on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, and designated as tidal marsh, seagrasses, and sandbars/flats habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: U.S. Fish and Wildlife Service Aransas National Wildlife Refuge**
- **Conservation Strategy: Develop management plan to share land with wintering Whooping cranes; and manage shoreline erosion and mangrove development**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Seagrasses, Sandbars/Flats**


ANWR North Bludworth Island Wetlands

Site Number: 36
Approximate Latitude: 28°9'57.19" N
Approximate Longitude: 96°52'24.18" W
Habitat Type: Listed as E2EM1Ms, E2EM1Ns, E2ABNh, E2USN, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, and designated as tidal marsh, seagrasses, sandbars/flats, and open water habitats for this project, respectively.

### Database Information

- **Nominated in: Phase I**
- **Land Ownership: U.S. Fish and Wildlife Service Aransas National Wildlife Refuge**
- **Conservation Strategy: Develop management plan to share land with wintering Whooping cranes; and manage shoreline erosion and mangrove development**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Seagrasses, Sandbars/Flats, Open Water**


# Roddy Island Wetlands

Site Number: 37
Approximate Latitude: 28°10'52.75" N
Approximate Longitude: 96°50'53.12" W
Habitat Type: Listed as E2EM1Ns, E2ABNs, E2USMs, and E2USNs on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, and designated as tidal marsh, seagrasses, and sandbars/flats habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Outside U.S. Fish and Wildlife Service Aransas National Wildlife Refuge boundaries, other entities (state and federal) should be consulted**
- **Conservation Strategy: Develop conservation easement or acquire land; develop management plan to share land with wintering Whooping cranes; and manage shoreline erosion and mangrove development**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Seagrasses, Sandbars/Flats**


## RATTLESNAKE ISLAND WETLANDS

Site Number: 38
Approximate Latitude: 28°11'25.98" N
Approximate Longitude: 96°50'12.66" W
Habitat Type: Listed as E2EM1Ns, E2EM1Ps, E2ABNs, and E2USNs on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, and designated as tidal marsh, seagrasses, and sandbars/flats habitats for this project, respectively.

### *Database Information*

- **Nominated in: Phase I**
- **Land Ownership: Portions within the U.S. Fish and Wildlife Service Aransas National Wildlife Refuge and other entities (stated and federal)**
- **Conservation Strategy: Develop conservation easement or acquire land for portion not within ANWR; develop management plan to share land with wintering Whooping cranes; and manage shoreline erosion and mangrove development**
- **Potential Partners: ACOE, CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, TXDOT, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*) and Piping plover (*Charadrius melodus*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Seagrasses, Sandbars/Flats**


SHOALWATER BAY WETLANDS

Site Number: 39
Approximate Latitude: 28°20'12.47" N
Approximate Longitude: 96°36'44.67" W
Habitat Type: Listed as E2EM1N, E2EM1Ps, E2USM, E2USN, E2USP, E1AB3L, E2ABM, E1UBL, PUBKh, and PEM1Kh on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, freshwater pond, and freshwater emergent wetland, and designated as tidal marsh, sandbars/flats, seagrasses, ponds/basins, and marsh habitats for this project, respectively.

### *Database Information*

- **Nominated in: Phase I**
- **Land Ownership: TGLO**
- **Conservation Strategy: Develop conservation easement or acquire land; develop management plan from siltation and mangrove development; and, develop education to share land with wintering Whooping cranes**
- **Potential Partners: ACOE, CCA, ICF, TPWD, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*) and Piping plover (*Charadrius melodus*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Marsh, Seagrasses, Sandbars/Flats, Ponds/Basins, Marsh**


# Dewberry Island Wetlands

Site Number: 40
Approximate Latitude: 28°22'57.06" N
Approximate Longitude: 96°31'33.18" W
Habitat Type: Listed as E2EM1N, E1AB3L, E2USNs, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine marine deepwater, and designated as tidal marsh, seagrasses, sandbars/flats, and open water habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO**
- **Conservation Strategy: Develop conservation easement or acquire land; develop management plan to allow ridge to become vegetated and not become elevated; management plant from siltation and mangrove development; and, develop education to share land with wintering Whooping cranes**
- **Potential Partners: ACOE, CCA, ICF, TPWD, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*) and Piping plover (*Charadrius melodus*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Flat, Tidal Marsh, Seagrasses, Sandbars/Flats, Open Water**


# BLACKBERRY ISLAND WETLANDS

Site Number: 41
Approximate Latitude: 28°24'44.59" N
Approximate Longitude: 96°27'47.54" W
Habitat Type: Listed as E2EM1N, E2USP, E2USNs, E1AB3L, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, and designated as tidal marsh, sandbar/flats, seagrasses, and open water habitats for this project, respectively.

## *Database Information*

- **Nominated in: Phase I**
- **Land Ownership: TGLO**
- **Conservation Strategy: Develop conservation easement or acquire land; develop management plan from siltation and mangrove development; and, develop education to share land with wintering Whooping cranes**
- **Potential Partners: ACOE, CCA, ICF, TPWD, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*) and Piping plover (*Charadrius melodus*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Flat, Tidal Marsh, Seagrasses, Sandbar/Flats, Open Water**


# BAYUCOS ISLAND WETLANDS

Site Number: 42
Approximate Latitude: 28°24'39.05" N
Approximate Longitude: 96°24'45.99" W
Habitat Type: Listed as E2EM1M, E2EM1N, E2USP, E1AB3L, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, and designated as tidal marsh, sandbar/flats, seagrasses, and open water habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Portions within U.S. Fish and Wildlife Service Aransas National Wildlife Refuge and other entities (stated and federal) should be consulted**
- **Conservation Strategy: Develop conservation easement or acquire land; develop management plan from siltation and mangrove development; and, develop education to share land with wintering Whooping cranes**
- **Potential Partners: ACOE, CCA, ICF, TPWD, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*) and Piping plover (*Charadrius melodus*), waterfowl, and shorebirds**
- **Key Terms: Education, Bird, Management, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Commercial Species, Migration, Tidal Flat, Tidal Marsh, Seagrasses, Sandbars/Flats, Open Water**


SEADRIFT ISLAND 609-280C

Site Number: 43
Approximate Latitude: 28°23'19.17" N
Approximate Longitude: 96°43'33.32" W
Habitat Type: Not listed on the 2008-2009 National Wetland Inventory.


## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO owned and leased by the Audubon Society**
- **Conservation Strategy: Restoration from erosion**
- **Potential Partners: ACOE, CBBEP, Gulf Ecosystem Restoration Task, SABP, TGLO**
- **Species: Nesting colonial waterbirds**
- **Key Terms: Bird, Restoration, Rookery, Protected Species, Migration**


SEADRIFT ISLAND
609-280B AND
CHAIN

Site Number: 44
Approximate Latitude: 28°23'40.41" N
Approximate Longitude: 96°43'39.92" W
Habitat Type: Not listed on the 2008-2009 National Wetland Inventory.

## Database Information

- **Nominated in: Phase I and II**
- **Land Ownership: TGLO owned and leased by the Audubon Society**
- **Conservation Strategy: Restoration from erosion and develop a 4-6 acre island using dredge material from adjacent navigation channels**
- **Potential Partners: Audubon Society, Bird Conservancy, Calhoun County, Port of Victoria, TGLO, TPWD, West Side Calhoun County Navigation District**
- **Species: Nesting Colonial Waterbirds**
- **Key Terms: Bird, Restoration, Enhancement, Rookery, Protected Species, Migration**


SECOND CHAIN ISLANDS

Site Number: 45
Approximate Latitude: 28°11'34.98" N
Approximate Longitude: 96°48'51.90" W
Habitat Type: Listed as E2EM1N and E2USN on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, and designated as tidal marsh and sandbar/flats habitats for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO owned and leased by the Audubon Society**
- **Conservation Strategy: Restoration from erosion**
- **Potential Partners: ACOE, CBBEP, Gulf Ecosystem Restoration Task, SABP, TGLO**
- **Species: Colonial Waterbirds, Egrets, Herons, Skimmers, and Terns**
- **Key Terms: Bird, Restoration, Rookery, Protected Species, Migration, Tidal Marsh, Sandbar/Flats**


BIG BIRD ISLAND

Site Number: 46
Approximate Latitude: 28°16'30.45" N
Approximate Longitude: 96°44'6.57" W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated as open water habitat for this project.

Example of rookery signage

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Develop new rookery island since no other rookery island exists in the area**
- **Potential Partners: ACOE, CBBEP, Gulf Ecosystem Restoration Task, SABP, TGLO**
- **Species: Potential colonial waterbirds**
- **Key Terms: Bird, Creation, Rookery, Protected Species, Migration, Open Water**


SOUTH PASS ISLANDS

Site Number: 47
Approximate Latitude: 28°17'49.47" N
Approximate Longitude: 96°37'18.82" W
Habitat Type: Listed as E2EM1P and E2USP on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, and designated as tidal marsh and sandbar/flats habitats for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO**
- **Conservation Strategy: Restoration from erosion and need protection from boaters**
- **Potential Partners: ACOE, CBBEP, Gulf Ecosystem Restoration Task, SABP, TGLO**
- **Species: Nesting colonial waterbirds, Black Skimmers (*Rynchops niger*), and Royal Terns (*Thalasseus maximus*)**
- **Key Terms: Bird, Restoration, Rookery, Protected Species, Sensitive Species, Migration, Tidal Marsh, Sandbar/Flats**


# Victoria Barge Canal Island

Site Number: 48
Approximate Latitude: 28°20'49.95" N
Approximate Longitude: 96°42'23.67" W
Habitat Type: Listed as E2EM1N, E2EM1P, and E2USN on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, and designated as tidal marsh and sandbar/flats habitats for this project.

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: TGLO**
- **Conservation Strategy: Develop conservation easement or acquire land and restoration of habitat if determined suitable for the Aplomado falcon; Aplomado falcon was seen on the island in the winter of 2010**
- **Potential Partners: CBBEP, SABP, TGLO, USFWS**
- **Species: Endangered Aplomado falcon (*Falco femoralis*)**
- **Key Terms: Bird, Restoration, Conservation Easement, Land Acquisition, Endangered Species, Bay Island, Tidal Marsh, Sandbars/Flats**


# TURNSTAKE ISLAND COMPLEX

Site Number: 49
Approximate Latitude: 28°19'0.58" N
Approximate Longitude: 96°40'47.17" W
Habitat Type: Listed as E2EM1N, E2EM1P, E2USP and E2USN on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, and designated as tidal marsh and sandbar/flats habitats for this project.

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: TGLO**
- **Conservation Strategy: Restoration of habitat for potential rookery islands, removing invasive species, and thinning vegetation**
- **Potential Partners: CBBEP, SABP, TGLO, USFWS**
- **Species: Nesting colonial waterbirds**
- **Key Terms: Bird, Restoration, Rookery, Protected Species, Migration, Tidal Marsh, Sandbar/Flats**


CHESTER ISLAND

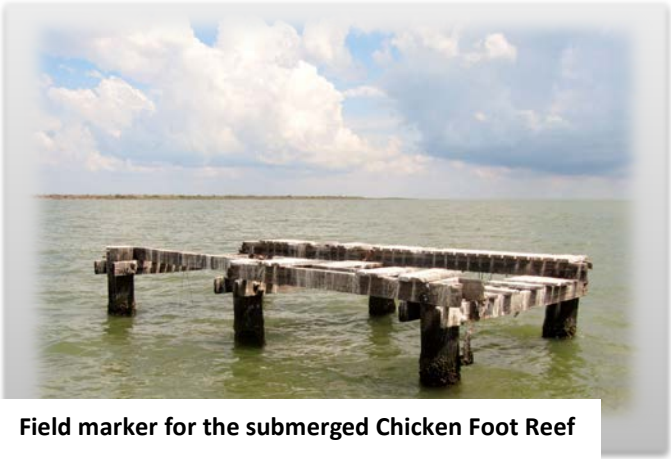
Site Number: 50
Approximate Latitude: 28°27'6.25" N
Approximate Longitude: 96°20'46.30" W
Habitat Type: Listed as E2USN, PUBF, and PEM1C on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, freshwater pond, and freshwater emergent wetland, respectively, and designated as sandbar/flats, ponds/basins, and marsh habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO owned and leased by the Audubon Society**
- **Conservation Strategy: Restoration from erosion and maintenance of largest rookery in bay system. Actually located in Matagorda Bay system, but included because of its size and importance.**
- **Potential Partners: ACOE, CBBEP, CCA, National Audubon Society, SABP, TPWD, USFWS**
- **Species: Colonial waterbirds**
- **Key Terms: Bird, Management, Restoration, Rookery, Protected Species, Migration, Sandbar/Flats, Ponds, Marsh**


## Chicken Foot Oyster Reef

Site Number: 51
Approximate Latitude: 28°12'54.46" N
Approximate Longitude: 96°46'17.35" W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated open water habitat for this project.



Field marker for the submerged Chicken Foot Reef

### Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Restore degraded oyster reef and fishery habitat. Additional research on the health of the existing reef may be required.**
- **Potential Partners: CCA, TGLO, TPWD**
- **Species: Shellfish and fishery habitat**
- **Key Terms: Shellfish, Fish, Restoration, Commercial Species, Oyster Reef, Open Water**


# Upper-San Antonio Bay Oyster Reefs

Site Number: 52
Approximate Latitude: 28°22’57.35” N
Approximate Longitude: 96°46’28.25” W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated as open water habitats for this project.

## Database Information

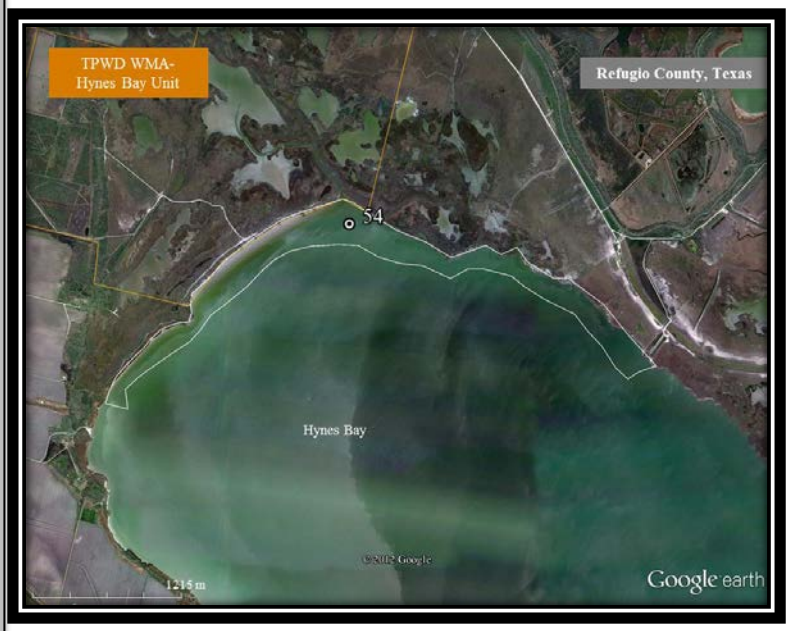
- **Nominated in: Phase II**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Monitor and develop a more comprehensive database for oyster habitat and density; data in region used from Senate Bill 3 GSA BBEST**
- **Potential Partners: TPWD, SARA**
- **Species: Shellfish and fishery habitat**
- **Key Terms: Shellfish, Fish, Monitoring, Oyster Reef, Commercial Species, Open Water**


## Mission Lake-Guadalupe Bay Rangia Clams

Site Number: 53
Approximate Latitude: 28°28'14.37" N
Approximate Longitude: 96°48'14.46" W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated as open water habitats for this project.

### Database Information

- **Nominated in: Phase II**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Monitor and develop a more comprehensive database for rangia clam (*Rangia* spp.) habitat and density; data in region used from Senate Bill 3 GSA BBEST**
- **Potential Partners: TPWD, SARA**
- **Species: Shellfish and fishery habitat**
- **Key Terms: Shellfish, Fish, Monitoring, Clams, Bay Bottom, Open Water**




# Hynes Bay Tire Removal

Site Number: 54
Approximate Latitude: 28°25'52.10" N
Approximate Longitude: 96°50'15.04" W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated as open water habitats for this project.

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: Private and TGLO submerged land**
- **Conservation Strategy: Restoration by removing tires that have been moved off the shoreline into the nearshore area**
- **Potential Partners: CCA**
- **Species: Fishery habitat**
- **Key Terms: Fish, Management, Restoration, Monitoring, Open Water**

## SAN ANTONIO BARRIER ISLANDS

Matagorda Island shelters the San Antonio Bay system from the Gulf of Mexico and is the northern barrier island located within the study area. It is jointly owned by The Texas General Land Office (TGLO) and USFWS and is managed as the Aransas National Wildlife Refuge Matagorda Unit and State Natural Area by cooperation between USFWS and TPWD. Matagorda Island is 38 miles long and ranges in width from <1 mile to 4.5 miles. The island is located between San Antonio Bay and the Gulf of Mexico in southern Calhoun County, Texas. San Jose Island is located immediately south of Matagorda Island; Cedar Bayou, an intermittent exchange channel, forms the boundary between Matagorda Island and San Jose Island. San Jose Island is privately owned and operates as a working cattle ranch.

Matagorda and San Jose barrier islands provide the eastern boundary of the study area and were formed about 5,000 years ago as accretionary barrier spits along the mainland and Gulf of Mexico. The island profile encompasses several dynamic habitats including gulf shore, foredunes, mid-island ridge and swales, back dunes, tidal flats, and coastal marshes. Freshwater wetlands are located within the swales and temporarily fill following rain events.

The islands have experienced minor development dating back as early as the Civil War, and include an abandoned lighthouse and airport runway on the northern tip and a lodge and ranching operation (Wynn Lodge) at the southern tip of Matagorda Island. This island is owned and managed by three governmental agencies (U.S. Fish & Wildlife Service, Texas Parks & Wildlife, and Texas General Land Office) within various agreements. San Jose Island, which is privately owned, has lodges and ranching operations about midway along the island. Currently, no plans are being developed to build or divide on either island.

Natural passes that historically connected the bay system to the Gulf of Mexico included Pass Cavallo at the northern extent and Cedar Bayou Pass at the southern extent of Matagorda Island. Both passes have been hydrologically compromised from the artificially created and maintained ship channels at Matagorda Bay and Port Aransas (south of the project area). Pass Cavallo has become much shallower over time; and Cedar Bayou Pass is only open following tropical storms.

Thirteen sites along Matagorda and San Jose barrier islands were recommended during this project (Fig. 8). Conservation strategies associated with these sites included: Management (11), Monitoring (7), and Education (4), Restoration (2), and Protection (1).


Figure 8. The location of thirteen recommended sites along Matagorda Island within the barrier island geographic section of the San Antonio Bay system using Google Earth Pro software.


# CEDAR BAYOU PASS

Site Number: 55
Approximate Latitude: 28°4'4.20" N
Approximate Longitude: 96°50'55.42" W
Habitat Type: Listed as E2EM1N, E2USM, E2USN, E2ABM, M2USP, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetland, estuarine and marine deepwater, and designated as tidal marsh, sandbar/flats, seagrasses, beach and open water habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Restore hydrologic connection between San Antonio Bay and the Gulf of Mexico**
- **Potential Partners: ACOE, Aransas County, Aransas County Navigation District, Calhoun County, CBBEP, Coastal Conservation Association, SABP, TGLO, TPWD, USFWS**
- **Species: Fishery habitat**
- **Key Terms: Fish, Restoration, Hydrology, Gulf Pass, Tidal Marsh, Sandbar/Flats, Seagrasses, Beach, Open Water**


## St. Joe Marsh/Tidal Flat

Site Number: 56
Approximate Latitude: 28°5'32.78" N
Approximate Longitude: 96°51'56.94" W
Habitat Type: Listed as E2EM1N, E2EM1M, E2USM, E2USN, E2SS3P, E2ABM, E1AB3L, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, and designated as tidal marsh, sandbar/flats, mangrove, seagrasses, and open water habitats for this project, respectively.

### Database Information

- **Nominated in: Phase I**
- **Land Ownership: Private**
- **Conservation Strategy: Develop conservation easement and acquire land**
- **Potential Partners: ACOE, CBBEP, NRCS, SABP, TGLO, TNC, TPWD, USFWS**
- **Species: Endangered Whooping crane (*Grus americana*) and shorebirds**
- **Key Terms: Bird, Conservation Easement, Land Acquisition, Endangered Species, Protected Species, Migration, Barrier Island, Tidal Marsh, Sandbar/Flats, Mangrove, Seagrasses, Open Water**


## South Matagorda Island Tidal Fan Wetlands

Site Number: 57
Approximate Latitude: 28°10’8.11” N
Approximate Longitude: 96°46’56.38” W
Habitat Type: : Listed as E2EM1N, E2EM1P, E2USP, E2USN, E2ABM, E1AB3L, PEM1A, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, and freshwater emergent wetlands, and designated as tidal marsh, sandbar/flats, seagrasses, marsh, and open water habitats for this project, respectively.

### Database Information

- **Nominated in: Phase I**
- **Land Ownership: USFWS**
- **Conservation Strategy: Restore hydrologic connectivity via culverts in roads and levees, and breaches in levees; and, develop management plan for mangrove establishment and education to share land with wintering Whooping cranes**
- **Potential Partners: CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*) and shorebirds**
- **Key Terms: Education, Bird, Management, Restoration, Endangered Species, Protected Species, Barrier Island, Tidal Marsh, Sandbar/Flats, Seagrasses, Marsh, Open Water**


PANTHER POINT BACK BARRIER WETLANDS

Site Number: 58
Approximate Latitude: 28°12’59.56” N
Approximate Longitude: 96°40’49.25” W
Habitat Type: Listed as E2EM1N, E2EM1P, E2USP, E2USN, E1AB3L, E1UBL, and PEM1A on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, and freshwater emergent wetlands, respectively, and designated as tidal marsh, sandbar/flats, seagrasses, open water, and marsh habitats for this project, respectively.

## Database Information

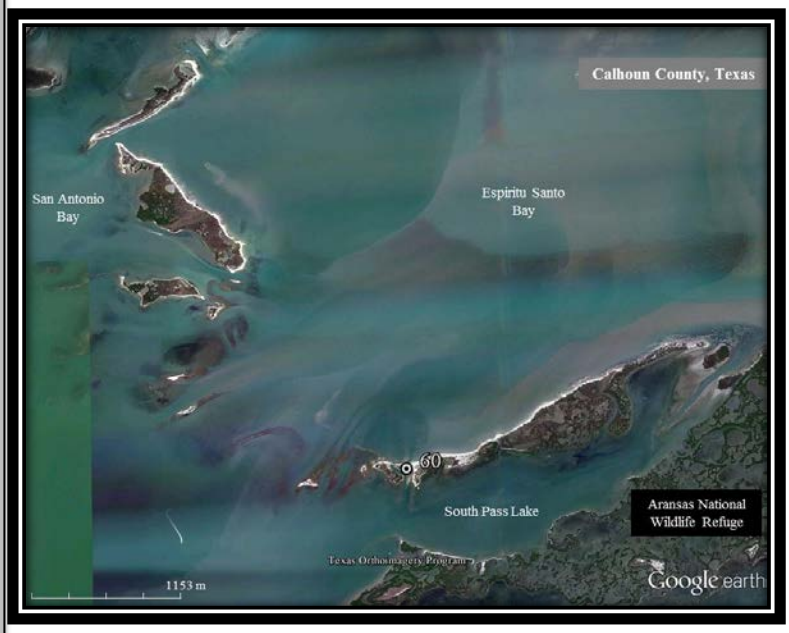
- **Nominated in: Phase I**
- **Land Ownership: USFWS**
- **Conservation Strategy: Develop management plan for mangrove establishment and education to share land with wintering Whooping cranes**
- **Potential Partners: CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*) and shorebirds**
- **Key Terms: Education, Bird, Management, Endangered Species, Protected Species, Migration, Tidal Marsh, Sandbar/Flats, Seagrasses, Open Water, Marsh**


LONG LAKE ENTRANCE

Site Number: 59
Approximate Latitude: 28°16'11.04" N
Approximate Longitude: 96°37'21.65" W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated as open water habitat for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Maintain hydrologic connectivity with San Antonio Bay system**
- **Potential Partners: CCA, TGLO, TPWD**
- **Species: Fishery habitat**
- **Key Terms: Fish, Management, Monitoring, Bay Pass, Hydrology, Open Water**




SOUTH PASS LAKE ENTRANCE

Site Number: 60
Approximate Latitude: 28°17'31.79" N
Approximate Longitude: 96°36'14.63" W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated as open water habitat for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Maintain hydrologic connectivity with San Antonio Bay system**
- **Potential Partners: CCA, TGLO, TPWD**
- **Species: Fishery habitat**
- **Key Terms: Fish, Management, Monitoring, Bay Pass, Hydrology, Open Water**


CONTEE LAKE-VANDEVEER ISLAND BACK BARRIER WETLANDS

Site Number: 61
Approximate Latitude: 28°17'14.60" N
Approximate Longitude: 96°34'7.52" W
Habitat Type: Listed as E2EM1N, E2EM1M, E2EM1P, E2USP, E2USN, E1AB3L, E1UBL, and PEM1A on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, estuarine and marine deepwater, and freshwater emergent wetlands, respectively, and designated as tidal marsh, sandbar/flats, seagrasses, open water, and marsh habitats for this project, respectively.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: USFWS**
- **Conservation Strategy: : Develop management plan for mangrove establishment and education to share land with wintering Whooping cranes**
- **Potential Partners: CBBEP, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*) and shorebirds**
- **Key Terms: Education, Bird, Management, Endangered Species, Protected Species, Migration, Tidal Marsh, Sandbar/Flats, Seagrasses, Open Water, Marsh**


PRINGLE LAKE ENTRANCE

Site Number: 62
Approximate Latitude: 28°19'28.75" N
Approximate Longitude: 96°30'52.81" W
Habitat Type: Listed as E2EM1M, E2USN, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetland and estuarine and marine deepwater, and designated as tidal marsh, sandbar/flats, and open water habitat for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Maintain hydrologic connectivity with San Antonio Bay system**
- **Potential Partners: CCA, TGLO, TPWD**
- **Species: Fishery habitat**
- **Key Terms: Fish, Management, Monitoring, Bay Pass, Hydrology, Tidal Marsh, Sandbar/Flats, Open Water**


# BACK BAY WETLANDS

Site Number: 63
Approximate Latitude: 28°22'16.33" N
Approximate Longitude: 96°25'8.61" W
Habitat Type: Listed as E2EM1N, E2EM1M, E2EM1P, E2USP, E2USN, E2USM, E2ABM, E1AB3L, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands and estuarine and marine deepwater, respectively, and designated as tidal marsh, sandbar/flats, seagrasses, and open water habitats for this project, respectively.

## *Database Information*

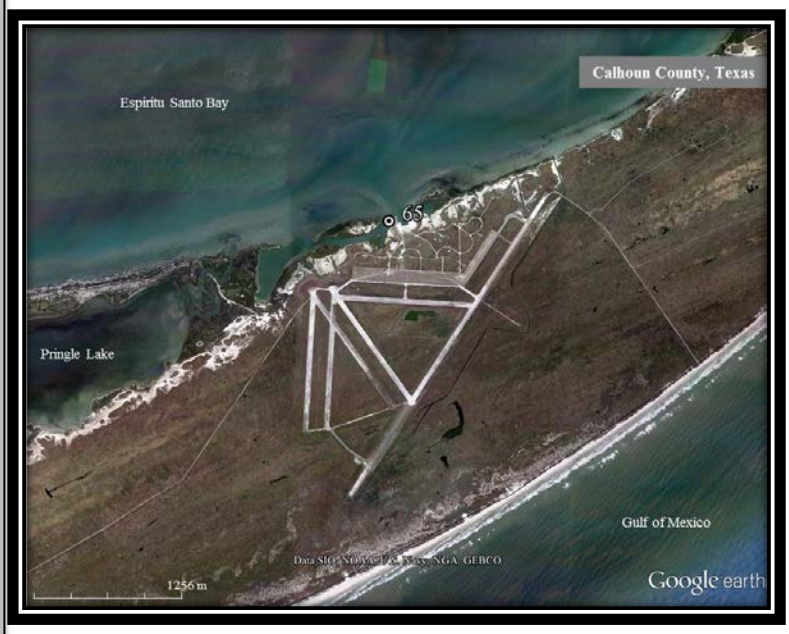
- **Nominated in: Phase I**
- **Land Ownership: USFWS**
- **Conservation Strategy: Develop management plan for mangrove establishment and education to share land with wintering Whooping cranes; and, maintain hydrologic passes throughout the area**
- **Potential Partners: : CBBEP, CCA, EPA, ICF, GBRA, NOAA, NRCS, SABP, SARA, TGLO, TPWD, USFWS**
- **Species: Endangered Whooping cranes (*Grus americana*) and shorebirds**
- **Key Terms: Education, Bird, Fish, Management, Endangered Species, Protected Species, Migration, Wetlands, Barrier Island, Tidal Marsh, Sandbar/Flats, Seagrasses, Open Water**


SUNDAY BEACH

Site Number: 64
Approximate Latitude: 28°23'22.66" N
Approximate Longitude: 96°24'5.27" W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated open water habitat for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Maintain hydrologic connectivity with San Antonio Bay system**
- **Potential Partners: CCA, TGLO, TPWD**
- **Species: Fishery habitat**
- **Key Terms: Fish, Management, Monitoring, Gulf Pass, Hydrology, Open Water**




ARMY HOLE ENTRANCE

Site Number: 65
Approximate Latitude: 28°19'58.20" N
Approximate Longitude: 96°27'52.63" W
Habitat Type: Listed as E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine deepwater, and designated as open water habitat for this project.

## Database Information

- **Nominated in: Phase I**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Maintain hydrologic connectivity with San Antonio Bay system**
- **Potential Partners: CCA, TGLO, TPWD**
- **Species: Fishery habitat**
- **Key Terms: Fish, Management, Monitoring, Bay Pass, Hydrology, Open Water**


PELICAN ISLAND AT PASS CAVALLO

Site Number: 66
Approximate Latitude: 28°21’36.60” N
Approximate Longitude: 96°23’57.65” W
Habitat Type: Listed as E2USN and M2USP on the 2008-2009 National Wetland Inventory, estuarine and marine wetlands, and designated sandbar/flats and beach habitats for this project.

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: TGLO submerged land**
- **Conservation Strategy: Maintain hydrologic connectivity with San Antonio Bay system and Gulf of Mexico**
- **Potential Partners: TPWD, TGLO, USFWS**
- **Species: Fishery Habitat**
- **Key Terms: Fish, Management, Monitoring, Bay/Gulf Pass, Hydrology, Sandbar/Flats, Beach**


Oil Well Cuts- Saluria Bayou

Site Number: 67
Approximate Latitude: 28°23'26.42" N
Approximate Longitude: 96°25'6.24" W
Habitat Type: Listed as E2EM1N, E2USN, E2USP, E2ABM, E1AB3L, E1UBLx, and E1UBL on the 2008-2009 National Wetland Inventory, estuarine and marine wetland and estuarine and marine deepwater, and designated as tidal marsh, sandbar/flats, and open water habitat for this project, respectively.

## Database Information

- **Nominated in: Phase II**
- **Land Ownership: USFWS and TGLO submerged land**
- **Conservation Strategy: Maintain hydrologic connectivity with San Antonio Bay system, monitor dredging effects, and remove abandoned oil facilities**
- **Potential Partners: TGLO, TPWD, USFWS**
- **Species: Fishery habitat**
- **Key Terms: Fish, Management, Monitoring, Bay Pass, Hydrology, Tidal Marsh, Sandbar/Flats, Open Water**

# LITERATURE CITED


Davis, N.A. and E.H. Smith. 2011. Preliminary inventory of conservation, restoration, and protection sites: San Antonio Bay system. Coastal Bend Bays and Estuaries Program Publication CBBEP-74. pp. 1-91.

Google. 2010. Google Earth Pro. Google, Inc., Mountain View California. (http://www.google.com/earth/index.html).

Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays Basin and Bay Expert Science Team (BBEST). 2011. Environmental Flows Recommendations Report Final Submission to the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays Basin and Bay Area Stakeholder Committee, Environmental Flows Advisory Group, and Texas Commission on Environmental Quality. pp. 1-427.

March, R.G. and E.H. Smith. 2011. Modeling Potential Coastal Vegetation Response to Sea Level Rise and Storm Surge on Estuarine Peninsulas. Journal of Coastal Research, online http://dx.doi.org/10.2112/JCOASTRES-D-10-00177.1

Otvos, E.G. and W.E. Howat. 1996. South Texas Ingleside barrier; coastal sediment cycles and vertebrate fauna. Late Pleistocene Stratigraphy Revised. Transactions of the Gulf Coast Association of Geological Societies, 46: 333-344.

TPWD. 2009. Texas Parks and Wildlife Department. (www.tpwd.state.tx.us).

Tremblay, T.A. and T.R. Calnan. 2011. Status and trends of inland wetland and aquatic habitats, Freeport and San Antonio Bay areas. Texas General Land Office and National Oceanic and Atmospheric Administration under GLO Contract NO. 10-060. Coastal Coordination Council pursuant to National Oceanic and Atmospheric Administration Award No. NA09NOS4190165. pp. 1-81.

White, W.A. and R.A. Morton. 1987. Historical shoreline changes in San Antonio, Espiritu Santo, and Mesquite Bays, Texas Gulf coast. Geological Circular 87-1. Bureau of Economic Geology, University of Texas at Austin, Austin, TX. pp. 1-41.

Appendix I

National Wetland Inventory (NWI) classification types used to describe habitat types within the San Antonio Bay system

| **National Wetland Inventory (NWI) Classification 2008-2009** | | |
|---|---|---|
| NWI Acronym | NWI Description | Inventory Description |
| E1AB3L | (E)Estuarine, (1)Subtidal, (AB)Aquatic Bed, (3)Rooted Vascular, (L)Subtidal | Seagrasses |
| E2ABM | (E)Estuarine, (2)Intertidal, (AB)Aquatic Bed, (M)Irregularly Exposed | |
| E2ABMs | (E)Estuarine, (2)Intertidal, (AB)Aquatic Bed, (M)Irregularly Exposed, (s)spoil | |
| E2ABN | (E)Estuarine, (2)Intertidal, (AB)Aquatic Bed, (N)Regularly Flooded | |
| E2ABNh | (E)Estuarine, (2)Intertidal, (AB)Aquatic Bed, (N)Regularly Flooded, (h)Diked/Impounded | |
| E2ABNs | (E)Estuarine, (2)Intertidal, (AB)Aquatic Bed, (N)Regularly Flooded, (s)Spoil | |
| E1UBL | (E)Estuarine, (1)Subtidal, (UB)Unconsolidated Bottom, (L)Subtidal | Open Water |
| E1UBLh | (E)Estuarine, (1)Subtidal, (UB)Unconsolidated Bottom, (L)Subtidal, (h)Diked/Impounded | |
| E2EM1/SS3N | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent/(SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (N)Regularly Flooded | Tidal Marsh/Mangrove Mix |
| E2EM1/SS3P | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent/(SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (P)Irregularly Flooded | |
| E2SS3/EM1P | (E)Estuarine, (2)Intertidal, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen/(EM)Emergent, (1)Persistent, (P)Irregularly Flooded | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| E2EM1/USN | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent/;(US)Unconsolidated Shore, (N)Regularly Flooded | Tidal Marsh/Flats Mix |
| E2EM1/USP | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent/;(US)Unconsolidated Shore, (P)Irregularly Flooded | |
| E2US/EM1N | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore/(EM)Emergent, (1)Persistent, (N)Regularly Flooded | |
| E2US/EM1P | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore/(EM)Emergent, (1)Persistent, (P)Irregularly Flooded | |
| E2EM1M | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (M)Irregularly Exposed | Tidal Marsh |
| E2EM1Ms | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (M)Irregularly Exposed, (s)Spoil | |
| E2EM1N | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (N)Regularly Flooded | |
| E2EM1Nh | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (N)Regularly Flooded, (h)Diked/Impounded | |
| E2EM1Ns | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (N)Regularly Flooded, (s)Spoil | |
| E2EM1Nx | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (N)Regularly Flooded, (x)Excavated | |
| E2EM1P | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (P)Irregularly Flooded | |
| E2EM1Ph | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (P)Irregularly Flooded, (h)Diked/Impounded | |
| E2EM1Ps | (E)Estuarine, (2)Intertidal, (EM)Emergent, (1)Persistent, (P)Irregularly Flooded, (s)Spoil | |
| E2EM5P | (E)Estuarine, (2)Intertidal, (EM)Emergent, (5)*Phragmites australis*, (P)Irregularly Flooded | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| E2SSN | (E)Estuarine, (2)Intertidal, (SS)Scrub-Shrub, (N)Regularly Flooded | Mangrove |
| E2SS3Ns | (E)Estuarine, (2)Intertidal, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (N)Regularly Flooded, (s)Spoil | |
| E2SS3P | (E)Estuarine, (2)Intertidal, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (P)Irregularly Flooded | |
| E2SS3Ps | (E)Estuarine, (2)Intertidal, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (P)Irregularly Flooded, (s)Spoil | |
| E2SS5P | (E)Estuarine, (2)Intertidal, (SS)Scrub-Shrub, (5)Dead, (P)Irregularly Flooded | |
| E2USM | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore, (M)Irregularly Exposed | Sandbars/Flats |
| E2USMs | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore, (M)Irregularly Exposed, (s)Spoil | |
| E2USN | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore, (N)Regularly Flooded | |
| E2USNs | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore, (N)Regularly Flooded, (s)Spoil | |
| E2USP | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore, (P)Irregularly Flooded | |
| E2USPr | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore, (P)Irregularly Flooded, (r)Artificial | |
| E2USPs | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore, (P)Irregularly Flooded, (s)Spoil | |
| E2USPx | (E)Estuarine, (2)Intertidal, (US)Unconsolidated Shore, (P)Irregularly Flooded, (x)Excavated | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| L1ABH | (L)Lacustrine, (1)Limnetic, (AB)Aquatic Bed, (H)Permanently Flooded | Lakes |
| L1ABKh | (L)Lacustrine, (1)Limnetic, (AB)Aquatic Bed,(K)Artificially Flooded, (h)Diked/Impounded | |
| L1ABHh | (L)Lacustrine, (1)Limnetic, (AB)Aquatic Bed, (H)Permanently Flooded, (h)Diked/Impounded | |
| L1ABHx | (L)Lacustrine, (1)Limnetic, (AB)Aquatic Bed, (H)Permanently Flooded, (x)Excavated | |
| L1UBKh | (L)Lacustrine, (1)Limnetic, (UB)Unconsolidated Bottom, (K)Artificially Flooded, (h)Diked/Impounded | |
| L1UBKx | (L)Lacustrine, (1)Limnetic, (UB)Unconsolidated Bottom, (K)Artificially Flooded, (x)Excavated | |
| L2AB3H | (L)Lacustrine, (2)Littoral, (AB)Aquatic Bed, (3)Rooted Vascular, (H)Permanently Flooded | |
| L2UBFh | (L)Lacustrine, (2)Littoral, (UB)Unconsolidated Bottom, (F)Semi-permanently Flooded, (h)Diked/Impounded | |
| L2USA | (L)Lacustrine, (2)Littoral, (US)Unconsolidated Shore, (A)Temporarily Flooded | |
| L2USAx | (L)Lacustrine, (2)Littoral, (US)Unconsolidated Shore, (A)Temporarily Flooded, (x)Excavated | |
| L2USC | (L)Lacustrine, (2)Littoral, (US)Unconsolidated Shore, (C)Seasonally Flooded | |
| L2USCh | (L)Lacustrine, (2)Littoral, (US)Unconsolidated Shore, (C)Seasonally Flooded, (h)Diked/Impounded | |
| M2RS2P | (M)Marine, (2)Intertidal, (RS)Rocky Shore, (2)Rubble, (P)Irregularly Flooded | Beaches |
| M2USN | (M)Marine, (2)Intertidal, (US)Unconsolidated Shore, (N)Regularly Flooded | |
| M2USP | (M)Marine, (2)Intertidal, (US)Unconsolidated Shore, (P)Irregularly Flooded | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| PAB3F | (P)Palustrine, (AB)Aquatic Bed, (3)Rooted Vascular, (F)Semi-permanently Flooded | Ponds/Basins |
| PAB3Fh | (P)Palustrine, (AB)Aquatic Bed, (3)Rooted Vascular, (F)Semi-permanently Flooded, (h)Diked/Impounded | |
| PAB3Fx | (P)Palustrine, (AB)Aquatic Bed, (3)Rooted Vascular, (F)Semi-permanently Flooded, (x)Excavated | |
| PAB3H | (P)Palustrine, (AB)Aquatic Bed, (3)Rooted Vascular, (H)Permanently Flooded | |
| PAB3Hh | (P)Palustrine, (AB)Aquatic Bed, (3)Rooted Vascular, (H)Permanently Flooded, (h)Diked/Impounded | |
| PAB4F | (P)Palustrine, (AB)Aquatic Bed, (4)Floating Vascular, (F)Semi-permanently Flooded | |
| PAB4Fx | (P)Palustrine, (AB)Aquatic Bed, (4)Floating Vascular, (F)Semi-permanently Flooded, (x)Excavated | |
| PAB4H | (P)Palustrine, (AB)Aquatic Bed, (4)Floating Vascular, (H)Permanently Flooded | |
| PABF | (P)Palustrine, (AB)Aquatic Bed, (F)Semi-permanently Flooded | |
| PABFh | (P)Palustrine, (AB)Aquatic Bed, (F)Semi-permanently Flooded, (h)Diked/Impounded | |
| PABFx | (P)Palustrine, (AB)Aquatic Bed, (F)Semi-permanently Flooded, (x)Excavated | |
| PABH | (P)Palustrine, (AB)Aquatic Bed, (H)Permanently Flooded | |
| PABHh | (P)Palustrine, (AB)Aquatic Bed, (H)Permanently Flooded, (h)Diked/Impounded | |
| PABHx | (P)Palustrine, (AB)Aquatic Bed, (H)Permanently Flooded, (x)Excavated | |
| PABKh | (P)Palustrine, (AB)Aquatic Bed, (K)Artificially Flooded, (h)Diked/Impounded | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| PUBF | (P)Palustrine, (UB)Unconsolidated Bottom, (F)Semi-permanently Flooded | Ponds/Basins |
| PUBFh | (P)Palustrine, (UB)Unconsolidated Bottom, (F)Semi-permanently Flooded, (h)Diked/Impounded | |
| PUBFx | (P)Palustrine, (UB)Unconsolidated Bottom, (F)Semi-permanently Flooded, (x)Excavated | |
| PUBFs | (P)Palustrine, (UB)Unconsolidated Bottom, (F)Semi-permanently Flooded, (s)Spoil | |
| PUBH | (P)Palustrine, (UB)Unconsolidated Bottom, (H)Permanently Flooded | |
| PUBHh | (P)Palustrine, (UB)Unconsolidated Bottom, (H)Permanently Flooded, (h)Diked/Impounded | |
| PUBHx | (P)Palustrine, (UB)Unconsolidated Bottom, (H)Permanently Flooded, (x)Excavated | |
| PUBKh | (P)Palustrine, (UB)Unconsolidated Bottom, (K)Artificially Flooded, (h)Diked/Impounded | |
| PUBKx | (P)Palustrine, (UB)Unconsolidated Bottom, (K)Artificially Flooded, (x)Excavated | |
| PUBV | (P)Palustrine, (UB)Unconsolidated Bottom, (V)Permanently Flooded-Tidal | |
| PEM1/SS1A | (P)Palustrine, (EM)Emergent, (1)Persistant/(SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (A) Temporarily Flooded | Marsh/Scrub-Shrub Mix |
| PEM1/SS1C | (P)Palustrine, (EM)Emergent, (1)Persistant/(SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (C)Seasonally Flooded | |
| PEM1/SS1J | (P)Palustrine, (EM)Emergent, (1)Persistant/(SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (J)Intermittently Flooded | |
| PEM1/SSKx | (P)Palustrine, (EM)Emergent, (1)Persistant/(SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (K)Artificially Flooded, (x)Excavated | |
| PEM1/SS3A | (P)Palustrine, (EM)Emergent, (1)Persistant/(SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (A) Temporarily Flooded | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| PEM1/SS3C | (P)Palustrine, (EM)Emergent, (1)Persistant/(SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (C) Seasonally Flooded | Marsh/Scrub-Shrub Mix |
| PEM1/SS3F | (P)Palustrine, (EM)Emergent, (1)Persistant/(SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (F) Semi-permanently Flooded | |
| PEM1/SS3J | (P)Palustrine, (EM)Emergent, (1)Persistant/(SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (J) Intermittently Flooded | |
| PSS1/EM1A | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous/(EM)Emergent, (1)Persistent, (A)Temporarily Flooded | |
| PSS3/EM1A | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen/(EM)Emergent, (1)Persistent, (A)Temporarily Flooded | |
| PSS3/EM1C | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen/(EM)Emergent, (1)Persistent, (C)Seasonally Flooded | |
| PEM1A | (P)Palustrine, (EM)Emergent, (1)Persistant, (A) Temporarily Flooded | Marsh |
| PEM1Ad | (P)Palustrine, (EM)Emergent, (1)Persistant, (A) Temporarily Flooded, (d)Partly Drained/Ditched | |
| PEM1Ah | (P)Palustrine, (EM)Emergent, (1)Persistant, (A) Temporarily Flooded, (h)Diked/Impounded | |
| PEM1As | (P)Palustrine, (EM)Emergent, (1)Persistant, (A) Temporarily Flooded, (s)Spoil | |
| PEM1Ax | (P)Palustrine, (EM)Emergent, (1)Persistant, (A) Temporarily Flooded, (x)Excavated | |
| PEM1C | (P)Palustrine, (EM)Emergent, (1)Persistant, (C) Seasonally Flooded | |
| PEM1Cd | (P)Palustrine, (EM)Emergent, (1)Persistant, (C) Seasonally Flooded, (d)Partly Drained/Ditched | |
| PEM1Ch | (P)Palustrine, (EM)Emergent, (1)Persistant, (C) Seasonally Flooded, (h)Diked/Impounded | |
| PEM1Cx | (P)Palustrine, (EM)Emergent, (1)Persistant, (C) Seasonally Flooded, (x)Excavated | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| PEM1Cs | (P)Palustrine, (EM)Emergent, (1)Persistant, (C) Seasonally Flooded, (s)Spoil | Marsh |
| PEM1F | (P)Palustrine, (EM)Emergent, (1)Persistant, (F) Semi-Permanently Flooded | |
| PEM1Fd | (P)Palustrine, (EM)Emergent, (1)Persistant, (F) Semi-Permanently Flooded, (d)Partly Drained/Ditched | |
| PEM1Fh | (P)Palustrine, (EM)Emergent, (1)Persistant, (F) Semi-Permanently Flooded, (h)Diked/Impounded | |
| PEM1Fx | (P)Palustrine, (EM)Emergent, (1)Persistant, (F) Semi-Permanently Flooded, (x)Excavated | |
| PEM1J | (P)Palustrine, (EM)Emergent, (1)Persistant, (J)Intermittently Flooded | |
| PEM1Kh | (P)Palustrine, (EM)Emergent, (1)Persistant, (K)Artificially Flooded, (h)Diked/Impounded | |
| PEM1Kx | (P)Palustrine, (EM)Emergent, (1)Persistant, (K)Artificially Flooded, (x)Excavated | |
| PEM1R | (P)Palustrine, (EM)Emergent, (1)Persistant, (R)Seasonally Flooded-Tidal | |
| PEMf | (P)Palustrine, (EM)Emergent, (f)Farmed | |
| PFO1A | (P)Palustrine, (FO)Forested, (1)Broad-Leaved Deciduous, (A)Temporarily Flooded | Forested/Scrub-Shrub Floodplain |
| PFO1C | (P)Palustrine, (FO)Forested, (1)Broad-Leaved Deciduous, (C)Seasonally Flooded | |
| PFO1Ch | (P)Palustrine, (FO)Forested, (1)Broad-Leaved Deciduous, (C)Seasonally Flooded, (h)Diked/Impounded | |
| PFO1Cx | (P)Palustrine, (FO)Forested, (1)Broad-Leaved Deciduous, (C)Seasonally Flooded, (x)Excavated | |
| PFO1F | (P)Palustrine, (FO)Forested, (1)Broad-Leaved Deciduous, (F)Semi-Permanently Flooded | |
| PSS1/3A | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous/(3)Broad-Leaved Evergreen, (A) Temporarily Flooded | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| PSS1A | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (A) Temporarily Flooded | Forested/Scrub-Shrub Floodplain |
| PSS1C | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (C) Seasonally Flooded | |
| PSS1Cx | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (C) Seasonally Flooded, (x)Excavated | |
| PSS1F | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (F) Semi-permanently Flooded | |
| PSS1Fd | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (F) Semi-permanently Flooded, (d)Partly Drained/Ditched | |
| PSS1Fh | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (F) Semi-permanently Flooded, (h)Diked/Impounded | |
| PSS1Fx | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (F) Semi-permanently Flooded, (x)Excavated | |
| PSS1Kh | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (K)Artificially Flooded, (h)Diked/Impounded | |
| PSS1Kx | (P)Palustrine, (SS)Scrub-Shrub, (1)Broad-Leaved Deciduous, (K)Artificially Flooded, (x)Excavated | |
| PSS3A | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (A)Temporarily Flooded | |
| PSS3Ah | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (A)Temporarily Flooded, (h)Diked/Impounded | |
| PSS3Ax | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (A)Temporarily Flooded, (x)Excavated | |
| PSS3C | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (C)Seasonally Flooded | |
| PSS3Ch | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (C)Seasonally Flooded, (h)Diked/Impounded | |
| PSS3Cx | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (C)Seasonally Flooded, (x)Excavated | |

| NWI Acronym | NWI Description | Inventory Description |
|---|---|---|
| PSS3F | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (F)Semi-permanently Flooded | Forested/Scrub-Shrub Floodplain |
| PSS3Fh | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (F)Semi-permanently Flooded, (h)Diked/Impounded | |
| PSS3J | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (J)Intermittently Flooded | |
| PSS3Kh | (P)Palustrine, (SS)Scrub-Shrub, (3)Broad-Leaved Evergreen, (K)Artificially Flooded, (h)Diked/Impounded | |
| PSS4A | (P)Palustrine, (SS)Scrub-Shrub, (4)Needle-Leaved Evergreen, (A)Temporarily Flooded | |
| PUSA | (P)Palustrine, (US)Unconsolidated Shore, (A)Temporarily Flooded | Flats/Basins |
| PUSAh | (P)Palustrine, (US)Unconsolidated Shore, (A)Temporarily Flooded, (h)Diked/Impounded | |
| PUSAx | (P)Palustrine, (US)Unconsolidated Shore, (A)Temporarily Flooded, (x)Excavated | |
| PUSCh | (P)Palustrine, (US)Unconsolidated Shore, (C)Seasonally Flooded, (h)Diked/Impounded | |
| PUSCx | P)Palustrine, (US)Unconsolidated Shore, (C)Seasonally Flooded, (x)Excavated | |
| PUSKh | P)Palustrine, (US)Unconsolidated Shore, (K)Artificially Flooded, (h)Diked/Impounded | |
| PUSKx | P)Palustrine, (US)Unconsolidated Shore, (x)Excavated | |