

## **Calhoun County Texas Shoreline Access Plan**



**Atkins Coastal Planning and Restoration Group**  
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**\*Front page photo: Seadrift Shoreline Park**

## Table of Contents

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	Page
Table of Contents .....	3
1. Introduction .....	6
2. Methodology .....	7
3. Benefits of Recreational infrastructure .....	9
4. Geographical Distribution .....	11
San Antonio Bay .....	12
Zone A-San Antonio Bay North and South .....	12
- North Side-Green Lake and Victoria Channel Shorelines .....	12
Zone A North: Boat Ramps.....	13
- Potential boat ramps along the Victoria Navigation Channel .....	13
- Potential boat ramps at Hog Bayou .....	14
Zone A North: Paddling Trails or Kayaking Sites .....	14
- Potential paddling trails or kayaking sites along Hog Bayou .....	14
- Potential paddling trails or kayaking sites along the Victoria Navigation Channel.....	15
- Alternatives to the Victoria Navigation Channel and SH-35 .....	16
Zone A North: Fishing Piers .....	16
Zone A South: San Antonio Bay .....	16
- Seadrift to Welder Flats Wildlife Management Area .....	16
Zone A - South: Boat Ramps .....	16
- Boat Ramps at Seadrift Bayfront Park (City of Seadrift Seawall) .....	16
- Town of Seadrift Marina Boat Ramp .....	17
- Bill Sanders Memorial Park Boat Ramp .....	18
Zone A South: Kayaking Sites .....	19
- Town of Seadrift paddling trails .....	19
- Town of Seadrift-Austwell paddling trail .....	20
Zone A South: Fishing Piers .....	21
- Seadrift Seawall .....	21
- Bill Sanders Park.....	21
Wildlife Areas Beyond Seadrift .....	21
- Welder Flats Coastal Preserve and the Guadalupe Delta Wildlife Management Area .....	21
Espiritu Santo Bay.....	23
Zone B: GIWW Shorelines and Adjacent Areas- .....	23
Zone B: Boat Ramps- .....	23
- Froggie's boat ramp .....	23
- Potential boat ramps along the GIWW .....	24
Zone B: Paddling Trails and/or Kayaking Access Points .....	24

- Charlie's Baitcamp .....	24
- Long Island-Shoalwater Bay-Steam Boat Island-South Pass Island-Grass Island paddling trail .....	24
- Dewberry Island-Shoalwater Bay paddling trail.....	24
- Port O'Connor paddling trail.....	24
Zone B: Fishing Piers .....	25
South Lavaca-Matagorda Bays .....	26
Zone C: Port O'Connor to Chocolate Bayou .....	26
Zone C: Boat Ramps .....	27
- Indianola Beach & Historic Site boat ramp .....	27
- Powder Horn RV Park .....	27
- Magnolia Beach .....	28
- Alamo Beach .....	29
Zone C: Paddling Trails and/or Kayaking Access Points .....	30
- The Port O'Connor paddling trails .....	30
- Alamo/Magnolia/Indianola Beach paddling trails .....	31
- La Salle Loop paddling trail.....	32
- Coloma Creek paddling trail (At Powderhorn Lake).....	34
Zone C: Fishing Piers and Observation Decks - .....	35
- King Fisher Park fishing pier .....	35
- Boggy Bayou observation deck .....	36
- Magnolia fishing pier.....	36
- Magnolia Creek observation deck .....	37
- Coloma Creek Recommended observation deck .....	38
North Lavaca Bay - .....	39
Zone D: Chocolate Bayou to Point Comfort - .....	39
Zone D: Boat Ramps- .....	39
- Harbor of Refuge boat ramp .....	39
- Chocolate Bayou boat ramp .....	39
- Port Lavaca Bayfront Peninsula boat ramp .....	40
- Lighthouse Beach, Bird Sanctuary and RV Park boat ramp .....	42
- Bauer Road shoreline access area .....	42
- Six Mile Road boat ramp .....	43
- Point Comfort Park boat ramp .....	44
Zone D: Paddling Trails/Kayaking Sites.....	45
- Chocolate Bay-Bayou paddling trail.....	45
- Lighthouse Beach Park paddling trail.....	45
- Bauer Road paddling trail .....	46
- Six Mile Road Park paddling trail .....	47
- Six Mile Road Park-FM 616 paddling trail .....	48
- Point Comfort Park paddling trail .....	48

- Point Comfort-Lighthouse Park paddling trail .....	49
Zone D: Fishing Piers .....	50
- Bayfront Peninsula Park fishing pier .....	50
- Lighthouse Beach Park fishing pier .....	51
- Six Mile Park T-head fishing pier .....	51
- Point Comfort fishing piers .....	52
East Calhoun County - .....	53
Zone E: Keller and Carancahua Bays .....	53
Zone E: Boat Ramps- .....	53
- Port Alto County Park boat ramp .....	53
- Olivia Haterius Park boat ramp .....	54
Zone E: Paddling Trails and/or Kayaking Access Points .....	55
- SH-35-Port Alto paddling trail .....	55
- Port Alto-Salt Lake and Redfish Lake paddling trail .....	55
- Keller Creek at FM 2143-Olivia Boat Ramp at Keller Bay paddling trail .....	56
- Olivia to South Keller Bay paddling trail .....	57
- Short paddling trails from Olivia .....	58
Zone E: Fishing Piers- .....	58
- Potential fishing piers and observation decks at Olivia Public Park .....	58
Calhoun County Shoreline Access Recommendations .....	59
References .....	61
Appendix A: Shoreline Access Inventory .....	
Appendix B: Geologic History, Physical Processes, Habitat Inventories and Environmental Recommendations .....	
Appendix C: Regional Maps on Boat Ramps, Kayaking Sites, Fishing Piers and Observation Decks .....	

## 1. Introduction

Calhoun County is located in one of the best strategic settings for coastal recreation in Texas and the Gulf of Mexico. The County is connected to eight (8) important bays (Figure 1): Guadalupe, San Antonio, Espiritu Santo, Lavaca, Cox, Keller, Carancahua and Matagorda Bays, each having different physical conditions and environmental benefits. These bays provide a large number of diverse coastal natural resources and recreational opportunities for local residents and county visitors. The pressure for good public access to the bays has become a critical issue for Calhoun County and an overall plan to address those pressures was needed.

This document is divided into the following sections:

1. Shoreline Access Master Plan
2. Inventory of Shoreline Access Infrastructure (Presented in Appendix A)
3. General Environmental Conditions (Presented in Appendix B)
4. Thematic Maps with the shoreline access information (Presented in Appendix C)

This master plan was created by Atkins at the request of the Calhoun County Commissioners Court to assist the County in addressing public access issues along bay shorelines. Many thanks are extended to County Judge Michael J. Pfeifer, Commissioner Roger C. Galvan, Commissioner Vern Lyssy, Commissioner Neil E. Fritsch, and Commissioner Kenneth W. Finster for their assistance in this endeavor. Thanks are also extended to Mr. Elmer DeForest, Mayor of Seadrift; Ms. Rhonda Cummins, Texas A&M University Agriculture Extension Program Agent; Mr., Darren Gurley, City of Port Lavaca; Ms. Kathy Smartt, Grant Consultant; and Mr. Keith Schmidt, local historian. Ms. K Smartt helped improving the last version of this report.

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## 2. Methodology

This project was conducted in two phases. A technical memorandum called “Calhoun County Preliminary Inventory (Update) of Shoreline Access Infrastructure” (presented in Appendix A) was produced in the first phase to identify the current conditions of the basic infrastructure available for shoreline access in Calhoun County. The second phase of the project was to specifically address recommendations for shoreline and infrastructure improvement, and access for recreational opportunity. Local conditions and protection of natural resources present at specific areas, including any environmental concerns associated with access areas, were considered. This document and information presented herein is intended to facilitate the enjoyment of the natural environment, and serve as a planning tool for future improvements to shoreline access infrastructure, water recreation, and protection of habitats located along county shorelines. The four main topics covered by this project included the following:

- a. **Boat Ramps.** Identification of the general conditions of the available boat ramps, analysis of potential areas for future development of new single- or multi-use boat ramps, and any potential improvements to the related infrastructure.
- b. **Paddling Trails or Paddling Areas.** Identification of the general conditions of the available paddling trails and/or kayaking access points and the identification of potential areas for future development of new single- or multi-use paddling trails and kayaking access.
- c. **Fishing Piers and Observation Decks.** Identification of the general conditions of the available fishing piers and potential areas for future development of new single- or multi-use fishing piers. It also includes the identification of potential areas for observation decks as a form of a shoreline access-recreational opportunity.
- d. **Environmental and Recreational Recommendations for Shoreline Access Improvements.** Identification of environmental issues associated with long-term development of shoreline access improvements and the protection of the natural resources visited by the public.

Atkins first analyzed the current inventory of existing public or semi-public bay and estuary shoreline access points and their available infrastructure as presented in the Texas Beach and Bay Access Guide (Guide) developed by the Texas General Land Office (GLO), which is available at: [www.glo.state.tx.us/OC/Beach\\_Access/pdf/04-GoldenCrescent.pdf](http://www.glo.state.tx.us/OC/Beach_Access/pdf/04-GoldenCrescent.pdf).

The GLO guide on shoreline access points (Figure 2) and the Atkins Technical Memorandum (see Appendix A) were designed to help coastal visitors locate a variety of public access sites close to specific locations, such as wildlife refuges, marshes, beaches, specific bays or river deltas, areas of interest, etc. The two sources provide a

brief description of primary recreational activities at each point. Specifically, the Atkins memorandum included updated location maps showing available boat ramps, areas with access for kayaking, paddling trails, fishing piers, observation decks, and any other areas of recreational interest. The memorandum also provides information about available activities such as fishing, swimming, wildlife viewing, picnicking, camping, windsurfing, etc., along with the available public infrastructure such as the boat ramps, fishing piers, restrooms, showers, electricity and lighting, fresh water, concessions, fees, access for the mobility impaired, etc.



Figure 1. Bays in contact with Calhoun County.

In the second phase of the project, Atkins recommended new perspectives in the use of the access points and proposed locations for new boat ramps, piers, and paddling trails. Atkins also developed a synopsis of the geologic evolution of the county, geologic and geomorphologic processes affecting the shorelines, the physical process affecting the water circulation in the bays, and the location of natural habitats that include marshes, oyster reefs and seagrasses in the area (presented in Appendix B). This data may be considered when creating the new access points.

Finally, this document provides recommendations that will help with the improvement of recreational opportunities where planned management may bring new or frequent visitors to the county shorelines and potential environmental impacts.



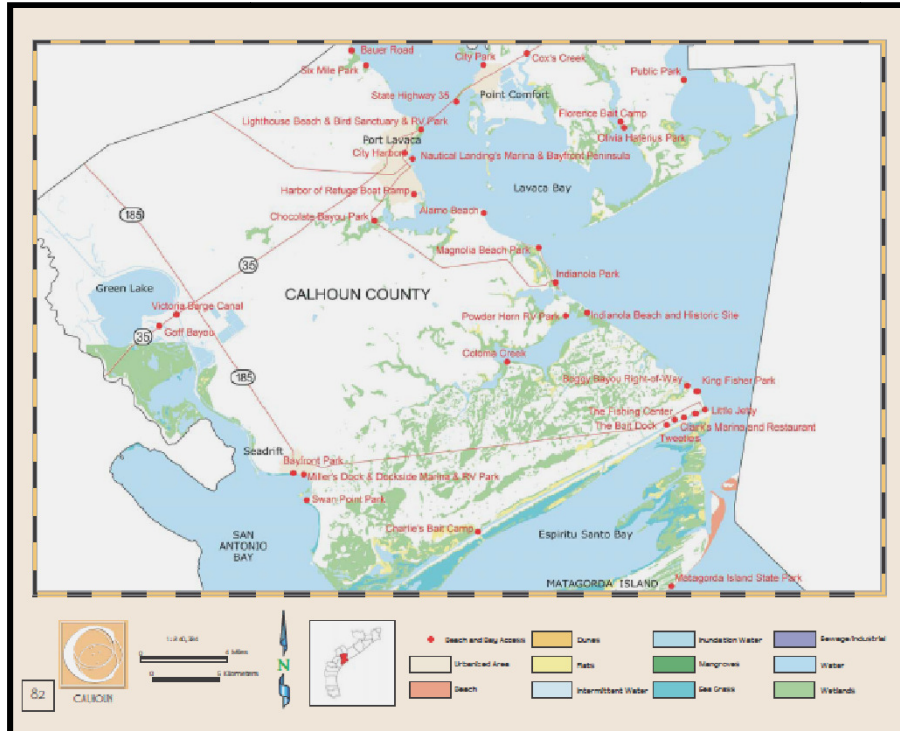


Figure 2. Location of the existing bay access points (Source: TGLO). Source: [www.glo.texas.gov/what-we-do/caring-for-the-coast/publications/TexasBeachBay Access Guide.pdf](http://www.glo.texas.gov/what-we-do/caring-for-the-coast/publications/TexasBeachBayAccessGuide.pdf)

The three appendixes were included in this report to support the Master Plan. Appendix A includes the technical memorandum with the updated shoreline access infrastructure. Appendix B presents the physical conditions of the county shorelines in order to understand how to manage visitation while balancing the potential impact to natural and cultural resources along the shorelines. Finally, Appendix C includes the location of the public infrastructure by area.





























### 3. Benefits of the Recreational Infrastructure

As the population increases along the coastal areas, more environmental pressures from human activities will occur along county shorelines. For that reason, the purpose of this plan is provide the information needed to develop a management approach that facilitates public access while protecting natural resources. Calhoun County understands that by developing controlled access to the natural resources, local residents and visitors will minimize impacts to the shorelines and adjacent habitats.

This shoreline access plan can also be used as a tool to enhance and support different aspects of the quality of life in the county, which include:

1. Community programs goals to improve the quality of life of county residents and visitors, bring economic resources and educational programs to the area, and create a stronger community identity based on the enjoyment of the natural resources.
2. Policies protecting environmentally sensitive areas such as wetlands, marshes, shoreline habitats, oyster reefs, seagrasses, and water courses.
3. Initiatives to increase low-impact visitation, and recreational and ecological management of the natural resources by the local residents and visitors accessing the shorelines and waters of Calhoun County.

To be consistent with readily-available recreational programs, Atkins used the illustrations used by Texas Parks & Wildlife Department for state parks infrastructure (Figure 3). A few illustrations were also created to include unique local conditions. It is important for the reader to note that some infrastructure may change in the future without notice. Infrastructure may be improved with more or better facilities or removed due to new ownership, change in priorities, safety issues, etc.

	Hiking Trails		Picnic Tables
	Nature/Interpretive Trails		Exhibit/Interpretive Center
	Biking Trails		Historic Site/Museum
	Equestrian Trails		Primitive/Walk-in Campsites
	Golf		Tent Campsites
	Fishing		Water and Electric Campsites
	Fishing Pier		Water, Electric and Sewer Sites
	Fish Cleaning Shelters		Motel/Lodging
	Swimming		Playground
	Restaurant		Boat Ramp
	Restrooms		<b>Wildlife Viewing</b>
	Showers		<b>Shoreline Access</b>
	Wheelchair Accessible		<b>Wind Surfing</b>
	<b>Open Beach</b>		<b>Electricity/Lighting</b>

 User's Fee	 Fresh Water
 Swimming Pool	 Kayaking

Figure 3. List of signs for recreational and shoreline access purposes used in this report.

#### 4. Geographical Distribution

The geographic shoreline access zones used in the project inventory include: Zone A--San Antonio Bay and West Calhoun County; Zone B--Gulf Intracoastal Waterway (GIWW) and Espiritu Santo Bay; Zone C--South Lavaca Bay; Zone D--North Lavaca Bay; and Zone E--East Calhoun County (Figure 4). The general physical conditions for each zone, such as water circulation, shoreline types, and shoreline retreat rates, are described in Appendix B.



Figure 4. Shoreline Access Zones used in this inventory: Zone A--San Antonio Bay and West Calhoun County; Zone B--Gulf Intracoastal Waterway (GIWW and Espiritu Santo Bay); Zone C--South Lavaca Bay; Zone D--North Lavaca Bay; and Zone E--East Calhoun County.

# San Antonio Bay

## Zone A- San Antonio Bay North and South

### North Side-Green Lake and Victoria Channel Shorelines

Zone A-North begins in the northwest corner of Calhoun County, where Mission Lake flows into the San Antonio Bay (Figure 5). This area of the county was formed as part of the San Antonio and Guadalupe River delta systems. Sediments in these deltas consist of unconsolidated mud and sands and are covered with extended wetlands and marshes. Longshore bay circulation appears to be mainly towards the north in this area. Winds from the north-northeast are common during wintertime and can last up to 5 months. Winds from the south-southeast are common during the summertime and can last up to 7 months.



Figure 5. Location of the Northwestern Bays in Calhoun County. The area includes: Green Lake, Mission Lake, Guadalupe Bay, San Antonio Bay, Guadalupe Delta and the Victoria Navigation Channel, Hog Bayou and Goff Bayou.

East of Mission Lake is the Victoria Navigation Channel, and toward the northwest are Hog and Goff Bayous. The channel presents limited environmental concerns associated with shoreline erosion or potential habitat impacts that could be affected by shoreline access activities. Elevated levees at the channel provide protection to adjacent

properties and present good locations for future shoreline access to San Antonio Bay. Hog and Goff Bayous are protected by Hwy 35 on one side and Green Lake on the other. With the acquisition of Green Lake by the county, this corner of Calhoun County will be able to support a wide diversification of recreational opportunities, including fishing, canoeing, kayaking, camping, hiking, bird watching, and wildlife photography.

### Zone A North: Boat Ramps

**Potential boat ramps along the Victoria Navigation Channel.** No boat ramps currently exist along the Victoria Channel. The land west of the channel is protected from water surges by the channel levees. These levees may also provide flood protection to future boat ramps. Based on the analysis of the shoreline physical conditions, new shoreline access points have been recommended, as shown in Figure 6. A levee breach in front of Sonneman Road may facilitate access to San Antonio Bay. If a new boat ramp was created along the Victoria Channel, navigation safety must also be considered due to the barges using the channel.

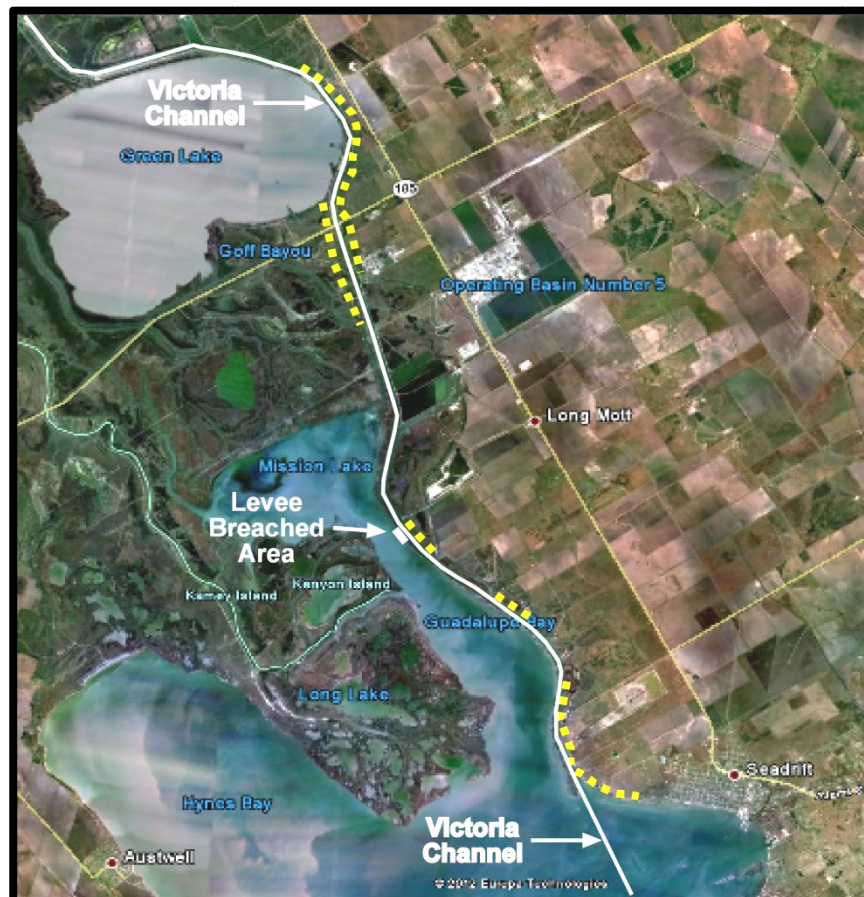








Figure 6. Location of Green and Mission Lakes and Guadalupe Bay. The yellow dashes are recommended areas for potential boat ramps. The white arrow shows a breached area with access to the bays. The solid white line is the Victoria Navigation Channel.

**Potential boat ramps at Hog Bayou.** The usability of the existing boat ramp at Hog Bayou, mistakenly identified as Goff Bayou in the GLO Guide, could be increased with some improvements (Figure 7). Current infrastructure consists of a concrete ramp and parking space only. The area needs infrastructure for the mobility impaired, better access to the water and restrooms. A wooded deck may facilitate access to the launched boats in the water.



Figure 7. Location of the Hog Bayou Boat Ramp north of SH35.

 Swimming	 Wildlife Viewing
 Fishing	 Boat Ramp
 Shoreline Access	 Kayaking

### Zone A North: Paddling Trails or Kayaking Sites

Since this corner of the county tends to have low wave energy and is semi-protected from strong winds, it offers good opportunities for paddling trails, which may be combined with the boat ramp or new kayaking launching areas.

**Potential paddling trails or kayaking sites along Hog Bayou.** The boat ramp at Hog Bayou (Figures 7 & 8) has great potential for kayaking activities. The recommended wooded deck at the boat ramp could also facilitate the access for kayakers. Approximately seven miles of paddling trails, which can be enjoyed north and south of SH 35, are available as presented in Figure 8. The ends of the paddling trails are limited by water gates. Kayakers should be aware of the presence of alligators in these waters.



Figure 8. Hog Bayou paddling trails marked with the yellow dashed line. More than 7 miles of paddling trails can be accessed from this boat ramp.

**Potential paddling trails or kayaking sites along the Victoria Navigation Channel.**

The intersection of the Victoria Navigation Channel and SH35 has an area for a new kayaking site (Figure 9). A kayak ramp, consisting of a wooded deck, may be developed underneath the bridge for access to the water. The existing access road allows for parking and can facilitate the launching site, but the channel shoreline slope is steep and presents a safety concern. The west access to the channel appears to have safer conditions than the east side.

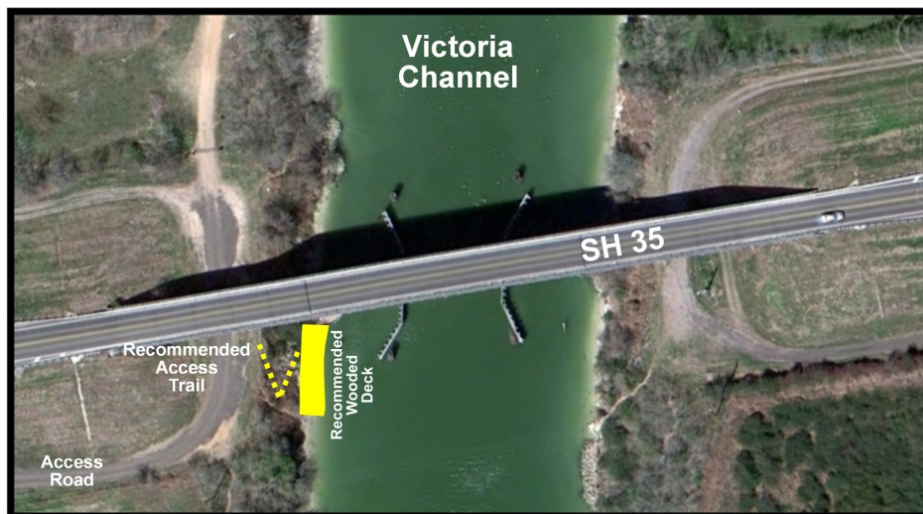


Figure 9. Potential Victoria Channel kayaking launching area at the intersection with SH35. The yellow dashed line represents a potential trail on the west shoreline of the channel; the yellow box represents a proposed wooded deck.

**Alternatives to the Victoria Navigation Channel and SH35.** As shown in Figure 9, the eastern shorelines of the channel also have the potential for more kayaking launching areas. The access to Mission Lake, the Guadalupe Delta, and Guadalupe and San Antonio Bays make the area a great access for outdoor activities. These shorelines are private properties, but the county might negotiate agreements with the owners to allow for more ecological visitation.

### **Zone A North: Fishing Piers**

Fishing piers are also limited on the northwest side of the county. However, people are already fishing on the shores of the Victoria Channel at Highway 35. The wooded deck recommended in Figure 9 should improve the fishing recreational conditions since the area already has access from the highway. The same deck can be a multi-use structure and used as a fishing pier, kayaking launching area, and bird watching.

### **Zone A South: San Antonio Bay**

#### **Seadrift to Welder Flats Wildlife Management Area**

The town of Seadrift is well situated for easy access to San Antonio Bay and diverse shoreline access infrastructure is in place. However, natural bay erosion and sedimentation processes affect this area. The shorelines between Seadrift and Swan Point have shoreline retreat rates in the order of 3 to 4 ft/yr. The access channels that connect with the Victoria Channel require continual dredging as part of general maintenance. Intense sediment shoaling affects the life of these channels and shorelines.

### **Zone A South: Boat Ramps**

**Boat ramps at Seadrift Bayfront Park (City of Seadrift Seawall).** A boat ramp was re-developed recently on the west side of the Seadrift Seawall by the Texas Parks and Wildlife Department. According to local citizens, the sedimentation is intense and soon after its construction, the access channel started to present shoaling problems. This active zone of sediment accumulation may affect any future boat ramps and fishing piers on the west side of the seawall.













The eastern side of the seawall presents active erosion, expressed by the damage of the seawall, which may require it to be re-built due to the structural damage, scouring



and the impacts from past storm surges. The City of Seadrift has a plan to replace the seawall and maintain the recreation infrastructure at the park (Figure 10).



Figure 10. Location of the Seadrift Public Park with the nearby boat ramps and future fishing pier.

 Fishing	 Electricity/Lighting
 Wind Surfing	 Fresh Water
 Boat Ramp	 Wheelchair Accessible
 Restrooms	 Shoreline Access
 Motel/Lodging	 Wildlife Viewing
 Fishing Pier	 Kayaking

**Town of Seadrift Marina Boat Ramp.** The public boat ramp at the City of Seadrift Marina is one of the fastest accesses to San Antonio Bay (Figure 11). Since the bulkhead protecting the marina has been recently re-built, the marina offers a great access for bay recreation, including visiting the Guadalupe Delta. Users of the boat ramp tend to leave their trucks and trailers on the street, causing parking limitations on busy days. Since the area is close to hotels and other recreational infrastructure, extra parking areas may be needed in the future.

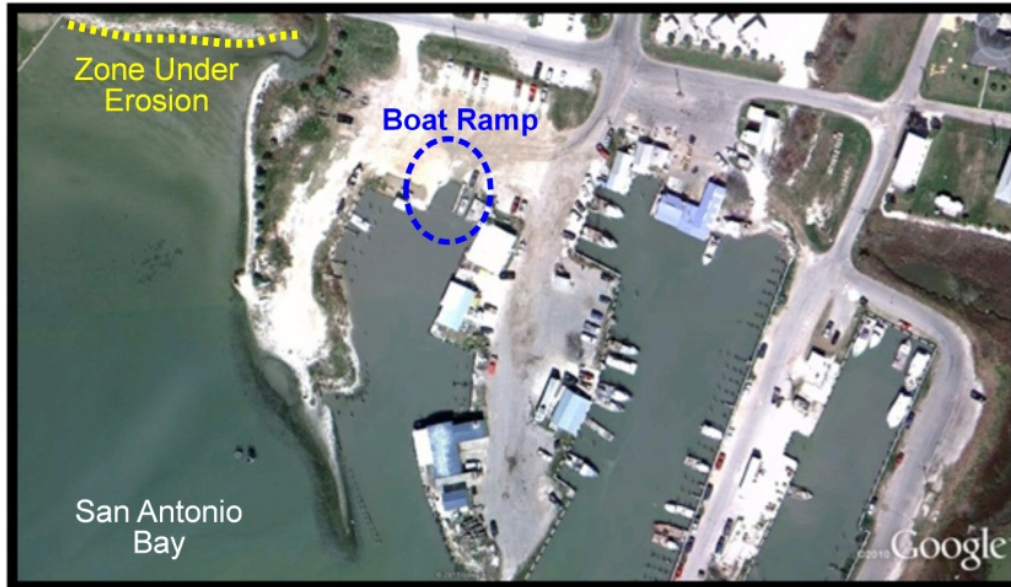














Figure 11. Location of the City of Seadrift Marina Boat Ramp.

 Fishing	 Wind Surfing
 Boat Ramp	 Electricity/Lighting
 Restrooms	 Fresh Water
 Motel/Lodging	 Wheelchair Accessible
 Fishing Pier	 Wildlife Viewing
 User's Fee	 Shoreline Access

**Bill Sanders Memorial Park Boat Ramp.** The boat ramp at Bill Sanders Memorial Park (aka Swan Point Park) is in good condition. The main obstacle for the use of the boat ramp is the potential shoaling of the bay access channel. Access to fresh water and restrooms are needed. Although users fish from the park shorelines, a recommended fishing pier (marked with the black dashed line in Figure 12) may allow for a deeper reach for fishing, which may attract more frequent users. The parking space is sufficient for a large number of visitors.



Figure 12. Location of the boat channel at Bill Sanders Park. Also, shown is a recommended location for a fishing pier on the bay shoreline.

 Fishing	 Electricity/Lighting
 Swimming	 Wheelchair Accessible
 Wind Surfing	 Shoreline Access
 Boat Ramp	 Wildlife Viewing
 Picnic Tables	 Kayaking

### Zone A South: Kayaking Sites

**Town of Seadrift paddling trails.** Kayaking is becoming more popular in the Seadrift area since the western shorelines of the county tend to be more protected from the southeastern winds and the public infrastructure available at Seadrift is good. The boat ramp located at the Seadrift seawall is becoming a launching area for kayaking, as well as the City of Seadrift Marina and Bill Sanders Memorial Park boat ramp. The bird islands next to the navigation channels between Seadrift and Swan Point offer scenic and environmental opportunities for the kayakers, including fishing and bird watching. Figure 13 shows the locations of potential paddling trails available near Seadrift.



Figure 13. Paddling trails near Seadrift marked with the yellow dashed lines. Also shown are the three available public kayaking launching sites.

**Town of Seadrift-Autswell paddling trail.** A well-known paddling trail is being used across San Antonio Bay from Seadrift to Austwell in Hynes Bay (Figure 14). This trail is becoming very popular in different educational and environmental events occurring in the San Antonio Bay area. The trails are about seven miles long and allows for the enjoyment of the shorelines of the Guadalupe Delta. The trail goes from boat ramp to boat ramp on both towns.



Figure 14. Paddling trail from Seadrift to Austwell in San Antonio Bay.

## **Zone A South: Fishing Piers**

**Seadrift Seawall.** A new public fishing pier will soon be constructed with funding provided by a grant from the Coastal Impact Assistance Program on the shorelines of the Seadrift public park (Figure 10). It will be built at the center of the seawall where lesser shoaling occurs, and may provide long-term support for recreational infrastructure. No other public fishing pier is available in the Seadrift area.

**Bill Sanders Park.** Good conditions exist for the development of a public fishing pier on the bay shorelines of Bill Sanders Memorial Park (Figure 12). Private fishing piers are already available along the shorelines south of the park. The recommended pier location is a good area for public fishing since the shoreline bend reaches deeper into the waters of San Antonio Bay.

## **Wildlife Areas Beyond Seadrift**

**Welder Flats Coastal Preserve and the Guadalupe Delta Wildlife Management Area.** The presence of the Welder Flats Coastal Preserve (south of Seadrift) and the Guadalupe Delta Wildlife Management Area (northeast of Seadrift), both managed by the Texas Parks and Wildlife Department (TPWD), offer a great opportunity for recreational opportunities for boaters and kayakers (Figure 15). Details of this area can be found at:

<http://www.tpwd.state.tx.us/landwater/water/conservation/txgems/welderfl/index.phtml>

<http://www.tpwd.state.tx.us/landwater/water/conservation/txgems/guadalup/index.phtml>

Seadrift is strategically located to support access to these habitat areas. More advertisement may be required to make the public aware of these habitat areas, being accessed mainly from this portion of the county. This may increase visitation and revenue for hotels, restaurants, services, etc.

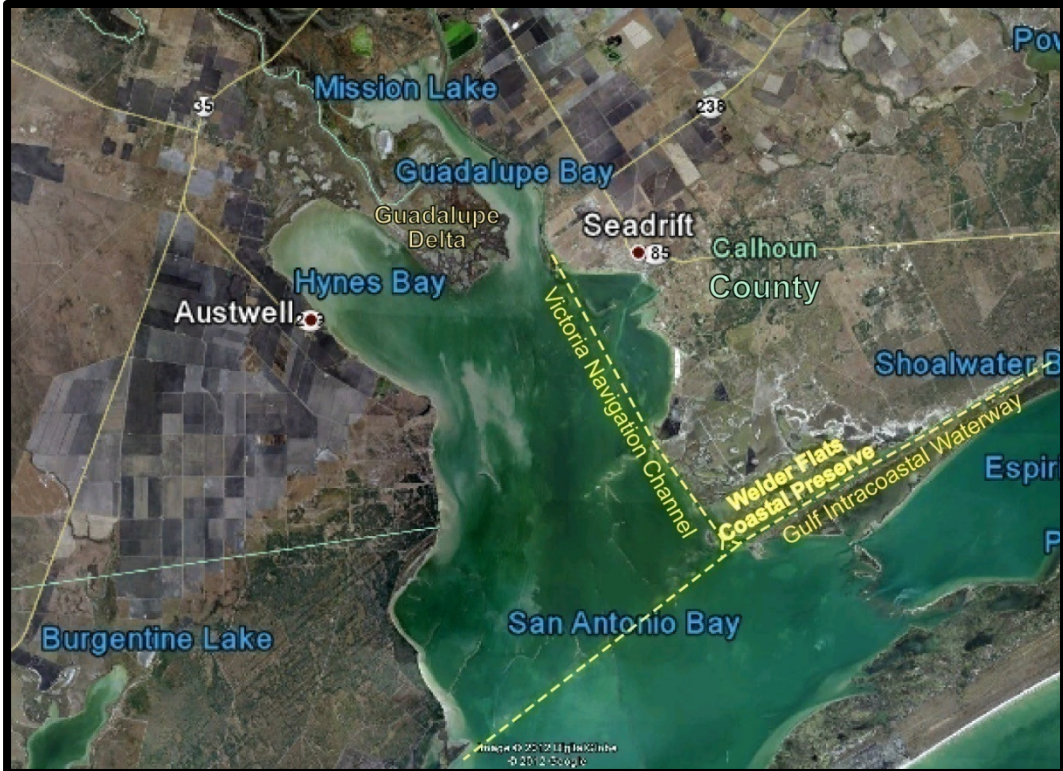


Figure 15. Location of Welder Flats Coastal Reserve and the Guadalupe Delta Wildlife Management Area with respect to Seadrift.

# Espiritu Santo Bay

## Zone B: GIWW Shorelines and Adjacent Areas






About 19 miles of Gulf Intracoastal Waterway (GIWW) shorelines cover the southern portion of Calhoun County, which includes public and private property on the north and south side of the GIWW. The shoreline access areas are directly in contact with the GIWW. Shoreline access infrastructure is located on the north side of the GIWW and consists almost exclusively of private boat ramps. The south side of the GIWW corresponds to private property and U.S. Army Corps of Engineers' dredge material placement areas. The boat ramps along the GIWW tend to have good infrastructure and are highly utilized. Every year their demand is increased, and parking space and street safety in accessing the boat ramps get compromised. These shorelines tend to be bullheaded as soon as they become developed, making it difficult to estimate shoreline retreat rates.




## Zone B: Boat Ramps

**Froggie's boat ramp.** Froggie's boat ramp is the only public boat ramp along the GIWW (Figure 16). Calhoun County is in the process of expanding the parking space and combining the area with a recreational park with funding provided by a grant from the Coastal Impact Assistance Program. It is expected that the demand for direct access to the GIWW will be increased in the future mainly toward the west of Port O'Connor, which is privately owned.



Figure 16. Location of the Froggie's Boat Ramp on the north side of the GIWW.

 Fishing	 Electricity/Lighting
 Wildlife Viewing	 Wheelchair Accessible
 Wind Surfing	 Shoreline Access

 Restrooms  Boat Ramp	 Fresh Water
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**Potential boat ramps along the GIWW.** Since the land west of Port O’Connor is mainly private property, if the County is interested in acquiring more areas for boat ramps or shoreline access, the best locations for these potential public boat ramps would be near the Welder Flats Coastal Preserve area. This area has an enormous potential for kayaking and passive recreation.

**Zone B: Paddling Trails and/or Kayaking Access Points**

**Charlie’s Baitcamp paddling trail.** The private boat ramp called “Charlie’s Baitcamp” offers a launching area for extensive paddling trails south of the GIWW. However, the safety of canoeists and kayakers crossing the GIWW should be considered since barge traffic is intense and traffic accidents have occurred in the past.

**Long Island-Shoalwater Bay-Steamboat Island-South Pass Island-Grass Island paddling trail.** More than 16 miles of paddling trails can be accessed west of Charlie’s Baitcamp through the placement cut to Espiritu Santo Bay (Figure 17). The trail includes kayaking trails accessing the Shoalwater Bay and the shorelines of Long Island in Espiritu Santo Bay. The strong wind is an important factor that should be considered when navigating these areas.



Figure 17. Paddling trails near Long Island north Espiritu Santo Bay.

**Dewberry Island-Shoalwater Bay paddling trail.** Close to 14 miles of paddling trails can be accessed east of Charlie’s Baitcamp through the GIWW cut to Espiritu Santo Bay (Figure 18). The paddling trail also includes kayaking in Shoalwater Bay or on the



shorelines of Espiritu Santo Bay, but south of Dewberry Island. The strong wind is an important factor that should be considered when navigating these areas.



Figure 18. Paddling trails around Dewberry Island and Shoalwater Bay, north Espiritu Santo Bay.

**Port O'Connor paddling trail.** Although the Port O'Connor paddling trail can be accessed from the shorelines or boat ramps along the GIWW, access is recommended from King Fisher Park in Matagorda Bay (Figure 19) or the Little Rock Groin Park on the north side of the GIWW. Other boat ramps may facilitate the launching for kayakers along the GIWW, but as mentioned early, the risk to be impacted by barges or large boats is significant.

### **Zone B: Fishing Piers**

Due to private ownership and safety issues in the GIWW, no fishing piers are available along the GIWW in Calhoun County.

## South Lavaca-Matagorda Bays

### Zone C: Port O'Connor to Chocolate Bayou

This section covers South Lavaca and Western Matagorda Bays. From the geological point of view, the southern portion of these shorelines (from Port O'Connor to Powderhorn Lake) is sandy, with sandy shell beaches and low-angle shorelines (Figure 19). This section of the county is affected by the highest shoreline rates of retreat and accretion (Appendix B). Erosion rates go from 1 to 32 ft/yr and accretion rates go from 1 to 6 ft/yr on localized areas.



Figure 19. Types of shorelines along South Lavaca and Matagorda Bays.









The shorelines with marshes, such as Boggy, Broad and Big Dam Bayous, and Powderhorn Lake (Figure 19), are comprised of sand and sandy shell; beaches north of Magnolia Beach are comprised of hard clays, with steep shorefaces.

### Zone C: Boat Ramps

**Indianola Beach & Historic Site boat ramp.** Since this is a private boat ramp, county involvement may be limited; however, this area provides access to Matagorda and Lavaca Bays through the Powderhorn Lake inlet (Figure 20). The area offers kayaking and fishing opportunities. The parking space that serves the boat ramp may also allow a launching area for kayakers, but access requires a fee. A dedicated kayak launch site to access the bays and the lake would be helpful to attract more visitors.



Figure 20. Location of the Indianola Boat Ramp.

	Fishing		Fresh Water
	Boat Ramp		Wheelchair Accessible
	Wildlife Viewing		Shoreline Access
	User's Fee		Kayaking

**Powder Horn RV Park Boat Ramp.** This is also a private boat ramp and county involvement may be limited; however, this area also has safe access to Powderhorn Lake (presented in Figure 27). The parking space is limited and access fees may apply. The construction of parking space for kayakers and kayaking launching decks to access the bay (presented in Figure 21) may attract more visitors.

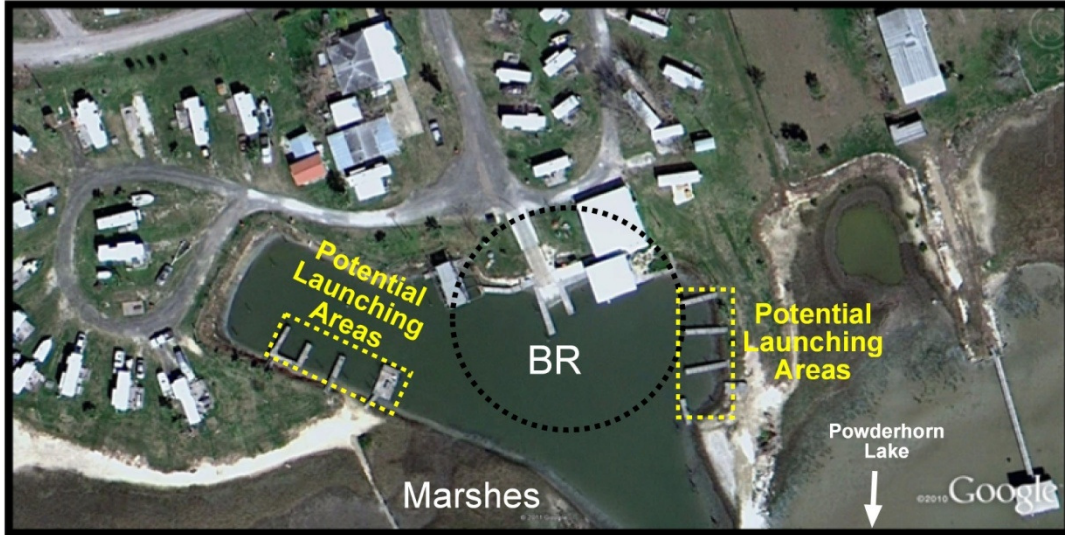

























Figure 21. Location of the Powder Horn RV Park and Boat Ramp showing potential launching areas for kayakers.

	Fishing		Fresh Water
	Boat Ramp		Wheelchair Accessible
	Wildlife Viewing		Shoreline Access
	Fishing Pier		User's Fee
	Electricity/Lighting		Picnic Tables
	Water and Electric Campsites		Restrooms
			Showers

**Magnolia Beach Boat Ramp.** The Magnolia Beach boat ramp is heavily used in the summertime. Showers and restrooms are being constructed with funding provided by a grant from the Coastal Impact Assistance Program. This area also has opportunities for kayaking to access Old Town Lake and the marshes, and for bird watching (Figures 25, 26 and 27). Texas Parks and Wildlife Department recently built a new groin on the north side of the boat ramp to reduce shoaling problems, so the ramp could be used more extensively (Figure 22). This boat ramp also provides a less-crowded access to Matagorda Bay and South Lavaca Bay. The visit to the Magnolia Beach boat ramp can be combined with a beach day since the area has different amenities and swimmers enjoy the beach on the regular basis.



Figure 22. Location of Magnolia Beach and Boat Ramp.

 Fishing	 Wheelchair Accessible
 Swimming	 Boat Ramp
 Picnic Tables	 Shoreline Access
 Wildlife Viewing	 Restrooms
 Kayaking	 Wind Surfing

**Alamo Beach Boat ramp (North).** The County has taken pro-active steps to protect this area from intense shoreline erosion rates by installing rock revetments. The existing boat ramp has limited infrastructure (Figure 23), but it provides an easy access to Lavaca and Matagorda Bays. Parking space is limited. Calhoun County maintains this area, but riprap may create safety concerns due to the presence of loose rocks in the revetments. The parking area could be improved with some fill material. Users mentioned that the area is a great spot for fishing, so the construction of a wooden fishing pier is recommended. The area is also good for windsurfing since boat traffic is limited, and winds and water depths are ideal for this activity.

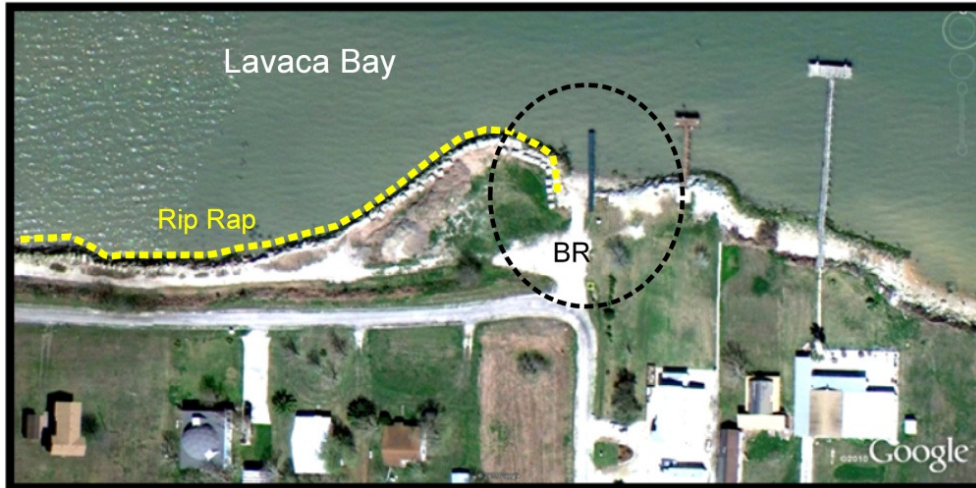









Figure 23. Location of the Alamo Beach (North) Boat Ramp.

 Fishing	 Boat Ramp
 Swimming	 Shoreline Access
 Wildlife Viewing	 Wind Surfing
	 Kayaking

### Zone C: Paddling Trails and/or Kayaking Access Points

**The Port O'Connor paddling trails.** The Port O'Connor Paddling Trail consists of four trails that total more than 25 miles. The trails include: the Fishpond Trail, the South Loop Trail, the Fish Pond and the North Loop Trail (Figure 24). The Fishpond Trail (~12.3 miles) begins in Port O'Connor and travels through a number of bayous and cuts along the edge of Espiritu Santo Bay to Saluria Bayou, where it joins the 8.28-mile South Loop Trail. From Mule Slough, the Fish Pond and North Loop (4.82 miles) trails continue east toward Sunday Beach on the Gulf of Mexico and to Lighthouse Cove, near the historic Matagorda Island Lighthouse. This area has the potential to be one of the longest paddling trails in Texas that run next to shallow waters and shorelines. Strong winds may limit the completion of the entire paddling trail. It is common to observe campers on Matagorda Island, who complete the trails in more than one day.

NOTE: Although launching can be accessed from the boat ramps along the GIWW, launching on the Matagorda side of Port O'Connor is more recommended. Heavy traffic from boats and barges create unsafe conditions for kayakers (See Appendix B).

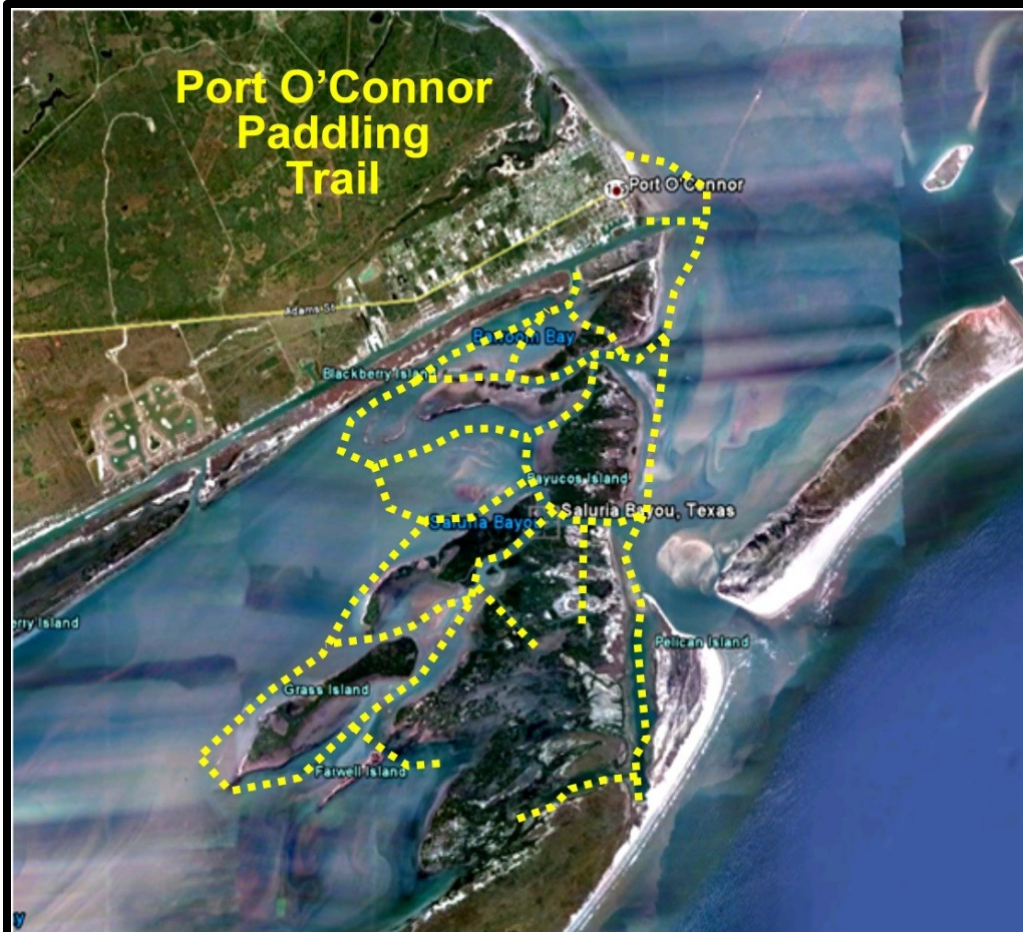


Figure 24. The Port O'Connor Paddling Trail consists of trails, which are interconnected and can be accessed from different sections in Port O'Connor.

**Alamo/Indianola/Magnolia Beach paddling trails.** The low-lying areas around Indianola contain a number of small saltwater lakes and bayous. These paddling trails are officially recognized by Texas Parks and Wildlife and other recreational organizations because they allow fishermen and nature lovers to explore these areas by kayak in a very safe environment since boat access is limited. In addition to excellent fishing, the area is well-known as a bird watching spot and includes several sites on the Texas Coastal Birding Trail. The area is also known for its historical value. Launching at Magnolia Beach (Figure 25), the well-known Magnolia Loop is about 2.5 miles long and loops around Old Town Lake and the adjacent bayous. Nearby bird watching sites include Magnolia Beach, Magic Ridge and the Indianola Bird Walk. More information on these kayaking trails can be found at:

<http://www.stxmaps.com/go/alamoindianolamagnolia-beach-kayak-trails.html>



Figure 25. Magnolia Kayak Launching Area.

**La Salle Loop paddling trail:** The La Salle Loop is about 3 miles long and loops around Blind Bayou and then to Powderhorn Lake (Figures 26 and 27). This trail is so named due to the nearby statue of the French explorer, Robert de La Salle. The Powderhorn Loop is about 12 miles long and loops around Powderhorn Lake and through Powderhorn Bayou (Figure 27). Launch sites for this trail can also be found at the Indianola Fishing Marina, the Powderhorn RV Park, and on Coloma Creek. Powderhorn Lake is also a popular birding area. The trails are marked and signage includes the length of a trail, so paddlers can decide just how far they wish to paddle. The specific locations for Blind Bayou kayak launches are presented in Figure 26.





Figure 26. Kayaking paddling trails and launching sites at Blind Bayou.



Figure 27. Location of the paddling trails in Alamo, Indianola and Magnolia Beach.

**Coloma Creek paddling trail (at Powderhorn Lake).** The shoreline access area consists of four right-of-way concrete access ramps from Highway FM 1289 to Coloma

Creek (Figure 28). The area has limited parking, which tends to be frequently used by anglers. The area needs improvements to access ramps, as well as safety signs for parking along FM 1289. This paddling trail can be used to access Powderhorn Lake and Coloma Creek, as presented in Figures 28 and 29, where more than six miles of kayaking trails are available along the creek shorelines.



Figure 28. Location of the launching access sites at Coloma Creek and FM 1289.





 Fishing	 Shoreline Access
 Wildlife Viewing	 Kayaking



Figure 29. Paddling trails from FM 1208 at Coloma Creek.

## Zone C: Fishing Piers and Observation Decks

Several fishing piers and observation decks are located on the shorelines of South Lavaca and Western Matagorda Bays.

**King Fisher Park fishing pier.** As with other parks and recreational areas in the county, this great beach park is not very well known. However, it has the potential to be one of the best bay beach destinations in Texas. The park has an 800-foot long T-head fishing pier, which offers extra access to the shoreline. The pier is part of King Fisher County Park, which was improved with a Texas Coastal Management Program-NOAA project grant and private sponsorship. The site is an official historical site as designated by Texas Historical Commission. The park features numerous amenities and is one of the best bird watching spots near Port O'Connor (Figure 30). The end of the fishing pier has accreted sandy bars and is now too shallow for effective fishing. Recommended actions to maintain the park include some dredging alternatives that are discussed in Appendix B.

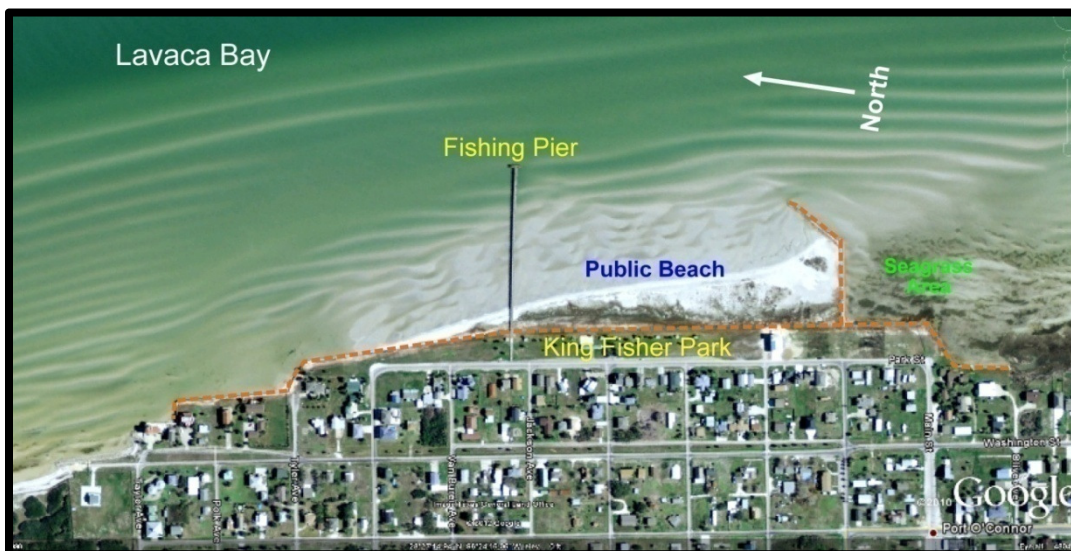














Figure 30. Location of the King Fisher Pier in Port O'Connor.

 Fishing	 Electricity/Lighting
 Wind Surfing	 Fresh Water
 Restrooms	 Wheelchair Accessible
 Motel/Lodging	 Shoreline Access
 Fishing Pier	 Wildlife Viewing
 Picnic Tables	 Swimming

**Boggy Bayou observation deck.** Boggy Bayou has an observation deck, constructed with Texas Coastal Zone Management Program-NOAA funds (Figure 31). The deck serves as an observation site for more than 100 acres of wildlife areas around the bayou, and consists of a semi-elevated wooden structure close to 630 feet long. Intense visitation and vehicles driving on the perimeter of the bayou tend to damage the sandy flats and marshes, including intertidal areas. It is recommended that Boggy Bayou implement a public access plan to reduce impacts to the marshes, such as restricting traffic to dedicated trails. The area has enough space for the construction of a second observation deck to enjoy the shorelines in Matagorda Bay. A marsh restoration initiative to enhance the marshes could also be implemented to protect adjacent areas, which are affected by shoreline retreat and vehicle traffic.



Figure 31. Location of the Boggy Bayou Observation Deck.

**Magnolia Beach fishing pier.** The location of the old Magnolia Beach fishing pier is affected by strong wave action. The beach bathymetry in the area is shallow and the area tends to receive frontal southeasterly winds. According to local residents, the fishing pier area is often affected by high tides. The physical conditions for the pier appear to be unfavorable, and relocation to the northwest is recommended (Figure 32). This new recommended area tends to be more protected from the southeasterly winds

and the local bathymetric profile is deeper than the old pier area, making it ideal for fishing.



Figure 32. Area showing the recommended relocation of the fishing pier in Magnolia Beach.

**Magnolia Creek observation deck.** The Magnolia Beach observation deck can be accessed from North Ocean Drive Road. It is located in front of the Magnolia Beach groins and consists of a 200-foot long wooden structure (Figure 33). The deck allows visitors to enjoy the view of more than 300 acres of marshes, being an excellent area for bird watchers. No improvements to the desk are suggested since the structure is in good conditions. The deck complies with ADA requirements and has parking. Perhaps better signage about the habitat and species in the area may encourage more visitations.



Figure 33. Location of the observation deck on the marshes of the Magnolia Beach Area. The deck can be accessed from North Ocean Drive Road.

**Coloma Creek Recommended Observation Deck.**

The intersection of FM 1289 and Coloma Creek has a great location for the construction of an observation deck (Figure 34). More than 70 acres of marshes and about one mile of shorelines with marshes and wildlife could be observed from this observation deck. Since the area is on route to and from Port O'Connor, the area may require better parking and safety signs if developed. The four sections of this intersection could be converted into kayak launching areas.



Figure 34. Location of a recommended site for an observation deck in Coloma Creek.

## North Lavaca Bay

### Zone D: Chocolate Bayou to Point Comfort






On the western side of Lavaca Bay, Port Lavaca offers a large number of boat ramps and shoreline access areas associated with recreation and navigation, as presented in the technical memorandum (See Appendix A).

### Zone D: Boat Ramps

**Harbor of Refuge boat ramp.** This boat ramp was developed by Texas Parks and Wildlife Department and is in very good condition (Figure 35). The boat ramp lacks restrooms and fresh water, and users mentioned these issues as very important for increased use.



Figure 35. Location of the Harbor of Refuge boat ramp.

 Fishing	 Wheelchair Accessible
 Boat Ramp	 Shoreline Access
	 Wildlife Viewing

**Chocolate Bayou boat ramp.** The Chocolate Bayou boat ramp is in good condition for boat users accessing Lavaca Bay (Figure 36), although the boat ramp tends to have problems with debris. New users trying to access Lavaca Bay tend to get stuck in shallow areas during low tides. If low tides are present, most users prefer to use other ramps to access Lavaca Bay. Debris underneath the bridge is also a common safety concern in the area.



Figure 36. Location of the Chocolate Bayou boat ramp and the boat access channel to Lavaca Bay.

	Fishing		Boat Ramp
	Wildlife Viewing		Shoreline Access
	Kayaking		

**Port Lavaca Bayfront Peninsula Park boat ramp (aka Port Lavaca Nautical Landing's).** The infrastructure for the Bayfront Peninsula Park was recently improved and the City of Port Lavaca has a plan to revitalize the area by improving this shoreline access area with several public recreational facilities. The City has plans for future expansion on the boat ramp, the construction of two pavilions, an amphitheater, a second boat ramp, more restrooms and a new area for playgrounds (Figure 37). The new infrastructure will be an important asset for shoreline access recreation in the entire county. The Bayfront Peninsula Park is located next to the Port Lavaca Marina, which will allow visitors that come to Port Lavaca to enjoy the park from the water as well as from land. The plan also includes the construction of a new educational boardwalk on the north side of the park, which will expose the public to the marshes, wetlands and submerged shoreline habitats in the area (Figure 38).



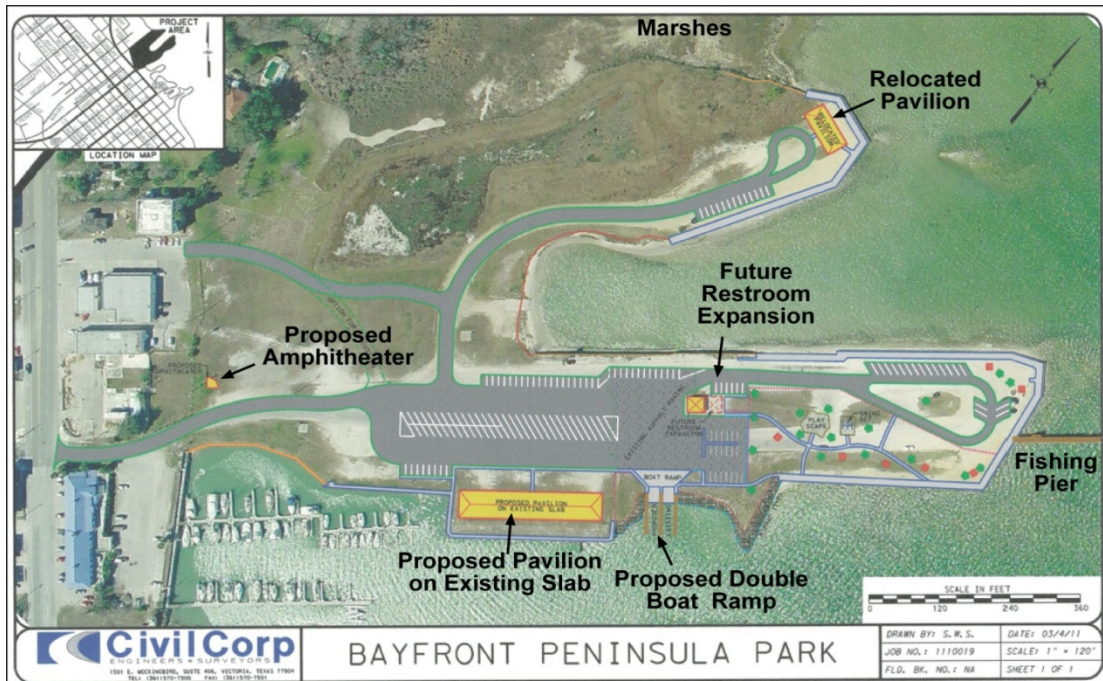


Figure 37. Sketch showing the future plans that the City of Port Lavaca has for the Bayfront Peninsula Park Boat Ramp.

	Fishing		Wheelchair Accessible
	Wildlife Viewing		Boat Ramp
	Fishing Pier		Shoreline Access
	Fresh Water		Restrooms
	Kayaking		Wind Surfing
	Electricity/Lighting		



















Figure 38. Proposed location of a ~1000 ft boardwalk and parking space on the north side of the Bayfront Peninsula Park.

**Lighthouse Beach, Bird Sanctuary and RV Park boat ramp.** The City of Port Lavaca has a long-term plan for the boat ramp at Lighthouse Beach (Figure 39). The park has RV facilities, water, restrooms, a public beach, an educational boardwalk, a fishing pier, and a large infrastructure for recreational activities. There are no recommendations for this park since it is one of the most diversified coastal county parks in central Texas.



Figure 39. Location of the boat ramp at the Lighthouse Beach and RV Park. Notice the nice beach next to the boat ramp.

 Fishing	 Wheelchair Accessible
 Swimming	 Boat Ramp
 Picnic Tables	 Shoreline Access
 Wildlife Viewing	 Restrooms
 Fishing Pier	 Wind Surfing
 Fresh Water	 Electricity/Lighting
 Showers	 Water and Electric Campsites
 Nature/Interpretive Trails	 User's Fee

**Bauer Road shoreline access area.** The Bauer Road Park shoreline access site offers a great perspective and view of North Lavaca Bay (Figure 40). There are no plans to develop a boat ramp in this shoreline access area. The marshes on the north side of the road attract birds, which may allow for bird watching. Shoreline signage showing habitat information could educate local residents and visitors on the natural resources available in the area.











Figure 40. Aerial photo of Bauer Road access point.

 Fishing  Swimming	 Wildlife Viewing  Kayaking
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**Six Mile Road boat ramp.** This park is located close to extraordinary natural-habitat resources and visitation is intense in the summer (Figure 41). The main comment from visitors at the boat ramp is that the area needs restrooms. County Commissioners mentioned that during storms, the area tends to get flooded by storm surges. Since the area needs restrooms, this infrastructure would need to be located on the highest points of the park to prevent impacts during flooding events. For that reason, and for other unsafe factors, swimming should be discouraged in the area. The marshes next to the park tend to have a high population of birds. An elevated observation deck, south of the parking area, would allow visitors to enjoy the marshes and attract more bird watchers and people interested in nature. The area has the potential to increase kayaking opportunities. The park has a large T-head fishing pier.














Figure 41. Location of Six Mile Road boat ramp and general infrastructure.

 Fishing	 Boat Ramp
 Wildlife Viewing	 Shoreline Access
 Kayaking	 Restrooms
 Fishing Pier	 Wind Surfing

**Point Comfort Park boat ramp.** This park has several amenities, including cleaning tables, lighted piers, and a helipad. The amenities available support other outdoor activities, such as a great swimming pool and a food court available at the concession stand. The park has two fishing piers and courtyards for different sports, as well as restrooms, fresh water and picnic tables with barbeque grills (Figure 42). The bulkheads may require minor repairs at their base. Parking may be needed in the future. A large area exists immediately south of the current parking lot, which might be used for parking expansion. Other areas in the park could also be used for parking space.



Figure 42. Location of the Boat Ramp and other amenities at Point Comfort.

 Fishing	 Wheelchair Accessible
 Picnic Tables	 Boat Ramp
 Wildlife Viewing	 Shoreline Access
 Fishing Pier	 Restrooms
 Fresh Water	 Wind Surfing
 Swimming Pool	

## Zone D: Paddling Trails/Kayaking Sites

**Chocolate Bay-Bayou paddling trail.** The boat ramp at Chocolate Bayou appears to have a great potential to expand recreational opportunities associated with kayaking on the west and east sides. The west side of CR 238 has up to six miles of meandering channels as part of Chocolate Bayou (Figure 43), which may allow visitors to enjoy the habitats in the marshes and fishing areas. This area could be used as a regional kayaking destination. During high tides, kayaks can be launched on Chocolate Bayou next to SH35 and go about six miles to CR 238, as marked in Figure 43 (or vice versa). Signs are needed to inform visitors of the kayaking locations and on the natural resources observed in the area. Another launching area for kayakers could be the Little Chocolate Bayou City Park in Port Lavaca, which has parking space and other amenities. The channel at the city park allows access to the boat ramp on CR238.



Figure 43. Aerial photo of Chocolate Bayou and Chocolate Bay showing potential paddling trails (in yellow). These areas can be used during high tides. Potential launching areas are marked with the red circles.

**Lighthouse Beach Park paddling trail.** North of Chocolate Bay on Lavaca Bay, the strong winds and currents make it difficult to kayak the shorelines next to Port Lavaca. The urban, commercial and industrial environment in Port Lavaca also prevent more areas for kayaking since these areas tends to have intense boat traffic. In the Port Lavaca area, only Lighthouse Beach Park offers good conditions for safe, short kayaking trips to enjoy the bay view and fishing (Figure 44). These habitats include the marshes next to the park, some depressions in the bay, and shaded areas under the SH35 highway bridge.



Figure 44. Potential paddling trails from the Lighthouse Beach Park.

**Bauer Road paddling trail.** Bauer Road Park consists of a county road that reaches the Lavaca Bay shorelines (Figure 45). There is no public infrastructure on site. The area is ideal for kayaking a short distance along the bay shorelines and to reach Six Mile Park from the water toward the north. This may allow visitors to enjoy the two marsh areas located between Bauer Road and Six Mile Park.

The marshes between Six Mile Park and Bauer Road have important bird populations that can be also watched from the bay. The distance between the two parks is about one mile (Figure 45). Safety and educational signs placed in the area for educational purposes would allow further enjoyment of the natural resources. Kayaking opportunities would create fewer potential impacts than a boat ramp.



Figure 45. Access to kayaking areas from the shorelines at Bauer Road Park. The yellow dashed line shows the paddling trail that can be used for fishing or bird watching.

**Six Mile Road Park paddling trail.** This is a very popular site for kayaking in the northern side of Lavaca Bay. Descriptions for specific paddling trails and fishing sites launching from Six Mile Park is available on the website: ([http://portlavacamainstreet.com/Kayak\\_Upper\\_Lavaca\\_Bay\\_1.html](http://portlavacamainstreet.com/Kayak_Upper_Lavaca_Bay_1.html)) and shown on. Figure 46. The names of the sites are listed in Table I below.

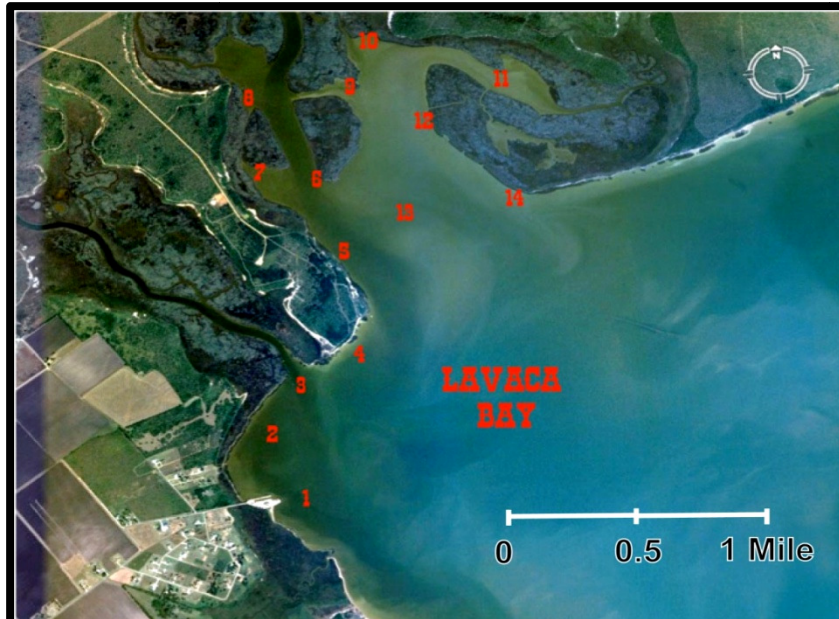


Figure 46. Location of the paddling trails and fishing sites in North Lavaca Bay.

Garcitas and Placedo Creeks can also be visited from the park. The sites need signs in order for visitors to know where they are in the area and to have a better appreciation of the natural resources.

1. Six Mile Park and Boat Ramp	8. Lake
2. Placedo Cove	9. Cut Thru Marsh
3. Placedo Creek	10. Deep Slough
4. Keeran's Point and Flats	11. Mud Lake
5. East Shoreline of Keeran's	12. East Shoreline Garcitas Cove
6. Garcitas Creek	13. Garcita Cove
7. Oyster Lake	14. Bennett's Point

Table I. Paddling trails as presented with the numbers in Figure 49.

**Six Mile Road Park-FM 616 paddling trail.** Six Mile Park is also the end of a paddling trail coming from Victoria County through Garcitas Creek (Figure 47). About 8 miles of

the paddling trail can be accessed from the boat ramp located at the intersection of FM 616 and Garcitas Creek. The same trail also allows visitors to access Placedo Creek as a protected paddling trail.



Figure 47. Paddling trail from Six Mile Park to the boat ramp at FM 616 and Garcitas Creek. It also shows the access to Placedo Creek.

**Point Comfort Park paddling trail.** Kayaking from Point Comfort Park has some of the most diverse possibilities in and out of Lavaca Bay. The boat ramp available on Lavaca River at FM 616 in Jackson County can be used as kayaking access to the Point Comfort Park. About 12 miles of meandering paths and estuarine environment can be enjoyed on this paddling trail (Figure 48). Also, more than 20 miles of paddling trails can be enjoyed on the north side of the bay (Figure 49). Swan, Redfish and Venado Lakes, as well as Lavaca River and Smugglers Bayou, can be accessed from Point Comfort Park, as part of this great recreational environment. The paddling trails in these areas are protected from high winds, which make them ideal for kayaking. The fresh water bodies in Lavaca River and the other lakes tend to have a significant population of alligators, so visitors should be aware of the species in the area.





Figure 48. Map showing the kayaking trails with a yellow dashed line between the boat ramp at FM 616 and Point Comfort Park. The path is about 12 miles long.



Figure 49. Map showing the kayaking trails with a yellow dashed line between Point Comfort Park and different lakes and estuarine sites. Swan, Redfish and Venado Lakes, as well as Lavaca River and Smugglers Bayou, can be accessed from this park, which has more than 25 miles of kayaking paths.

**Point Comfort-Lighthouse Park paddling trail.** There are about 4.3 miles between Point Comfort and Lighthouse Park in Lavaca Bay, which can be enjoyed by going parallel to the SH 35 Park and the piles of the causeway (Figure 50). It is common to see kayakers paddling underneath the causeway. Strong winds can be a factor to cross the bay, but the recreational alternatives for kayaking in this path are extensive.



Figure 50. Potential paddling trail marked with the yellow dashed line between Point Comfort Park and Light House Park in Lavaca Bay.

#### **Zone D: Fishing Piers**

The four main public parks in north Lavaca Bay have state-of-the-art fishing piers: Bayfront Peninsula, Light House, Six Mile Road, and Point Comfort.

**Bayfront Peninsula Park fishing pier.** The City of Port Lavaca has a complete development plan for this park, which includes the fishing pier as one of the strongest assets for recreation and visitation (Figure 51). Facilities at the fishing pier include extensive parking, which makes access very easy for the mobility impaired. The fishing pier is about 250 feet long and has a T-head about 100 feet long. The area has restrooms, freshwater and other recreational infrastructure. Easy access to shopping centers, restaurants and other facilities makes the pier an ideal fishing spot in Lavaca Bay.



Figure 51. General characteristics of the T-Head fishing pier at the Bayfront Peninsula Park.

**Lighthouse Beach Park fishing pier.** As mentioned previously, this park has one of the most diverse infrastructures for recreation in the county. The fishing pier is close to 800 feet long and has access to other recreational amenities (Figure 52), as well as quick access to SH 35. The entire park has accessible infrastructure for the mobility impaired, and also has water, restrooms and a protected beach.



Figure 52. Location and length of the fishing pier at the Lighthouse Peach Park.

**Six Mile Park T-head fishing pier.** Six Mile Park has a T-head fishing pier with access for the mobility impaired. The pier is located in an area where visitors can enjoy the view of Lavaca bay (Figure 53) and the marshes located in North Lavaca Bay. In the future, the park may also include an observation deck for viewing marsh habitats and migratory birds that come to the marshes. Since the area can be used a destination for kayakers, the park may need additional parking and fresh water.



Figure 53. Location of the fishing pier at the Six Mile Park. The park has enough space for additional recreational amenities, including restrooms, an observation deck and water.

**Point Comfort fishing piers.** Point Comfort has two fishing piers: one is a L-shape pier and the other is a single lineal pier. The L-shape pier has access to parking facilities for the mobility impaired (Figure 54). The diverse infrastructure available at the park includes a food concession area, swimming pool, restrooms, picnic tables, grills and water supply-- making these fishing piers a great place to visit in Central Texas.



Figure 54. Point Comfort Park fishing piers.

## East Calhoun County

### Zone E: Keller and Carancahua Bays

The Zone E includes the eastern shorelines of Calhoun County covering Keller, Matagorda and Carancahua Bays. The eastern portion of Calhoun County has limited infrastructure; however, since these bays have access to Matagorda Bay, the potential exists to expand recreational opportunities in this region in the future.



### Zone E: Boat Ramps

**Port Alto County Park boat ramp.** Port Alto Park now has limited shoreline access infrastructure. A boat ramp used to exist at Port Alto and may require a large investment to restore it. A habitat area with marshes, which is considered a public park, is being affected by erosion (Figure 55). The County will be using Coastal Impact Assistance Program funds to protect these marshes and the shoreline. Different alternatives may be used for the shoreline and marsh protection, which may include rock groins, rock revetments, beach nourishment, or the combination of them, as presented in the sketch in Figure 55. With these alternatives in place, a public boat ramp and the access channel at the end of Seagull Street may support more recreational infrastructure. Parking space may be needed, as well as habitat and safety signs and restrooms.



Figure 55. Location of the Port Alto Shoreline Park showing some potential improvements in the future as well as the marshes in the area.










 Fishing	 Wind Surfing
	 Shoreline Access

 Swimming  Wildlife Viewing	 Kayaking
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**Olivia Haterius Park boat ramp.** The public boat ramp at Olivia, which is located at the end of the SH 172, has good recreational infrastructure but is not well-known (Figure 56). The users can access Keller, Matagorda and Lavaca Bays from this ramp. The area has parking space, picnic tables and grills, but needs restrooms since there are no public restrooms on the shorelines of Keller and Carancahua Bays.



Figure 56. Location of the Olivia Public Boat Ramp in Keller Bay.

 Fishing  Swimming  Wildlife Viewing  Picnic Tables	 Wheelchair Accessible  Shoreline Access  Wind Surfing  Boat Ramp  Kayaking
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## Zone E: Paddling Trails and/or Kayaking Access Points

Several paddling trails and windsurfing sites appear available at Keller and Carancahua Bays.

**SH 35-Port Alto paddling trail.** There is a boat ramp available on SH 35 on the north side of Carancahua Bay in Jackson County. Jackson County has plans and funding to revitalize the ramp. The access channel of this boat ramp is currently subject to shoaling. However, the site presents a good opportunity for a paddling trail from or to Port Alto (Figure 57). The distance between these two sites is about 5.5 miles. The area is also ideal for windsurfing. Strong winds may help paddlers or windsurfers to launch in Port Alto and end at the SH 35 boat ramp.



Figure 57. Paddling trail from Port Alto to SH 35 in Jackson County.

**Port Alto-Salt Lake and Redfish Lake paddling trail.** A paddling trail can be used from Port Alto to access Salt and Redfish Lakes. This is also a good site for windsurfers to enjoy the marshes at those lakes (Figure 58). The distance between the two sites is about 3.7 miles. Strong winds may help paddlers and windsurfers access Salt Lake and come back to Port Alto. This paddling trail presents the opportunity to visit marsh areas that are being strongly affected by erosion and which may disappear in a few years.



Figure 58. Paddling trail from Port Alto to the Salt and Red Fish Lakes.

**Keller Creek at FM 2143-Olivia Boat Ramp paddling trail.** There is an ideal area for a paddling trail starting at the intersection of Keller Creek and FM 2143 (Figures 59 and 60). This is a good site to kayak the entire upper portion of Keller Bay, which is surrounded by marshes and wetlands. There are about 4.5 miles of distance between this area at FM 2143 and the Olivia boat ramp (Figure 59). The access from the FM 2143 road is difficult and the potential ramps accessing the water are being affected by erosion. In order to attract more visitors that can take this paddling trail, the launching area at FM 2143 would have to be improved as suggested in Figure 60. The improvements include better access from the road and parking areas, as well as improvements to the ramps to put the kayakers in the water. Stoned ramps are recommended to maneuver the kayakers and prevent slippery conditions.



Figure 59. Paddling trail available from FM-2143 to the public boat ramp in Olivia. A distance of about 4.5 miles covers the entire trail.



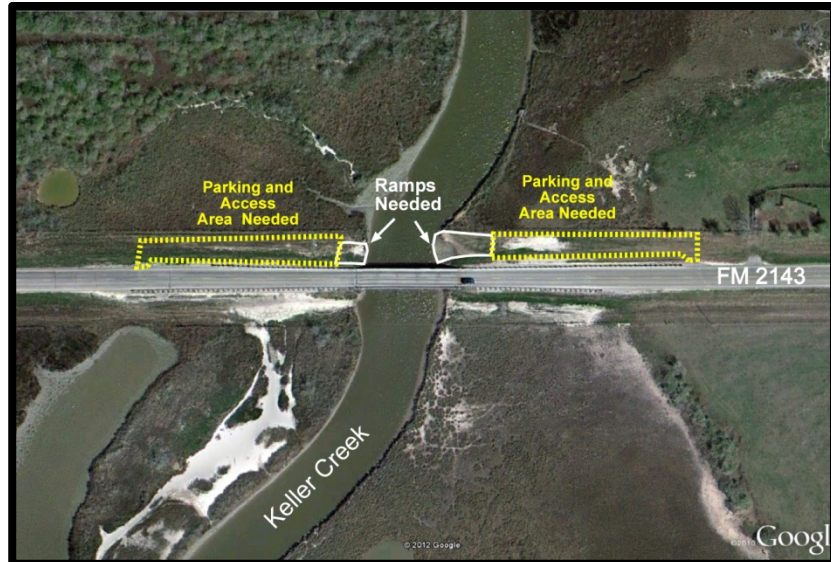


Figure 60. Suggested improvements needed for a paddling trail between Keller Creek-FM 2143 and Olivia boat ramp.

**Olivia to South Keller Bay paddling trail.** Another paddling trail is available from Olivia to South Keller Bay. This is an easy paddling trail that can access the southern portion of the bay paddling close to shorelines. The area is also ideal for wind surfers. The distance to the marshes is about 4.0 miles (Figure 61). The bay is in average 5 to 6 feet deep, making this a good area for kayaking and fishing. The peninsula between Keller and Matagorda Bay may protect kayakers from strong winds. Also, the southern part of Keller Bay has extensive marshes, ideal for bird watching.



Figure 61. Paddling trail from Olivia to south Keller Bay.

**Short paddling trails from Olivia.** There are several short paddling trails available from Olivia Park. The park allows for kayaking or windsurfing to the marshes in Keller Bay, less than a mile of distance from this park (Figure 62). One option is to launch from Olivia and at the end of CR 317 or vice versa. The marsh areas on the shorelines are known for being the habitats for waterfowl and sand hill cranes. More than six miles of paddling trails can be accessed in these areas.



Figure 62. Paddling trails from the Olivia boat ramp and CR 317 in Keller Bay.

### Zone E: Fishing Piers

**Potential fishing pier and observation deck at Olivia Park.** There are no public fishing piers in Keller or Carancahua Bays. Olivia Park has great conditions for expanding this type of infrastructure. A fishing pier could be constructed on the west side of the park, where the area is relatively deep for a short distance from the shoreline. Also, an observation deck could be built on the elevated portion of the park for viewing the marshes and Keller and Matagorda Bays. The sketch in Figure 63 shows some suggested improvements to this park, which may attract more visitors.



Figure 63. Recommended infrastructure for the Olivia Public Park. The park could be improved with a fishing pier, an observation deck and restrooms.

## Calhoun County Shoreline Access Recommendations

This list of recommendations would improve the shoreline access infrastructure and lessen the natural resources impacts associated with public use. Since visitation is dependent on the quality of the natural resources around Calhoun County, Atkins believes these recommendations would balance public use of shoreline infrastructure while protecting or enhancing natural resources. Calhoun County has taken pro-active steps to improve the recreational infrastructure along the bays shorelines with its constant search for federal and state grants for improvements to the shoreline access areas. Atkins recommends the following additional steps.

**Monitor infrastructure.** The County should implement a monitoring infrastructure program to reduce the costs of maintenance. Early identification of potential problems in the infrastructure, such as small damage and rotten wood on fishing piers, localized concrete failure in the boat ramps, etc., may save a significant amount of repair costs in the long-term.

**Team with natural resources groups to protect the natural habitats.** The presence of very diverse natural habitats in Calhoun County makes the area a natural treasure for the Texas Coast and the Gulf of Mexico. The County should consider the protection of these natural habitats as a priority since these resources bring economic benefits and aesthetic assets to the residents and visitors. The County should be involved in all the environmental efforts to restore or protect these natural resources.

**Create the Calhoun County Coastal Task Force.** It appears that there are different groups and entities interested in the improvement of the coastal environment in the county. Improvements can be managed through coordination and funding. The creation of a Calhoun County Coastal Task Force, consisting of entities representing every single group or community in Calhoun County, would allow the groups to work together to attract different funding opportunities for restoration, recreation and environmental projects.

**Create a Beneficial Use of Dredge Material (BUDM) Team.** Three major navigation channels are located in Calhoun County. These channels are subject to regular maintenance and dredging. By creating a county BUDM team, partnerships can be developed for the best use of the dredged sediments in restoration projects. Shoreline retreat is a major problem in the county, so the use of dredging sediments for the restoration of the shorelines and habitats would have a great benefit in the county. With the high loss of habitats along the bay shorelines, a pro-active BUDM team could contribute support for environmental and habitat restoration projects in coordination with federal, state and non-profit organizations.

**Advertise the shoreline access Infrastructure through a Website.** The local shoreline access infrastructure needs to be advertised locally and regionally. More than 200 miles of potential paddling trails are available in Calhoun County. This low-impact activity would allow more visitors to enjoy the coastal natural resources available in the county. Advertisements could be developed on the Calhoun County website, brochures, radio advertisement, flyers, etc.

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Port Lavaca Lighthouse Beach and Bird Sanctuary RV Park

<http://www.portlavacatx.org/>

[http://portlavacainstreet.com/Kayak\\_Upper\\_Lavaca\\_Bay\\_1.html](http://portlavacainstreet.com/Kayak_Upper_Lavaca_Bay_1.html)

**ATKINS**

**Calhoun County Preliminary Inventory (Update) of Shoreline  
Access Infrastructure**

**TECHNICAL MEMORANDUM-Appendix A**



**Atkins Coastal Planning and Restoration Group**

Atkins Job No. 100023672

THIS TECHNICAL MEMORANDUM WAS PREPARED FOR THE COASTAL COORDINATION COUNCIL PURSUANT TO NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AWARD NO. NA10NOS4190207.

December 2011



## Contents

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	Page
1. Introduction .....	1
2. Methodology .....	2
3. Inventory Update .....	7
4. Results.....	7
- Zone A: San Antonio Bay and West Calhoun County .....	9
- Zone B: Gulf Intracoastal Waterway (GIWW).....	21
- Zone C: South Lavaca Bay .....	32
- Zone D: North Lavaca Bay.....	52
- Zone E: East Calhoun County.....	74
5. References .....	81

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**\*Front page photo: King Fisher Park Fishing Pier at Port O’Connor**



## 1. Introduction

With the population growth and the privatization of the shorelines, a large portion of the Texas coast is receiving high pressures on its public shoreline access and the recreational activities that go with it. The growth in visitation and population in Calhoun County (County) is just one example of these coastal trends. Public access for recreation, public safety and other uses has been an increasing problem for the County in the last 20 years. As a response to these problems the County is developing this Calhoun County Shoreline Access Master Plan in order to have a long-term approach to the problems and potential solutions associated with the access to the shorelines in Calhoun County. This document is a preliminary inventory of the conditions of existing shoreline access points and it provides suggestions for site improvements.

A Comprehensive Recreation, Conservation and Access Master Plan was prepared in 2006 for the West Side Calhoun County Navigation District (Public Management Inc., 2006). The study served as a planning document to assist the navigation district in improving conditions for its citizens, but it also covered some of the shoreline infrastructure needed for the County to respond to the visitation, population and economic growth. The report developed an inventory of recreational facilities and locations associated with various shoreline areas, such as boat ramps, piers, pavilions, beach areas, camping, fishing, bicycling, hunting, wildlife viewing and bird watching.

Based on the conclusions of the Public Management report and the regional needs to resolve the shoreline access issues related to comprehensive solutions, Atkins has prepared the update of the shoreline access points as the first step to identify alternatives and solutions to public access.

This preliminary assessment and evaluation of currently mapped county coastal access locations includes an inventory of the available infrastructure at each location ,potential expansion or revitalization, and the potential for multi-use recreational activities such as beach areas, camping, fishing, bird watching, etc. At the request of the County, Atkins specifically addressed three main topics:

**1. Boat Ramps.** Identification of the general conditions of the available boat ramps and potential areas for future development of new single- or multi-use boat ramps.

**2. Fishing Piers.** Identification of the general conditions of the available fishing piers and potential areas for future development of new single- or multi-use fishing piers.

**3. Paddling Trails or Areas.** Identification of the general conditions of the available paddling trails and kayaking access points and potential areas for future development of new single- or multi-use paddling trails and kayaking access.

The county is surrounded by four bays (Figure 1): Lavaca and Matagorda Bays on the east side, Espiritu Santo Bay on the south side, and San Antonio Bay on the west side. The county is also in contact with the Gulf of Mexico through Matagorda Island, which is south of the Espiritu Santo Bay. The county has a total land area of about 1,032 sq mi (2,673 km<sup>2</sup>). The total area of county waters is about 520 sq mi (1,347 km<sup>2</sup>). The shorelines in these bays have excellent conditions for public shoreline infrastructure.

## 2. Methodology

Atkins analyzed the available inventory of existing bay and estuary access points and their available infrastructure as presented in the Texas Beach and Bay Access Guide (Guide) developed by the Texas General Land Office (TGLO) which is available at:

[http://www.glo.state.tx.us/OC/Beach\\_Access/pdf/04-GoldenCrescent.pdf](http://www.glo.state.tx.us/OC/Beach_Access/pdf/04-GoldenCrescent.pdf).

The guide was designed to help coastal visitors locate a variety of public access sites, National Wildlife Refuges, and Wildlife Management Areas along the Texas coast ( see Figure 2). As mentioned in the guide, public access sites may provide either direct or indirect access to the coast or bay. A brief description of primary recreational activities was provided. The guide included location maps showing available marinas, county/state/federal parks, boat ramps, and areas of recreational interest.





Figure 1. Bays in contact with Calhoun County.



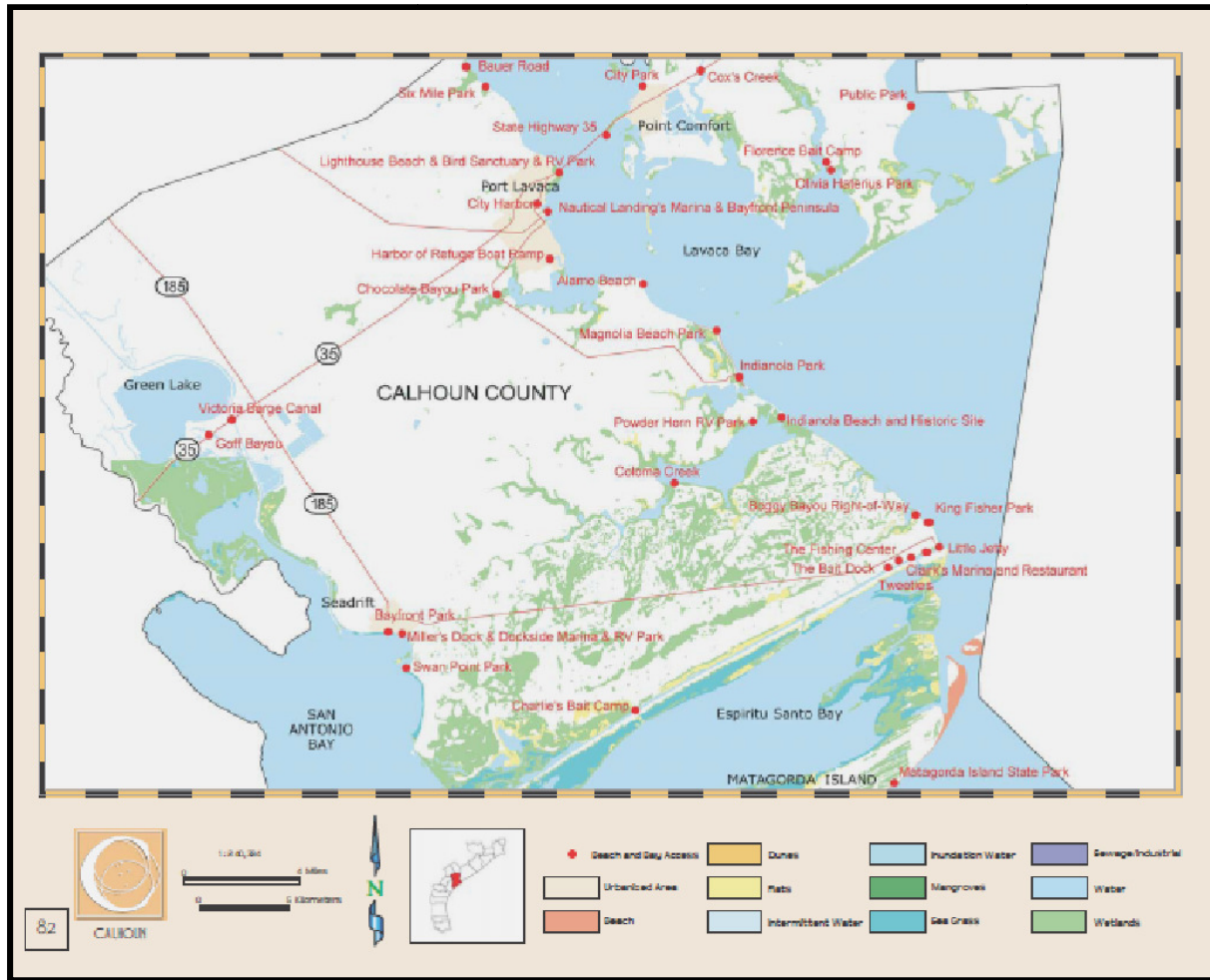


Figure 2. Location of the bay existing access points (Source: TGLO).

The guide provides information about available activities such as fishing, swimming, wildlife viewing, picnicking, camping, and windsurfing, along with available public infrastructure such as boat ramps, boat docks, piers, restrooms, showers, electricity and lighting, fresh water, concessions, fees, access for the mobility impaired, Gulf access, and access to bays, rivers, and lakes (Figure 3).

CALHOUN COUNTY																			
Site/Area	Location (includes nearest city/town)	Fishing	Swimming	Boat Mooring	Picnicking	Camping	Windsurfing	Boat Ramp	Boat Dock	Pier	Restroom	Shower	Electric City Lighting	Fresh Water	Concession	Entrance Parking Fee	Access for the Mobility Impaired	Golf Access	Boat Launch Access
Alamo Beach	Carrigan Avenue, Alamo Beach	●						●		●									●
Bauer Road	End of Bauer Road northwest of Port Lavaca	●		●															●
Bayfront Park	Bay Avenue, Seadrift	●		●	●					●	●		●	●			●		●
Boggy Bayou Right-of-Way	North end of 3rd Street Port O'Connor	●		●															●
Charlie's Bait Camp	Lane Road, Seadrift 361-785-3023	●		●	●			●	●	●	●		●	●	●	●	●		●
Chocolate Bayou Park	FM 238 at Chocolate Bayou Port Lavaca	●		●				●									●		●
City Harbor	Highway 238 & Harbor Street Port Lavaca	●			●			●	●						●				●
City Park	End of Lamar Street, Point Comfort	●		●	●			●	●	●	●		●	●	●		●		●
Clark's Marina & Restaurant	7th & Maple, Port O'Connor 361-983-4388			●				●	●	●	●				●		●		●
Coloma Creek	Highway 1289 & Powderhorn Lake Indianola	●		●				●											●
County Park	Bayshore Drive, Port Alto	●		●															●
Cox's Creek	Highway 35, 2 miles north of FM 1603, Point Comfort	●		●															●
Florence Bait Camp	End of Second Street, Olmita	●		●				●	●	●						●			●
Golf Bayou	State Highway 35, Seadrift	●																	●
Harbor of Refuge Boat Ramp	Off of Alcos Road (FM 1090) South of Port Lavaca	●		●				●	●								●		●
Indianola Beach & Historic Site	Omaha & Channel Drive Indianola	●		●	●														●
Indianola Park	North Ocean Drive & FM 316, Indianola	●		●	●					●	●						●		●
State Highway 35	North end of State Highway 35 & causeway, Point Comfort	●		●															●

































  

CALHOUN COUNTY																			
Site/Area	Location (includes nearest city/town)	Fishing	Swimming	Boat Mooring	Picnicking	Camping	Windsurfing	Boat Ramp	Boat Dock	Pier	Restroom	Shower	Electric City Lighting	Fresh Water	Concession	Entrance Parking Fee	Access for the Mobility Impaired	Golf Access	Boat Launch Access
King Fisher Park	Tyler & Washington, Port O'Connor	●	●	●	●		●			●	●	●					●		●
Lighthouse Beach & Bird Sanctuary & RV Park	700 Lighthouse Beach Drive, Port Lavaca, 361-552-5311	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
Little Jetty	Northeast end of Maple Avenue Port O'Connor	●	●	●													●		●
Magnolia Beach Park	Margo Toomey Road & North Ocean Drive Magnolia Beach	●	●	●	●	●	●	●	●	●	●					●			●
Matagorda Island State Park	Matagorda Island 361-983-2215	●	●	●	●	●	●				●	●				●		●	●
Miller's Dock & Dockside Marina & RV Park	100 Bay Avenue, Seadrift	●			●			●	●		●	●	●	●	●	●			●
Nautical Landings Marina & Bayfront Peninsula	106 Commerce Street Port Lavaca, 361-553-7041	●		●	●			●	●	●	●	●	●	●					●
Olivia Haterius Park	End of Highway 172, Olmita	●		●	●			●	●								●		●
Powderhorn RV Park	601 Powderhorn Lane, Port Lavaca 361-552-7481	●		●	●	●		●	●	●	●	●	●	●		●			●
Six Mile Park	End of Royal at Lavaca Bay Port Lavaca	●	●	●				●			●		●				●		●
Swan Point Park	End of Swan Point Road, Seadrift	●		●				●											●
The Bait Dock	Byers & Maple Street, Port O'Connor 361-983-4468	●		●	●	●		●	●	●		●	●	●			●		●
The Fishing Center	13th & Intracoastal Canal Port O'Connor, 361-983-4440			●	●			●	●		●				●		●		●
Tweedles	Located off of Maple Street Port O'Connor							●	●	●	●				●	●			●
Victoria Barge Canal	State Highway 35 southwest of Port Lavaca	●		●															●

● Boat Launch Fee

Figure 3. Information available on activities and infrastructure on the shoreline access points in Calhoun County, Texas (Source: TGLO)

Illustration signs were used in this memorandum to represent public infrastructure available at each access point, based on the descriptions provided in the TGLO Guide. Atkins followed the illustration format used by the Texas Parks and Wildlife Department for public parks. A few illustrations were also created to include local conditions. The list of signs is as follow:

 Hiking Trails	 Picnic Tables
 Nature/Interpretive Trails	 Exhibit/Interpretive Center
 Biking Trails	 Historic Site/Museum
 Equestrian Trails	 Primitive/Walk-in Campsites
 Golf	 Tent Campsites
 Fishing	 Water and Electric Campsites
 Fishing Pier	 Water, Electric and Sewer Sites
 Fish Cleaning Shelters	 Motel/Lodging
 Swimming	 Playground
 Restaurant	 Boat Ramp
 Restrooms	 <b>Wildlife Viewing</b>
 Showers	 <b>Shoreline Access</b>
 Wheelchair Accessible	 <b>Wind Surfing</b>
 <b>Open Beach</b>	 <b>Electricity/Lighting</b>
 <b>User's Fee</b>	 <b>Fresh Water</b>
 Swimming Pool	 <b>Kayaking</b>

### **3. Inventory Update**

Atkins used publically available spatial data (e.g., Google Earth, the TGLO's Shoreline Access Guide) to locate the shoreline access points. Once spatial data was collected, Atkins performed a field verification effort on all of the access points. Various amenities were noted, representative photographs were taken, and other features or issues (e.g., erosion evidence) were documented. In addition to the coastal access locations listed in the Guide, other unmapped or "unauthorized" potential access locations were also evaluated. These areas include access points that are either not listed or mapped in the TGLO Guide or are unauthorized but well used by the general public. Potential additional uses at each location were also considered.

### **4. Results**

Atkins performed a field verification of 33 coastal shoreline access locations that were listed in the TGLO Guide. Of the 33 sites, two sites were non-existent, and several had limited amenities, despite the fact that the TGLO Guide listed several or numerous significant amenities. Some locations existed, but were inaccurately listed as public access. Access on Coloma Creek is one such example. The access is actually a Texas Department of Transportation Right of Way, but the map indicates a much larger tract, with actual access location depicted on potential private property.

As part of the inventory, the area of study was analyzed by location. The analysis was divided in five areas (See Figure 4):

Zone A: San Antonio Bay and West Calhoun County

Zone B: Gulf Intracoastal Waterway (GIWW)

Zone C: South Lavaca Bay

Zone D: North Lavaca Bay

Zone E: East Calhoun County

The inventory presented in this preliminary report will serve as the first step in the development of a Shoreline Access Master Plan.



Figure 4. Shoreline Access Zones used in this inventory: Zone A--San Antonio Bay and West Calhoun County; Zone B--Gulf Intracoastal Waterway (GIWW); Zone C--South Lavaca Bay; Zone D--North Lavaca Bay; and Zone E--East Calhoun County.











**Zone A: San Antonio Bay and West Calhoun County**



**Area Name: Goff (Hog) Bayou (South of Green Lake)**



 Fishing	 Wildlife Viewing
 Swimming	 Shoreline Access
 Boat Ramp	 Kayaking




**Area Name: Goff (Hog) Bayou (South of Green Lake)**

Location: Highway 35 and Goff Bayou

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp	X	
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	The site is accessed from State Highway 35. Needs access to the shorelines for mobility impaired. Users mentioned that it really needs water and lights. It has great potential for kayaking.	

Area Name: Victoria Barge Channel



 Fishing

 Wildlife Viewing















**Area Name: Victoria Barge Channel**

Location: Highway 35 and Victoria Barge Channel

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access		
Other Comments:	The area has limited access to the water, manifested by steep slopes on the banks. Dangerous access for kayaking or swimming.	

**Area Name: Seadrift Bayfront Park (City of Seadrift Seawall)**



	Fishing		Electricity/Lighting
	Wind Surfing		Fresh Water
	Boat Ramp		Wheelchair Accessible
	Restrooms		Shoreline Access
	Motel/Lodging		Wildlife Viewing
	Fishing Pier		Kayaking



West



Center



East

**Area Name: Seadrift Bayfront Park (City of Seadrift Seawall)**













Location: Main St. and Bay Ave.

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking	X	
Camping		
Windsurfing	X	
Boat Ramp	X	Not in use due to shoaling problems
Boat Dock		
Pier		A pier will be built for the public in 2012
Restroom	X	
Shower	X	
Electricity/Lighting	X	
Fresh Water	X	
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Seawall is starting to show damage due to settlement and scouring. Erosion issues are all along bulkhead, and potentially an issue where the restroom facility is located. This park is the endpoint for the relatively high-profile event known as the Texas Water Safari; the event features kayakers and canoeists that race to Seadrift via the Guadalupe and San Marcos Rivers starting in San Marcos, TX (260-mile long course). A fishing pier will be built in 2012 and will attract more recreational opportunities. Great potential for kayaking.	



**Area Name: Seadrift Marina**



	Fishing		Electricity/Lighting
	Wind Surfing		Fresh Water
	Boat Ramp		Wheelchair Accessible
	Restrooms		Shoreline Access
	Motel/Lodging		Wildlife Viewing
	Fishing Pier		User's Fee

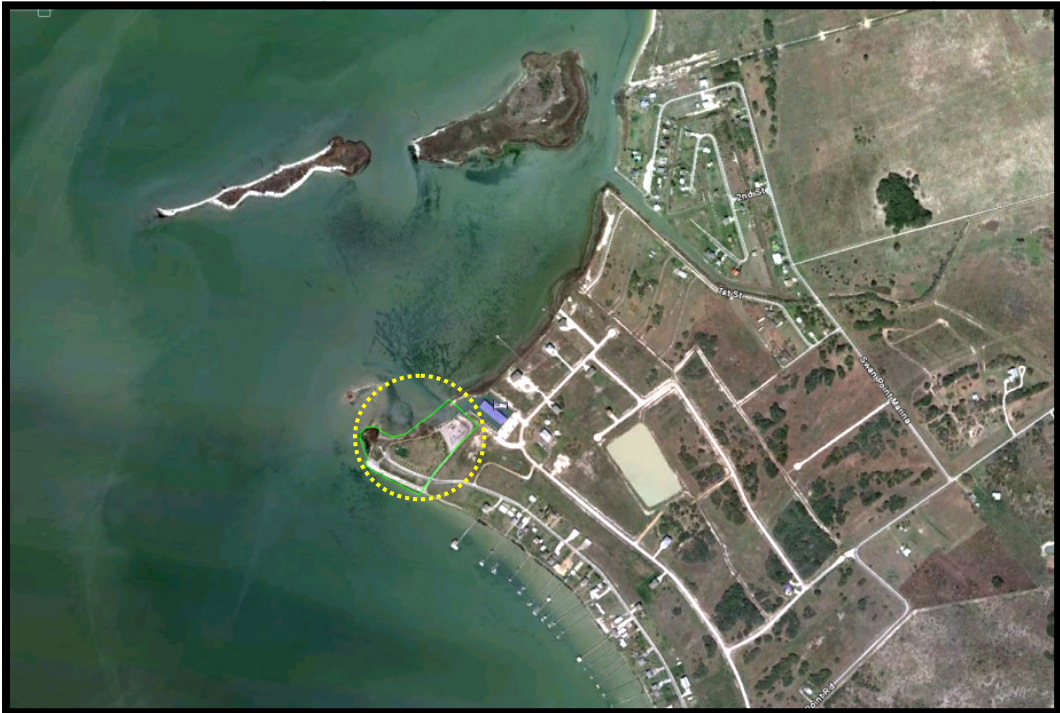












**Area Name: Seadrift Marina**

Location: Intersection of Main St and Bay Ave, City of Seadrift

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		
Wildlife Viewing		
Picnicking		
Camping		
Windsurfing	X	
Boat Ramp	X	New or under construction for improvements
Boat Dock	X	Under construction for improvements
Pier	X	
Restroom	X	Available in bait shop
Shower		
Electricity/Lighting	X	
Fresh Water	X	Available in bait shop
Concession	X	Available in bait shop
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	This site is a privately managed boat ramp. Owner says that large volumes of users fill the facility during peak seasons. No room for parking expansion. Primary request that users make to improve site is a dredged boat channel. The area is currently under improvement via new bulkhead.	

**Area Name: Swan Point (aka R. W. "Bill" Sanders Memorial Park)**



 Fishing	 Electricity/Lighting
 Swimming	 Wheelchair Accessible
 Wind Surfing	 Shoreline Access
 Boat Ramp	 Wildlife Viewing
 Picnic Tables	 Kayaking



**Area Name: Swan Point (aka R. W. "Bill" Sanders Memorial Park)**

Location: Terminus of Swan Point Rd, immediately south of City of Seadrift












Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking	X	
Camping		
Windsurfing	X	Protected area ideal for windsurfing
Boat Ramp	X	
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting	X	
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Erosion problems at the bulkhead are evident. This site could be a logical location for a lighted pier or kayak launch site. The area just northwest of the site is blocked by southeasterly winds and the presence of two islands makes it somewhat ideal for kayaks. Small bird islands are receiving active erosion. Area next to grasses ideal for creating bird habitats using beneficial use of dredge material from nearby channels.	

**Zone B: Gulf Intracoastal Waterway (GIWW)**



Area Name: Charlie's Baitcamp



 Fishing	 Electricity/Lighting
 Wildlife Viewing	 Wheelchair Accessible
 Wind Surfing	 Shoreline Access
 Boat Ramp	 Restrooms
 User's Fee	 Fresh Water
 Kayaking	












**Area Name: Charlie's Baitcamp**

Location: Terminus of Lane Rd, off of Highway 185, between Seadrift and Port O'Connor

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		Possible but not safe due to GIWW traffic
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		Open bay access may be attractive for windsurfers
Boat Ramp	X	
Boat Dock	X	
Pier		Poor condition; owner wants it removed
Restroom	X	Available in Concession
Shower		
Electricity/Lighting	X	
Fresh Water	X	Available in Concession
Concession	X	Available in Concession
Entrance/Parking Fee		Boat ramp use fee
Access for the Mobility Impaired	X	Available for bait shop
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Charlie's is a strategic boat ramp that draws crowds from Port O'Connor due to immediate bay access. Boats launching at Charlie's are less likely to traverse the GIWW. The ramp is away from the traffic in Port O'Connor. Shoreline erosion issues are severe due to GIWW traffic.	

Area Name: Froggie's



 Fishing	 Electricity/Lighting
 Wildlife Viewing	 Wheelchair Accessible
 Wind Surfing	 Shoreline Access
 Restrooms	 Fresh Water
 Boat Ramp	















**Area Name: Froggie's**

Location: Intersection of Byers and Stella, Port O'Connor

<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming		Possible but not safe due to GIWW traffic
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp	X	
Boat Dock		
Pier		
Restroom	X	Available in bait shop
Shower		
Electricity/Lighting	X	
Fresh Water	X	Available in bait shop
Concession	X	Available in bait shop
Entrance/Parking Fee		Boat ramp use free
Access for the Mobility Impaired	X	Available for bait shop
Gulf Access	X	Potentially since it is a close launch to Pass Cavallo or Matagorda Ship Channel
Bay/River/Lake Access	X	
Other Comments:	Froggie's staff suggested that bulkhead erosion is a constant problem and needs attention. Parking expansion in progress.	

**Area Name: The Fishing Center**



 Fishing	 Electricity/Lighting
 Wildlife Viewing	 Wheelchair Accessible
 Wind Surfing	 Shoreline Access
 Restrooms	 Fresh Water
 Boat Ramp	 User's Fee













**Area Name: The Fishing Center**

Location: Water and 13<sup>th</sup> St., Port O'Connor

<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming		Possible but not safe due to GIWW traffic
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp	X	
Boat Dock		
Pier		
Restroom	X	Available in bait shop
Shower		
Electricity/Lighting	X	
Fresh Water	X	Available in bait shop
Concession	X	Available in bait shop
Entrance/Parking Fee	X	Boat ramp use fee
Access for the Mobility Impaired	X	Available for bait shop
Gulf Access	X	Potentially since it is a close launch to Pass Cavallo or Matagorda Ship Channel
Bay/River/Lake Access	X	
Other Comments:	This entire facility is privately owned. Fishing Center suggests that bulkhead erosion is constant problem that they could use assistance with. Facility appears to be at a maximum and no room for expansion or more parking is possible. The limited parking restricts the use of this area and creates local traffic issues.	

**Area Name: Clarks Boat Ramp**



 Fishing	 Electricity/Lighting
 Wildlife Viewing	 Wheelchair Accessible
 Restrooms	 Shoreline Access
 Boat Ramp	 Fresh Water
 Fishing Pier	 User's Fee

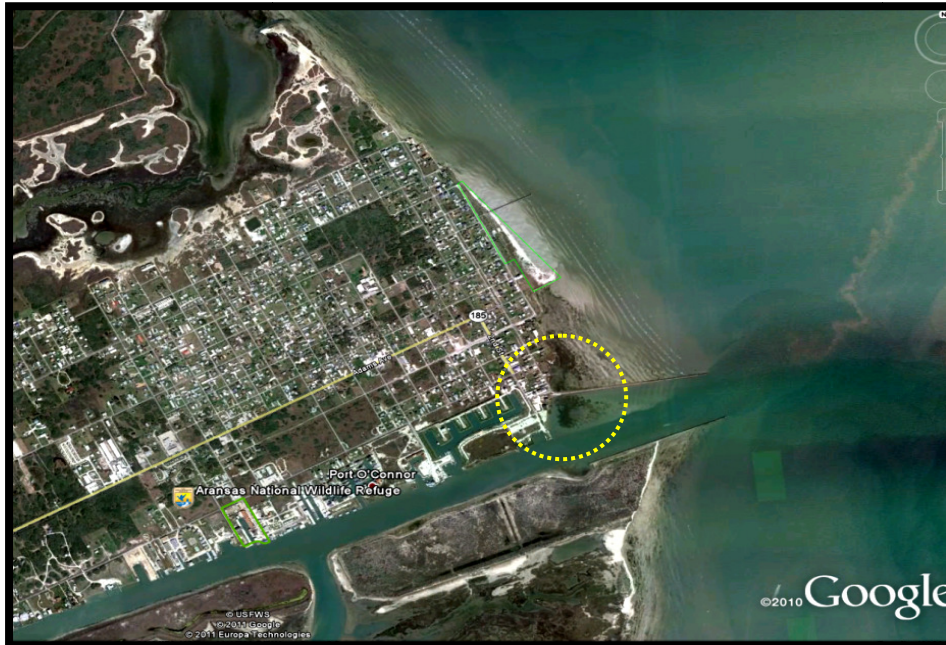


**Area Name: Clarks Boat Ramp**

Location: Terminus of 7<sup>th</sup> St., Port O'Connor

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp	X	
Boat Dock		
Pier	X	
Restroom	X	Available in bait shop
Shower		
Electricity/Lighting	X	
Fresh Water	X	Available in bait shop
Concession	X	Available in bait shop
Entrance/Parking Fee	X	Boat ramp use fee
Access for the Mobility Impaired	X	Available for bait shop
Gulf Access	X	Potentially, since it is a close launch to Pass Cavallo or Matagorda Ship Channel
Bay/River/Lake Access	X	
Other Comments:	This entire facility is privately owned. The facility is one of the more used boat ramps in the area. Some of the shorelines are eroding; no bulkhead but placement of oyster. Expanded parking lot is progress but is primitive and within a tidal area at present. It needs better parking services.	

Area Name: Little Jetty Park



 Wildlife Viewing

 Kayaking



**Area Name: Little Jetty Park**

Location: Intersection of Commerce and Washington, Port O'Connor

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing		
Swimming		
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	Walk-in access only
Other Comments:	Primitive site that has no improvements; only roadside parking and walk-in access. The submerged areas have extensive seagrasses and marshes. It needs improvement to parking and access and a small kayak trail. Kayaking during low tides may impact the seagrasses. A local sign should alert users about the presence of seagrasses.	













**Zone C: South Lavaca Bay**





**Area Name: Kingfisher Park**



	Fishing		Electricity/Lighting
	Wind Surfing		Fresh Water
	Restrooms		Wheelchair Accessible
	Motel/Lodging		Shoreline Access
	Fishing Pier		Wildlife Viewing
	Picnic Tables		Swimming








**Area Name: Kingfisher Park**

Location: Along Park St., Port O'Connor

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking	X	
Camping		
Windsurfing	X	
Boat Ramp		
Boat Dock		
Pier	X	
Restroom	X	
Shower	X	
Electricity/Lighting	X	
Fresh Water	X	
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Kingfisher Park is a result of a CMP and NOAA project grant. The site is also an official historical site as designated by Texas Historical Commission. The park features numerous amenities. Fishing pier appears to be situated within an accreting zone and is too shallow for effective fishing, however the site is one of the best bird watching spots close to Port O'Connor.	

Area Name: Boggy Creek (Bayou)



 Fishing	 Shoreline Access
 Wildlife Viewing	 Wind Surfing
 Kayaking	







**Area Name: Boggy Creek (Bayou)**

Location: Terminus of 3<sup>rd</sup> St, Port O'Connor

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		Swimming may be possible during high tides
Wildlife Viewing	X	
Picnicking		
Camping		No assigned areas for camping, area highly impacted by drivers. It needs car access control
Windsurfing	X	Only on high tides connecting to the bay
Boat Ramp		
Boat Dock		
Pier		Observation pier on the marshes
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	Walk-in wade in only
Other Comments:	Boggy (Bayou) Creek Park includes a nature trail, wildlife viewing observation deck, and is a highly primitive site. The area is managed by Calhoun County. The area is in severe need of tidal marsh protection, designated trails and roadways (to discourage off road access and promote re-vegetation), education signs, and potentially exclusionary fencing (to discourage off road access and promote re-vegetation).	

Area Name: Coloma Creek (At Powderhorn Lake)



 Fishing	 Shoreline Access
 Wildlife Viewing	 Kayaking








**Area Name: Coloma Creek (At Powderhorn Lake)**

Location: Intersection of Coloma Creek and FM 1289, southwest of Port Lavaca

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	<p>Coloma Creek is heavily used and littered. Simple improvements would include signage, garbage bins, and crushed shell to prevent or stop vehicle damage to soils and vegetation. The access is through the ROW easement only. Barbed wire fencing suggests county maps are either incorrect or the fence is unauthorized. This is the feeder creek to Powderhorn Lake, which is relatively well used for hunting and fishing. A nearby (to east) old bridge may be TXDOT ROW and potentially could be used for simple fishing or crabbing pier. It needs better sign for road safety when drivers exit the area.</p>	

**Area Name: Chocolate Bayou**



 Fishing	 Boat Ramp
 Wildlife Viewing	 Shoreline Access
 Kayaking	



**Area Name: Chocolate Bayou**

Location: Intersection of Chocolate Bayou and Highway 238, Port Lavaca


Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		

Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp	X	
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	<p>Chocolate Bayou is a primitive site, with some paved parking and a boat ramp. Bulkhead is severely eroded. The entire area associated with the ROW is used along with the boat ramp area. These other areas are unpaved, severely damaged from off road traffic, and littered. Signs, additional dumpsters or trash bins, and improved substrate to driveways and unauthorized areas could be simple improvements, particularly on the opposite side of ROW (southwestern side).</p>	



**Area Name: Indianola Beach & Historic Site**



	Fishing		Fresh Water
	Boat Ramp		Wheelchair Accessible
	Wildlife Viewing		Shoreline Access
	User's Fee		Kayaking
















**Area Name: Indianola Beach & Historic Site**

Location: Indianola Beach

<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming		
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing	X	Has potential for a launching windsurfing spot
Boat Ramp	X	
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting	X	
Fresh Water		
Concession		
Entrance/Parking Fee	X	
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	
Kayaking	X	Has great potential for kayaking to visit the marshes in Powderhorn Lake.
Other Comments:	Needs water and showers. Has great potential for access to kayaking and windsurfing.	

**Area Name: Powder Horn RV Park**



	Fishing		Fresh Water
	Boat Ramp		Wheelchair Accessible
	Wildlife Viewing		Shoreline Access
	Fishing Pier		User's Fee
	Electricity/Lighting		Picnic Tables
	Water and Electric Campsites		Restrooms
			Showers







**Area Name: Powder Horn RV Park**

Location: Indianola Beach & Historic Site

<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming		
Wildlife Viewing	X	
Picnicking	X	
Camping	X	
Windsurfing		
Boat Ramp	X	
Boat Dock	X	
Pier	X	
Restroom	X	
Shower	X	
Electricity/Lighting	X	
Fresh Water	X	
Concession		
Entrance/Parking Fee	X	
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Kayaking	X	
Other Comments:	Great potential for kayaking.	

Area Name: Indianola Park



 Fishing	 Wheelchair Accessible
 Picnic Tables	 Shoreline Access
 Wildlife Viewing	 Restrooms



**Area Name: Indianola Park**

Location: Indianola Park and Beach

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		
Wildlife Viewing	X	
Picnicking	X	
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier	X	
Restroom	X	
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Needs water and showers. Needs improvements to the restrooms. Restrooms will be improved with CIAP funds.	

**Area Name: Alamo Beach (Does not exist as mentioned in GLO Plan)**










**Area Name: Alamo Beach**

Location: Near Gallinipper Point, North Magnolia Beach

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing		
Swimming		
Wildlife Viewing		
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access		
Other Comments:	Does not exist	

### Alamo Beach (North)



 Fishing	 Boat Ramp
 Swimming	 Shoreline Access
 Wildlife Viewing	 Wind Surfing
	 Kayaking
















**Area Name: North Alamo Beach (North)**

Location: At Carrigan Avenue, North Magnolia Beach

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing	X	Great potential for windsurfing if promoted
Boat Ramp	X	
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		Needs access for the mobility impaired.
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Parking is limited. Has great potential for visitation. Has extensive debris and rusty rebar on the concrete rubble used for shoreline protection.	

**Area Name: Magnolia Beach**



 Fishing	 Wheelchair Accessible
 Swimming	 Boat Ramp
 Picnic Tables	 Shoreline Access
 Wildlife Viewing	 Restrooms
 Kayaking	 Wind Surfing
	 Picnic Tables



**Area Name: Magnolia Beach**

Location: Magnolia Beach





Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking	X	
Camping		
Windsurfing	X	
Boat Ramp	X	
Boat Dock	X	
Pier		
Restroom	X	
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Needs water and showers. The area presents a unique opportunity for kayaking to access Old Town Lake. Restrooms will be improved with CIAP funds.	

Zone D: North Lavaca Bay



**Area Name: Harbor of Refuge**



 Fishing	 Wheelchair Accessible
 Boat Ramp	 Shoreline Access
	 Wildlife Viewing














**Area Name: Harbor of Refuge**

Location: Near St. Virginia St. (aka FM 1090) and Seadrift St. intersection, Port Lavaca

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp	X	
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Harbor of Refuge is a parking facility with a boat ramp. Bulkhead has erosion issues. Site would be ideal for a fishing pier if it does not interfere with commercial shrimp boat maneuverability. Users encountered on the property stated that lighting in the parking lot is needed. This park has a great potential for more access to the bay. The area is not known by the public, only by locals.	

**Area Name: Nautical Landing's**



 Fishing	 Wheelchair Accessible
 Wildlife Viewing	 Boat Ramp
 Fishing Pier	 Shoreline Access
 Fresh Water	 Restrooms
 Kayaking	 Wind Surfing
 Electricity/Lighting	



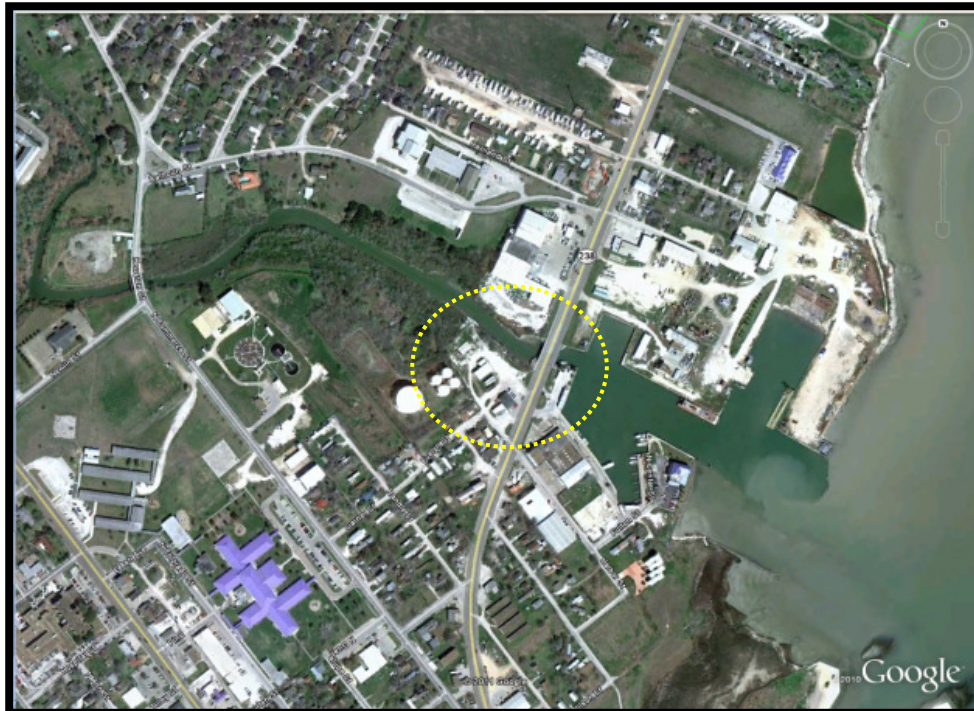
**Area Name: Nautical Landing's**

Location: Intersection of Main (HW 87) and Broadway St. (HW 238), Port Lavaca

<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing	X	Good access for windsurfing
Boat Ramp	X	
Boat Dock	X	
Pier	X	
Restroom	X	
Shower		
Electricity/Lighting	X	
Fresh Water	X	
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired	X	This was the only site with a boat ramp and access dock truly designed for mobility impaired.
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Major facility with numerous amenities; parking capacity could be rearranged and increased. No green areas.	



**Area Name: City Harbor (Does not exist as Park)**



 Fishing

 Wildlife Viewing



















**Area Name: City Harbor**

Location: Broadway St. (HW 238) and Lynn Bayou, Port Lavaca

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming		
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access		
Other Comments:	The park consists of a bulkhead for fishing only. No amenities are available and parking is simple. The public does not know this is a park. Does not appear to be used based on lack of trash.	

**Area Name: Lighthouse Beach, Bird Sanctuary and RV Park**



 Fishing	 Wheelchair Accessible
 Swimming	 Boat Ramp
 Picnic Tables	 Shoreline Access
 Wildlife Viewing	 Restrooms
 Fishing Pier	 Wind Surfing
 Fresh Water	 Electricity/Lighting
 Showers	 Water and Electric Campsites
 Nature/Interpretive Trails	 User's Fee



**Area Name: Lighthouse Beach, Bird Sanctuary and RV Park**

Location: Port Lavaca

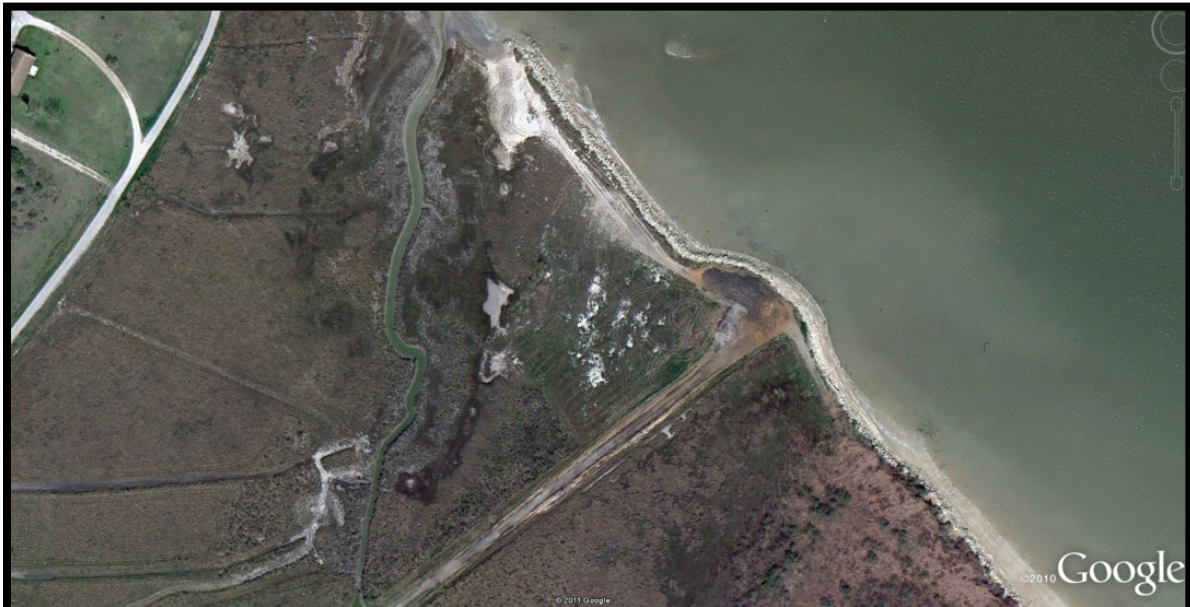
<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking	X	
Camping	X	
Windsurfing	X	
Boat Ramp	X	
Boat Dock		
Pier	X	
Restroom	X	
Shower	X	
Electricity/Lighting	X	
Fresh Water	X	
Concession		
Entrance/Parking Fee	X	
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Kayaking	X	
Other Comments:	The best park in the region in terms of amenities and infrastructure. Very educational site to encourage more visitations. Bulkhead may need repairs and maintenance.	

Area Name: Bauer Road



-  Fishing
-  Kayaking

-  Wildlife Viewing











**Area Name: Bauer Road**

Location: Bauer Road, North Port Lavaca

<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming		Potential for swimming if conditions improve.
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	Potential for better access.
Kayaking	X	Potential for more kayaking if conditions improved.
Other Comments:	Area lacks infrastructure. Local residents oppose to more traffic due to limited access.	

Area Name: Six Mile Road



 Fishing	 Boat Ramp
 Kayaking	 Shoreline Access
 Wildlife Viewing	 Restrooms
 Fishing Pier	 Wind Surfing



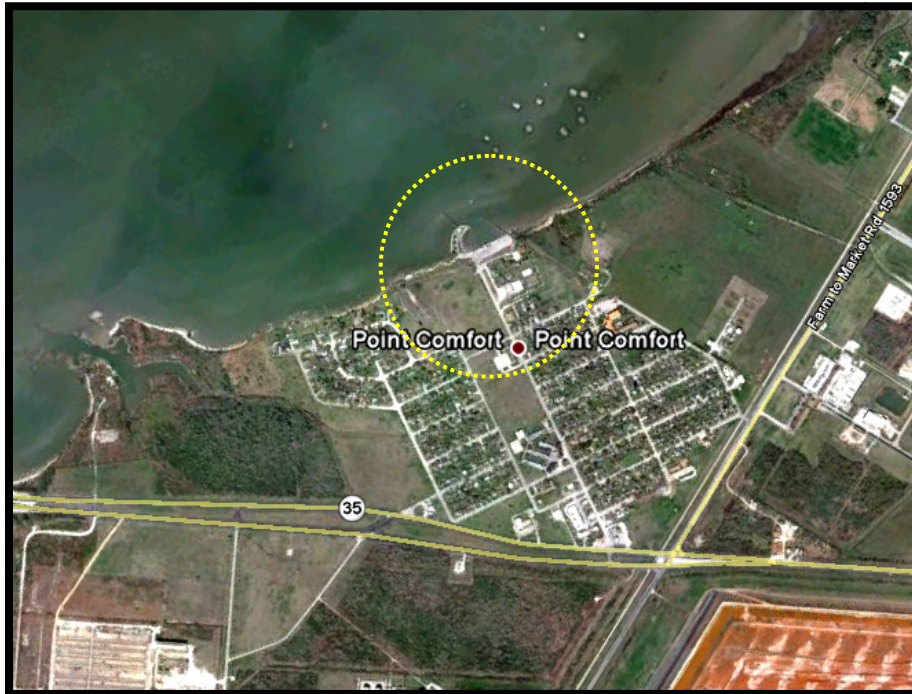
**Area Name: Six Mile Road**












Location: End of Parkroad at the Bay

<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking	X	
Camping		
Windsurfing		
Boat Ramp	X	
Boat Dock		
Pier	X	
Restroom	X	
Shower		
Electricity/Lighting	X	
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	
Kayaking	X	
Other Comments:	The area has great potential if light, electricity, restrooms and water are added to the park. Has great potential for kayaking and windsurfing and accessing the marshes and habitats on the north side of the bay. The abundance of wetlands and marshes next the park makes the area ideal for bird watnching.	



Area Name: Point Comfort Park



 Fishing	 Wheelchair Accessible
 Picnic Tables	 Boat Ramp
 Wildlife Viewing	 Shoreline Access
 Fishing Pier	 Restrooms
 Fresh Water	 Wind Surfing
 Swimming Pool	



**Area Name: Point Comfort Park**

Location: Terminus of Lamar St., Point Comfort

<b>Activity/Amenity</b>	<b>Infrastructure /Facilities</b>	<b>Comments</b>
Fishing	X	
Swimming	X	Swimming pool available
Wildlife Viewing	X	
Picnicking	X	Covered cabana structures
Camping		
Windsurfing	X	
Boat Ramp	X	
Boat Dock	X	
Pier	X	
Restroom	X	
Shower		
Electricity/Lighting	X	
Fresh Water	X	
Concession	X	Concession available in the summertime
Entrance/Parking Fee		
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	This facility has many amenities including cleaning tables, lighted piers, and a helipad. Minor damage to small pier base and bulkhead may need repair. The immediate area has no room for parking expansion; however a large field exists immediately south of the current parking lot.	

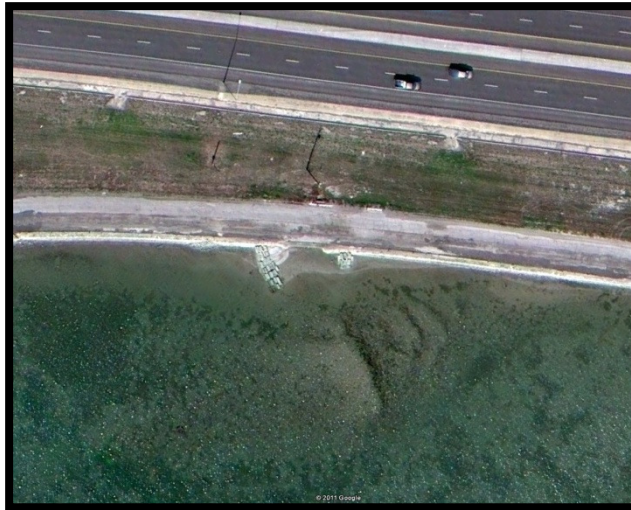
**Area Name: State Highway 35 Park**



 <b>Wildlife Viewing</b>	
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General Location on old Highway 35



Shoreline Access



Restricted Access Area



Abandoned Fishing Pier

**Area Name: State Highway 35 Park**  
 Location: Old Highway 35, Point Comfort

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing		
Swimming		
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		Old pier abandoned and affected by storm
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access		
Other Comments:	This area has a great location for scenic view of the bay. The area is known to be in front of submerged contaminated sediments.	

Area Name: Cox Creek (Closed)



Wildlife Viewing



**Area Name: Cox Creek (Closed)**




Location: SH 35 Bridge at Cox Creek, west of Point Comfort

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing		
Swimming		
Wildlife Viewing	X	Lacks parking
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access		
Other Comments:	This area is the ROW for SH35; no facilities or improvements; current hydrology is almost non-existent (either due to drought, current tidal signatures, or anthropogenic reasons unknown) rendering kayaking and fishing unlikely. The area is part of an active industrial area.	

Note: It is believed that this area was misplaced in the GLO Shoreline Access report. The area was located in Cox Creek when it supposed to be Keller Creek. The site Cox Creek has no access to the bay and is exposed to industrial areas.

**Area Name: Keller Creek (Not in the GLO Shoreline Access Report)**



 Fishing	 Wildlife Viewing
 Kayaking	





**Area Name: Keller Creek (not shown in GLO Report)**

Location: FM 2143 Bridge at Keller Creek, West of Port Alto

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	Limited parking
Swimming		
Wildlife Viewing	X	Limited parking
Picnicking		
Camping		
Windsurfing		
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access		
Other Comments:	This area is the ROW for FM 2143; no facilities or improvements. It needs better parking; current hydrology is good, with kayaking and fishing highly recommended. This area would serve as one of the best ideal spots for kayak launching or primitive fishing location, but signs on the highway will be needed for the safety of the road and users.	

Note: It is believed that this area was misplaced in the GLO Shoreline Access report. The area was located in Cox Creek when it supposed to be Keller Creek.

Zone E: East Calhoun County



**Area Name: Port Alto County Park**



 Fishing	 Wind Surfing
 Swimming	 Shoreline Access
 Wildlife Viewing	 Kayaking



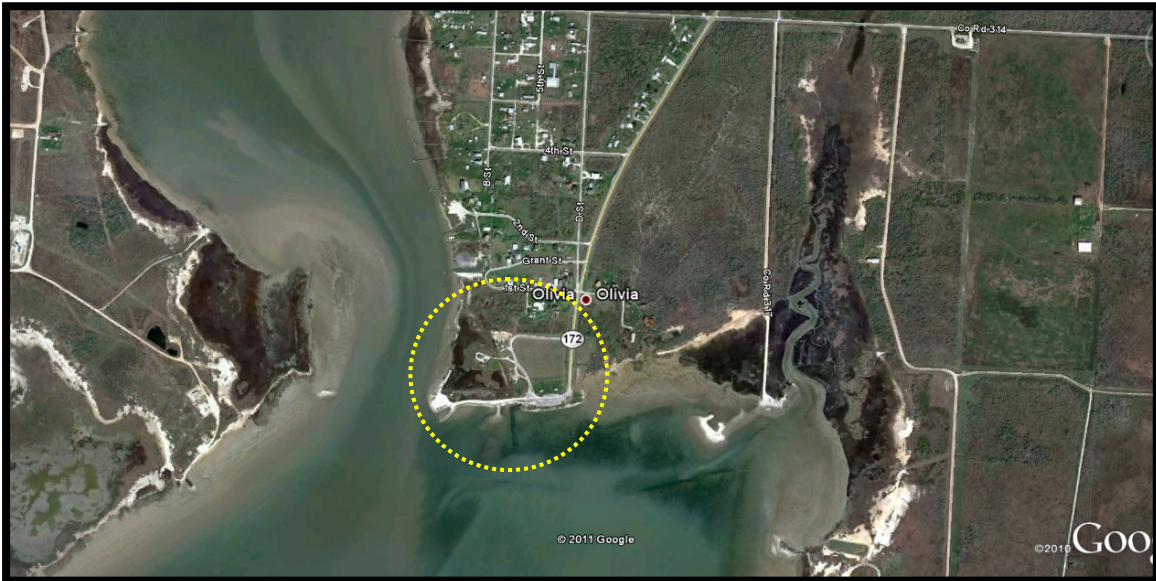
Access at Seagull St.










**Area Name: Port Alto County Park**

Location: Near Country Rd 307 and Curlew St., Port Alto

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking		
Camping		
Windsurfing	X	
Boat Ramp		
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	This project will be improved by Calhoun County under a shoreline protection grant. This location is a primitive access location, with minimal roadside parking or room for expansion. May be potential for parking improvements. Has great potential for passive recreation such as wildlife viewing, kayaking and hiking.	

**Area Name: Olivia Haterius Park**



 Fishing	 Wheelchair Accessible
 Swimming	 Shoreline Access
 Wildlife Viewing	 Wind Surfing
 Picnic Tables	 Boat Ramp
	 Kayaking










**Area Name: Olivia Haterius Park**

Location: Terminus of HW 172, Town of Olivia

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking	X	
Camping		
Windsurfing	X	
Boat Ramp	X	Erosion around boat ramp, bulkheading, free usage
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		Needs lighting for late boat use.
Fresh Water		
Concession		
Entrance/Parking Fee		
Access for the Mobility Impaired	X	
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	This site has room for parking expansion, has no restrooms, and needs additional trash bins or dumpsters. This area is situated in a location that may be a good area for both a kayak launch and a lighted fishing pier.	

**Area Name: Florence's Baitcamp (Private)**



 Fishing	 Wind Surfing
 Swimming	 Boat Ramp
 Wildlife Viewing	 User's Fee
 Shoreline Access	



**Area Name: Florence's Baitcamp (Private)**

Location: Terminus of 2<sup>nd</sup> St., Town of Olivia

Activity/Amenity	Infrastructure /Facilities	Comments
Fishing	X	
Swimming	X	
Wildlife Viewing	X	
Picnicking	X	
Camping		
Windsurfing	X	
Boat Ramp	X	Private ramp, usage requires membership fee, only useful in high tides.
Boat Dock		
Pier		
Restroom		
Shower		
Electricity/Lighting		
Fresh Water		
Concession		
Entrance/Parking Fee	X	Private ramp, usage requires membership fee
Access for the Mobility Impaired		
Gulf Access		
Bay/River/Lake Access	X	
Other Comments:	Public area with private ramp that requires membership fees; no other facilities but parking lot and private ramp. Adjacent walkways to ramp need repair.	



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# **Calhoun County Texas Shoreline Access Plan**

## **Appendix B**

### **Geologic History, Physical Processes, Habitat Inventories, and Environmental Recommendations**



Document Prepared by: Juan Moya, Matthew Mahoney, and Thomas Dixon  
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**Photo: Seadrift Shoreline Park**

## Table of Contents

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	Page
Table of Contents .....	2
Introduction .....	4
Geology .....	4
- Pleistocene fluvial deltaic system .....	5
- Pleistocene marine reworked delta sediments .....	6
- Pleistocene strand plain system .....	6
- Modern delta system .....	6
- Modern marsh system .....	6
- Modern shoreline beaches .....	6
Bay Water Circulation .....	6
- Geographic distribution of bays in Calhoun County .....	7
Shoreline Types .....	9
- Clifed shorelines with Pleistocene deposits exposed in the swash zone .....	10
- Shell and rock fragments beaches .....	10
- Terrigenous beaches .....	10
- Marsh dominated strandline .....	10
- Marsh dominated modern shorelines .....	10
- Shoreline altered by human activities .....	10
Shoreline Retreat Rates .....	10
Coastal Habitats in Calhoun County Bays and Shorelines .....	12
- Tidal wetlands .....	12
- Oyster Reefs .....	12
- Seagrass .....	12
- Rookeries .....	13
- State submerged lands .....	14
Information on Coastal Resources and Potential Regulatory Concerns .....	14
Shoreline Access and Environmental Recommendations .....	15
Geographical Distribution .....	15
Zone A .....	16
- Seadrift Recreational Recommendations .....	16
- Replacement of the Seadrift seawall .....	16
- Shoreline protection at the ends of the Seadrift seawall .....	16
- Marsh restoration as shoreline protection .....	17
- Beneficial use of dredge material and bird islands .....	17
Zone B .....	18
- Shoreline Access Along the Gulf Intracoastal Waterway (GIWW) and Navigation Safety in Calhoun County .....	18

- Shoreline access and safety .....	18
- GIWW safety responsibilities .....	19
- Construction permits needed along the GIWW .....	22
<b>Zone C .....</b>	<b>23</b>
- Shoreline Erosion, Sediment Issues, and Environmental Recommendations .....	23
- Beneficial use of dredge material (BUDM) opportunities at King Fisher Park .....	23
- King Fisher Park recommended sediment management alternatives .....	25
- Erosion affecting habitats of Brad Bayou, Big Dam, Huckleberry and Boggy Bayou .....	26
- Erosion at Powderhorn Lake Peninsula .....	27
- Rip Rap and shoreline protection at Indianola .....	27
- BUDM plan for the southeastern portion of Calhoun County .....	28
- Shoaling at the Magnolia Beach inlet .....	31
<b>Zone D .....</b>	<b>32</b>
- Shoreline Erosion, Sediment Issues, and Environmental Recommendations .....	32
- Point Comfort Park shoaling problems .....	32
<b>Zone E .....</b>	<b>33</b>
- Shoreline Erosion, Sediment Issues, and Environmental Recommendations .....	33
- Marshes in Cox and Carancahua Bay .....	33
<b>Historical Shoreline Resources in Calhoun County .....</b>	<b>35</b>
- Indian Point .....	35
- Indianola-La Salle Monument .....	35

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## **Introduction**

This appendix was developed to present some of the environmental and natural resources information available on Calhoun County. This information may be needed to develop action plans on potential solutions related to shoreline access points or recreation alternatives on the bay shorelines. The information was also presented as a tool that can support future efforts on the protection of these natural resources and the development of specific public shoreline infrastructure. The information covers the geology of county shorelines; the location of erosion problems on the shorelines; and the habitat-related data, which is needed when addressing public access to the county shorelines for recreational activities such as fishing, hunting, swimming, bird watching, kayaking, windsurfing, etc. In addition, a list of recommendations on localized environmental problems affecting the shorelines has been included, using the same areas described in the Calhoun County Shoreline Access Master Plan.

## **Geology**

The evolution of the Calhoun County shorelines is associated with the deposition of several river deltas in the last 125,000 years. This deposition was a response to the sea level changes that occurred in the Gulf of Mexico as the result of climatic variations, and the response of the rivers interacting with a changing coast (McGowen et al. 1976). On the east side of the county, the San Antonio and Guadalupe River Delta systems controlled the geologic deposition of the region. On the west side, the Lavaca-Navidad River System left extensive fluvial and deltaic deposits as well. These fluvial (river deposits) and delta systems (delta deposits) controlled the landscape in the county, leaving a flat fluvial-deltaic coastal plain environment. The changes in the sea level curve in the Gulf of Mexico for the past 125,000 years reflect the transgressions (sea level moving up) and regressions (sea level moving down), which developed the coastal morphological features of Calhoun County (White and Morton 1987). Figure B1 shows the geology of the county, which is manifested by different types of sediments as a response to these sea level rise adjustments. According to the geologic models forecasting the relative sea level rise, it is expected that the process of coastal change will continue in the future years. Although, in the short-term these changes are not expected to be noticeable by the public, they will be noticeable in the medium-term in respect to adaptation of human activities and natural habitats (Anderson 2007).

In general, the geologic evolution of Calhoun County in recent times can be divided into two general time dominated episodes: the units formed in the Pleistocene between 125,000 to ~10,000 before present (BP) and the geologic units formed in modern times (Holocene) between ~10,000 years (BP) and the present (McGowen et al. 1976). These two events can be observed directly in the morphology of the bay shorelines. The following description of the geology shows the geographic distribution of these geologic units also expressed by the local shoreline morphologies, presence of sandy beaches, marshes, inlets, bayous, bays, deltas, etc. (Figure B1).

**Pleistocene fluvial deltaic system.** The Pleistocene Fluvial-Deltaic system appears on the northern side of Calhoun County and consists of the original delta streams that controlled the formation of the coastal plain (McGowen et al. 1976). These deltaic sediments consist mainly from highly consolidated mud and clays, which when eroded by modern shoreline erosion, leave steep slopes (cliffs) along the shorelines (Figure B1).



Figure B1. Simplified shoreline geologic map units in Calhoun County as mapped by the University Of Texas Bureau Of Economic Geology (McGowen et al. 1976).

**Pleistocene marine reworked delta sediments.** These sediments consist of materials that were eroded from the original delta system when the Gulf of Mexico coast used to be located north of Port O'Connor (McGowen et al. 1976). These sediments are consolidated as fluvial deltaic deposits and consist mainly of mud and clays, which when eroded by modern shoreline erosion, also leave steep slopes (cliffs) along the shorelines (Figure B3).

**Pleistocene strand plain system.** The Strand Plain System consists of the ancient sandy shorelines of the Gulf of Mexico (McGowen et al. 1976). The area mapped as the Strand system consists of a former Gulf of Mexico barrier island. The shorelines of this geologic unit consist of semi-consolidated and loose sands, which tend to be highly erodible (Figure B1).

**Modern delta system.** The Modern Delta System corresponds to the recent delta sediments deposited in the last few thousand years (McGowen et al. 1976). For a few thousands of years, the deltas were growing due to the natural inputs of fluvial sediments. However, in the last 100 years, these deltas started being affected by erosion and local subsidence due to the limited amount of sediment inputs generated by human impacts. The sediments forming these deltas consist of unconsolidated mud and sands, which tend to be removed easily by erosion (Figure B1).

**Modern marsh system.** The modern marsh system deposits consist of the organic and fine sediments that created the marshes and wetlands present on the modern shorelines, bayous, and creeks in the region. These sediments are loose and highly erodible (Figure B1).

**Modern shoreline beaches.** Although not presented in the geologic map due to their limited presence, the modern shorelines have pockets of sand and sandy shells that are highly unconsolidated and highly erodible. These sandy beaches tend to be affected by shoreline erosion and are in constant migration.

### **Bay Water Circulation**

Shoreline processes are associated with geology-shoreline composition, wind, waves, and bay water circulation (White and Morton 1987). The bay water circulation is the process that generates the general trends of sediment transport due to the longshore drift. A basic bay water circulation model was developed by McGowen et al. (1976) for

the region, which shows the general trends of water circulation in the bays of Calhoun County (Figure B2). As can be seen in Figure B2, the cumulative wind direction during the year is a very important influence as it dictates the bay water circulation processes; erosion; and, accumulation affecting the shorelines. From the wind data observed by the Texas Coastal Ocean Observing Network (TCOON), it can be concluded that the shorelines of Calhoun County are affected by two sets of winds: winds coming from the north-northeast and from the south-southeast. Winds from the north-northeast are common in the winter and can extend up to five months. Winds from the south-southeast are common on the summer and can reach up to seven months in duration (TCOON 2012).

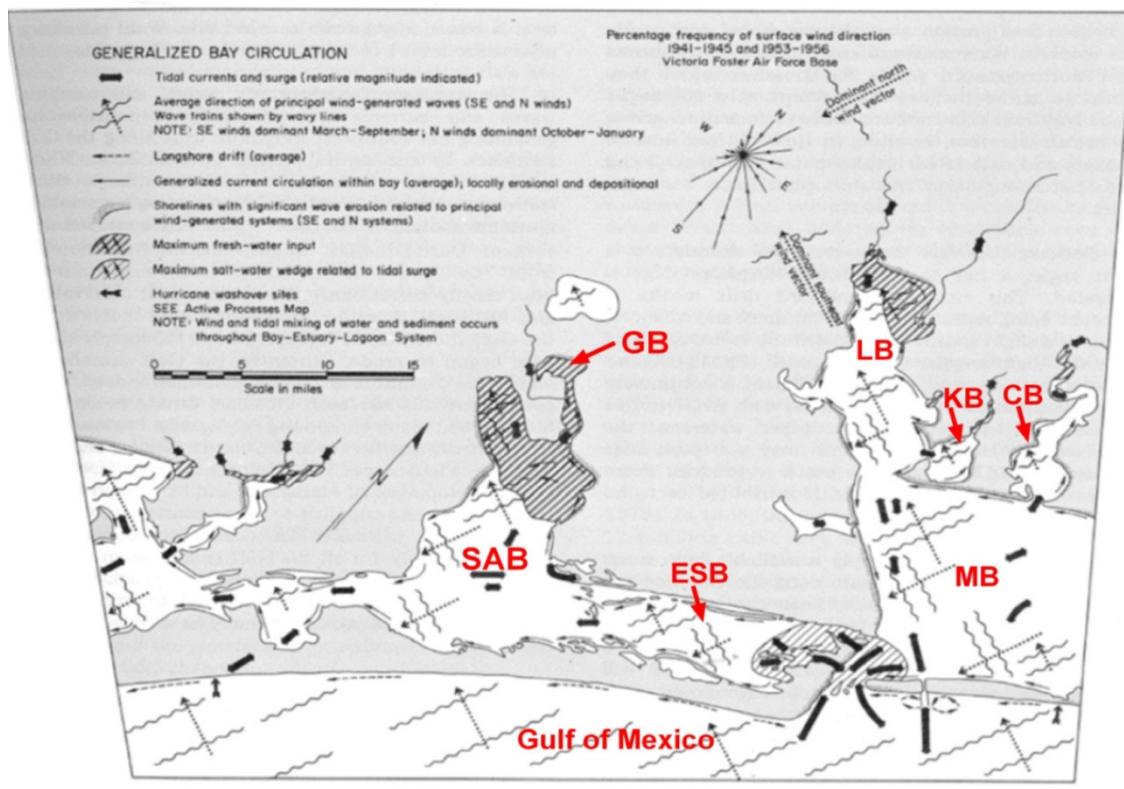


Figure B2. Generalized Water Bay Circulation from McGowen et al. (1976). SAB: San Antonio Bay; GB: Guadalupe Bay; ESB: Espiritu Santo Bay; MB: Matagorda Bay; LB: Lavaca Bay; KB: Keller Bay; and CB: Carancahua Bay.

**Geographic distribution of bays in Calhoun County.** Figure 1 in the Calhoun County Shoreline Access Master Plan, which shows the bays analyzed in the report, has been included in this Appendix as Figure B3 to facilitate the ease of comparison/inclusion of geographic analysis:



SAB: San Antonio Bay; GB: Guadalupe Bay; ESB: Espiritu Santo Bay; MB: Matagorda Bay; LB: Lavaca Bay; KB: Keller Bay; CB: Carancahua Bay



Figure B3. Bays in contact with Calhoun County.

In general, for San Antonio Bay (SAB), the shorelines on the west side of the county appear to be protected from the prevailing southeastern winds (Figure B2). The longshore bay circulation appears to be mainly towards the north along these shorelines. An active area of wave and circulation energy appears to be on the southwest corner of the county at the intersection of the Gulf Intracoastal Waterway (GIWW) and SAB in the area called Welder Flats Wildlife Management Area, where extensive marshes and seagrasses cover an area on public and private low lands. Also in SAB, the upper part of the bay, including Guadalupe Bay (GB), appears to be influenced by fresh water inputs coming from the San Antonio and Guadalupe Rivers. In both bays, SAB and GB, the longshore processes appear to move the sediments along the shorelines preferentially to the north (McGowen et al. 1976) (Figure B2).

For Espiritu Santo Bay (ESB), the shorelines of the county are protected from wind-fetch effects by the GIWW. On the areas located south of the GIWW, which are in contact with SAB, the sediment longshore circulation appears to be predominantly from east to west. An area of Gulf of Mexico flow intrusion near the Port O'Connor area appears to come from Pass Cavallo (Figure B2), which may have some influence on the circulation patterns on the shorelines (McGowen et al. 1976).

The McGowen et al. (1976) model for the shorelines of Matagorda Bay (MB) shows that the general longshore sediment and flow circulation on the east shorelines of Calhoun County move the sediments from north to south from Magnolia Beach to Port O'Connor. On the north side of MB, next to Cox and Carancahua Bays, the model shows that the longshore processes move sediments along the shorelines from east to west. However, local geomorphologic features observed in recent years near Magnolia Beach show that longshore sediment circulation has been seasonally moving to the north, as expressed by the sediment accumulation occurring on fishing piers and rock groins at King Fisher Beach Park and Indianola and Magnolia Beaches.

For Lavaca Bay (LB), the McGowen et al. (1976) model suggests a different shoreline longshore cell around the bay shorelines. Starting at the west side at Alamo Beach on West Lavaca Bay, the model suggests that longshore processes move from south to north until the longshore circulation reaches Chocolate Bayou (Figure B2). The model suggests that longshore sediment transport north of Chocolate Bayou tends to be from north to south. This is confirmed by the sand accumulation observed on the north side of an abandoned fishing pier located about 0.6 miles south of Lighthouse Park.

The McGowen et al. (1976) model also suggests that for Keller Bay (KB), a counter clockwise longshore circulation cell controls the longshore processes, which when intersecting LB, produces a local longshore circulation cell that tends to move from north to south towards MB. Carancahua Bay (CB) presents the same counter clockwise circulation pattern (See Figure B2).

### **Shoreline Types**

The shorelines of the western portion of Calhoun County have been classified by McGowen and Brewton (1975) according to their morphologic characteristics. These shorelines are located in different areas of the county.

**Cliffed shorelines with Pleistocene deposits exposed in the swash zone.** These features correspond to shorelines composed from hard Pleistocene clays, which are expressed by steep cliffs. The submerged shorelines tend to be hard clays and soft mud.

**Shell and rock fragments beaches.** The shell and rock fragments shorelines correspond to cumulative beaches with high content of gravels, sandy shells, calcareous debris, broken, and entire bay shells. These beaches are located in areas where shells are an important component of the shallow beaches, and tend to be accumulated by wave actions.

**Terrigenous sand beaches.** Sandy beaches, sometimes acting as pocket beaches, are common in localized areas along the county shorelines. These areas tend to be small but important in the general sediment accumulation occurring on the bay shorelines.

**Marsh dominated strandline.** These shorelines correspond to the marshes, wetlands, and vegetated bayous in contact with the bays.

**Marsh dominated modern shorelines.** These modern shorelines are not connected to the marshes on the strandline. These shorelines have marshes in different areas where creeks, coves and bayous have developed marshes that connect to the bay tides in restricted or protected areas.

**Shoreline altered by human activities.** These shorelines correspond to the shorelines modified by human activities through dredging and the construction of bulkheads, rock revetments, groins, boat ramps, etc. (McGowen and Brewton 1975).

### **Shoreline Retreat Rates**

The shoreline processes affecting the bays include erosion and accumulation processes. Shoreline erosion is a common problem in Texas bays. The rates of retreat or accretion are measured in ft/yr, and are determined by the Bureau of Economic Geology of the University of Texas at Austin, which has conducted different historic studies on the shorelines of Calhoun County. Although some data on the shoreline processes is historic, the general shoreline erosion trends tend to be steady due to the lack of regional modifications (Figure B4).

Two sets of shoreline retreat data are available for Calhoun County: 1) a study conducted by McGowen and Brewton (1975) for Lavaca and Matagorda bays; and, 2) a study from White and Morton (1987) for San Antonio and Espiritu Santo bays (Figure B3). The study conducted by McGowen and Brewton (1975) consisted of erosion and accretion rates based on shoreline profiles run in 1971-1972, which were then compared with data from 1956-1957. The study conducted by White and Morton (1987) consists of average rates that were compared from data collected in the period 1859-60 and compared with the data collected in the period of 1974-1982. There is no recent data collected for these bays. The rates in Figure B4 show that there are a few areas in the bay with high erosion rates that exceed >20 ft/yr of shoreline retreat, but the general trends are erosion rates that range between -2 and -5 ft/yr.



Figure B4. Erosion and accretion rates in ft/yr.

## Coastal Habitats in Calhoun County Bays and Shorelines

Calhoun County's coastal areas contain abundant and valuable natural resources. These natural resources attract many user groups with different recreational goals. Over-visitation may impact some specific resources. In some instances, a coastal natural resource is protected under both state and federal regulations, which must be recognized when considering new access points. Several coastal natural resources are represented in Figure B4 and described below.

**Tidal wetlands.** Wetland areas are influenced by the ebb and flow of tidal flows and energies. Depicted as hatched blue lines in Figure B4, this resource is protected under both federal and state regulations. These areas can include brackish marshes, tidal mud and salt flats, salt marshes, etc. Any discharge of fill within tidal wetlands would require a Clean Water Act (CWA) Section 404 permit through the U.S. Army Corp of Engineers (USACE); any work or construction in tidal wetlands would require authorization under Section 10 of the Rivers and Harbors Act (RHA, also regulated by USACE); and, coordination with the Texas General Land Office would be necessary as it is considered a Coastal Natural Resource Area protected through the Coastal Zone Management Act (CZMA). The data presented in Figure B5 was derived from U.S. Fish and Wildlife Service National Wetland Inventory data.

**Oyster reefs.** Oyster reefs are abundant in the bays surrounding Calhoun County. The areas where these resources are abundant are depicted as yellow polygons in Figure B5. These fish and natural habitats are also protected under Section 404 of the CWA, Section 10 of the RHA, and the CZMA. The data presented in Figure B5 was derived from National Oceanic Atmospheric Administration's National Marine Fisheries Services databases.

**Seagrass.** Shoal grass (*Hadule beaudettei*) and turtle grass (*Thalassia testudinum*) are typical species in the area and provide important ecological functions, including provision of nursery habitat for estuarine-dependent species; provision of organic biomass for coastal food webs; coastal erosion and sedimentation stabilization; and is part of the general coastal nutrient and water cycling processes. Boat propeller scarring is observed in aerial photos next to the shorelines of Calhoun County where seagrass is abundant. During low tides or in shallow areas, boat propellers tend to destroy important areas of seagrass. Coastal visitors should notice that fish productivity and seagrass stability are factors that go together, so the protection of seagrass areas should be

considered part of the success of coastal fisheries. The data presented in Figure B5 was derived from National Oceanic Atmospheric Administration's National Marine Fisheries Services databases. The location of seagrass is presented in Figure B5 as yellow polygons, which are also protected under Section 404 of the CWA, Section 10 of the RHA, and CZMA.

Note: Limited data is available for Lavaca and Matagorda Bays on oyster reefs and seagrass.

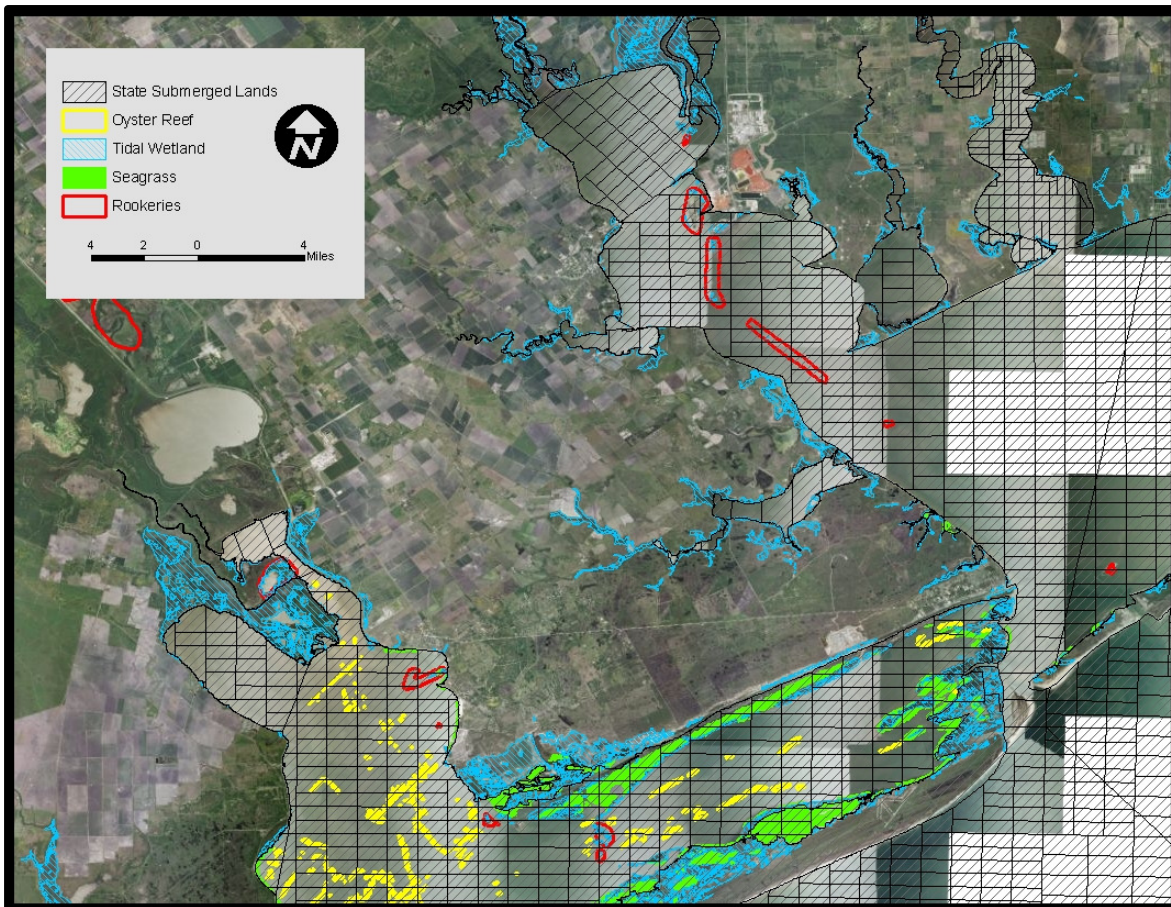


Figure B5. Habitats located around the shorelines of Calhoun County. Sources: National Oceanic Atmospheric Administration's (NOAA) National Marine Fisheries Services (NMFS) databases; Texas Parks and Wildlife Department's Natural Diversity Database; and, Texas GLO spatial databases.

**Rookeries.** These are large nesting areas for colonial waterbirds. Colonial waterbirds tend to be isolated and protected from predators. These habitats tend also to be isolated islands away from human activities as well. These habitat areas are protected under the Migratory Bird Treaty Act (MBTA). Usually, construction or visitation in or

immediately near a rookery should be avoided during breeding season (generally April through August). The data presented in Figure B5 was derived from Texas Parks and Wildlife Department's Natural Diversity Database and Texas GLO spatial databases. The protection of nests under the MBTA includes nests such as those found in shrubs, trees, and brush. Active nests should be avoided by visitors, mainly if visitation takes place between April and August (the general nesting season for migratory bird species).

The locations of resources depicted in Figure B5 should only be used as a reference for general location. For example, recent field visits to project sites revealed areas of seagrass and oyster reefs along the shorelines of Boggy Creek Park that were not shown in various state and federal spatial inventories. The natural resource agencies and the County are encouraged to make sure that inventories are current and data is available to the public so that impacts to the habitats will be limited.

**State submerged lands.** These are areas under tidal influence, which are owned or managed by the Texas General Land Office (GLO). Depending on the nature of the area, activities that may impact submerged public lands may require GLO coordination and approval. The GLO is in charge of the enforcement of the Texas Coastal Zone Management Program, which includes the policies that apply directly to these coastal submerged lands. The submerged land spatial data depicted in Figure B5 was obtained from the GLO website.

### **Information on Coastal Resources and Potential Regulatory Concerns**

Calhoun County contains habitat that is protected under the Endangered Species Act. Although several federally listed species are known to potentially occur in and around Calhoun County and its waters, the primary species that would be scrutinized during a coastal access improvement project would likely be the piping plover (*Charadrius melodus*). The piping plover uses many types of tidal shoreline interfaces including beachfronts, tidal and mud flats, etc. Many potential visitation and recreational areas contain suitable piping plover habitat. Piping plovers winter in Texas and typically occupy the habitat from October through March. A survey of potential piping plover habitat is recommended for future shoreline access projects.

The distribution of tidal wetlands is displayed in Figure B5. Some non-tidal waters (including streams, wetlands, rivers, etc.) are protected under Section 404 of the Clean

Water Act and discharge of fill into such waters would require a permit. A survey for potentially regulated waters should be developed on any shoreline access initiative.

## Shoreline Access and Environmental Recommendations

### Geographical Distribution

Although a map with the shoreline access zones was presented in Figure 4 in the Calhoun County Shoreline Access Master Plan, it is presented again in this Appendix as Figure B5, to facilitate the understanding of areas described in this partial document. The geographic shoreline access zones used in the project inventory include: Zone A--San Antonio Bay and West Calhoun County; Zone B--Gulf Intracoastal Waterway (GIWW) and Espiritu Santo Bay; Zone C--South Lavaca Bay; Zone D--North Lavaca Bay; and Zone E--East Calhoun County (Figure B6).



Figure B6. Shoreline Access Zones used in this inventory.



## Zone A

### Seadrift Recreational Recommendations

**Replacement of the Seadrift seawall.** The Seadrift seawall shows indicators of deterioration. Scouring is happening at the base of the seawall, where several segments of the wall are toppling towards the water. Calhoun County is in the process of searching for funding to replace the entire seawall, so that the public can continue to enjoy access to the bay as well as the amenities at the park.

**Shoreline protection at the ends of the Seadrift seawall.** Shoreline retreat is affecting the two ends of the seawall. A shoreline protection measure is needed on both sides. Breakwaters built in the bay may allow for accretion and the creation of more marshes in a sustainable manner. On the east side of the seawall, next to the Seadrift Marina boat ramp, another breakwater in the bay may serve as a sediment trap for sediments coming from the creek and sediments from the bay through longshore processes. The accumulation of sediments would provide for more marsh habitat. On the west side of the seawall, the recommended breakwater may also result in expansion of marshes already established on the shorelines, as presented in Figure B7.



Figure B7. General physical characteristics of the shorelines at Seadrift, showing areas that have hard structures, areas with incipient marshes, and recommended areas for breakwaters.

**Marsh restoration as shoreline protection.** The Seadrift seawall controls the erosion that is affecting the shorelines, but does not provide any natural benefits to the area. A potential habitat restoration project in front of the seawall may provide better conditions for fishing and bird habitat. Historical aerial photos show that the western segment of the seawall is shallow and has accreted sediments on the bay bottom. These sediments could be used to build marshes and improve the habitat conditions and the esthetics of the area. The construction of marshes, combined with breakwaters, may allow for the expansion of these marshes as a shoreline protection measure.

**Beneficial use of dredge material and bird islands.** The sediments that are shoaling the boat access and navigation channels next to the Seadrift embayment may offer some habitat restoration opportunities in this area. The dense number of recreational and navigation channels (Figure B8) indicate a need for dredge material placement areas nearby. One of the best environmentally friendly alternatives is to beneficially use dredged materials for habitat creation like bird islands and marsh. The development of bird islands on top of the spoil islands and new marsh habitats would encourage more recreational opportunities for fishing, kayaking, and bird watching.



Figure B8. Location of the recreational and navigation channels near Seadrift and potential habitat areas where spoil islands can be created from dredged material.

## Zone B

### Shoreline Access along the Gulf Intracoastal Waterway (GIWW) and Navigation Safety in Calhoun County

**Shoreline access and safety.** Currently there are plans to develop recreational facilities on the southern portion of the GIWW next to Port O'Connor. If these plans are executed, more demand for access to the boat ramps will be observed, which will include traffic on the streets and in the GIWW. In the long-term, it appears that development toward the west or the south of the GIWW at Port O'Connor will bring safety concerns and more traffic to the entire GIWW in county waters (Figure B9).



Figure B9. Location of the GIWW in Calhoun County.

Several minor and major accidents have occurred along the GIWW. These accidents necessitate the discussion about the role of shoreline access and safety concerns for visitors. Just as people seek shoreline access areas to enjoy the bays, they may also need to find access areas for boat egress to leave the waters during emergencies. If many boats try to leave the bays through the GIWW at the same time, it could create a large navigation safety issue that may impact navigation in the GIWW since it acts as a water highway. For that reason, it is recommended that an emergency plan be developed that will outline strategies to exit the water and/or egress to safe land areas in case of emergencies. The data source on safety of the GIWW was found in Mileski et al. (2010), which was developed by the Texas Transportation Institute. This report

mentions that the portion of the GIWW in Calhoun County has been considered a safety concern since it can affect the safety of maritime transportation.

Two major accidents occurred near Port O'Connor 2004 and 2009. The 2004 accident involved a vessel that collided with and destroyed the Alligator Head Fishing Club. Because of the lessons learned from that accident, Mileski et al. (2010) mention three major safety concerns for the area. First, the accumulated effect of development on the GIWW has a dramatic impact on the ability of barge operators to navigate the waterway. Second, the type of structures on the shorelines has a profound impact on navigation. Finally, the Port O'Connor area already has many structures along the waterway from mile marker 473 to 475, and it is expected that more will be built in the near future.

These safety issues deserve special attention because they have expanded beyond the local level to the state and federal level. These issues include: (a) the development of structures on the shorelines of the GIWW may encroach the channel, further narrowing accessibility; (b) there is a lack of strategic mooring or push-in (hold-up) places needed in inclement weather; and, (c) congestion caused by additional inexperienced recreational boaters entering and egressing from boat ramps may end in catastrophic events along the GIWW (Mileski et al. 2010). Calhoun County should address these issues in a master safety GIWW plan. The county should look for options for managing structures along the GIWW, with guidance from shoreline developers, state, and federal stakeholders, in order to maintain the safety and productivity of the maritime industry while balancing the need for public recreational purposes.

**GIWW safety responsibilities.** The Mileski et al. (2010) report streamlined the general stakeholders responsibilities associated with the safety of navigation on this section of the GIWW, which includes public and private entities. The public entities include: Texas Department of Transportation (TxDOT), United States Coast Guard (Coast Guard), Texas General Land Office (GLO); United States Army Corps of Engineers (USACE), county and municipal officials and Port Authorities. The private sector is represented by: the Gulf Intracoastal Canal Association, the Texas Waterway Operators Association, developers/economic development corporations, and shippers.

According to Mileski et al. (2010), the above-mentioned entities contribute to the discussion of corridor maintenance and navigation on the GIWW. TxDOT has easements over the GIWW right-of-way and, under the 1975 Texas Coastal Waterways Act, TxDOT acts as the state's agent in fulfilling the non-federal sponsorship of the

GIWW in Texas. TxDOT is required to continually evaluate the GIWW as it relates to Texas, including identifying major problems. Therefore, TxDOT is a major stakeholder in the GIWW navigation and its safety.

The U.S. Coast Guard (Coast Guard) is responsible for policing traffic in the GIWW and has the authority to impose restrictions on traffic (U.S. Coast Guard, 2009a). Therefore, the Coast Guard is a key stakeholder in how the GIWW is preserved for navigation and in how to ensure that traffic through the GIWW flows quickly, efficiently, and safely. As a result of its policing responsibilities, the Coast Guard requires the reporting of certain incidents that occur on the waterways. Form 2692 requires vessel operators to report any incident involving property damage of \$25,000 or higher or any incident that results in injury (Mileski et al. 2010).

The Texas General Land Office (GLO) grants leases for residential and commercial shoreline developments along the waterway. Therefore, indirectly the GLO is a key stakeholder in determining the impacts of shoreline development on GIWW navigation. The GLO Permitting Assistance Center for the upper Texas coast resides on the campus of Texas A&M University at Corpus Christi. A good source of information on obtaining a permit from the GLO is located on its website at <http://ww.glo.state.tx.us/psc>. In general, the GLO coordinates with USACE on issuing permits along the GIWW. The GLO's policy for development on the GIWW is found in the Texas Administrative Code at Title 31 Natural Resources and Conservation, Part 16 Coastal Coordination Council, Chapter 501 Coastal Management Program, Subchapter B Goals and Policies, Section 501.24 Policies for Construction of Waterfront Facilities and Other Structures on Submerged Lands. This policy has specific information about what is required based on the type of project, such as a marina or pier/dock. This policy states that structures built must not impede commercial navigation. This policy is also part of a greater coastal management program, Title 31 Natural Resources and Conservation, Part 6 Coastal Coordination Council, Chapter 501 Coastal Management Program, Subchapter B Goals and Policies.

The USACE has jurisdiction over the GIWW right-of-way and disposal easements, and is responsible for operating and maintaining the GIWW. As such, USACE is a major stakeholder in how GIWW navigation is impacted by shoreline development. Finally, "the permitting rules regarding obstruction of navigable water generally, wharves, piers, etc. and excavations and filling is found under 33 USC, Chapter 9, Subchapter I Section

403. Section 403 states that, “the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of the Army; and, it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army prior to beginning the same.”

Barge operators are the largest group of commercial navigators in the GIWW and are key components to the discussion of navigation hazards in the GIWW. The two industry associations identified as most important to the discussion of navigation on the GIWW are the Gulf Intracoastal Canal Association (GICA) and the Texas Waterway Operators Association (TWOA). According to Mileski et al. (2010), approximately 80 percent of the operators in the Texas portion of the GIWW are members of one of these organizations.

The primary representative of the barge operators is GICA. The GICA (2008) website states that they seek, “a comprehensive, coordinated, and consistent approach across the Gulf Coast that allows development to safely coexist with barge transportation on the Gulf Intracoastal Waterway. We must work together with development interests to insure that the primary purpose of the Intracoastal Waterway is preserved.” The website also states that the GICA would like to see, at a minimum, waterways without obstructions within reach of barges; have plenty of room for barges to be able to pull aside for other traffic, wait on weather, or stand-by for locks; and, have no blinding lights or confusion at bridge approaches. Additionally, the GICA encourages the education of recreational boaters, a presence of enforcement personnel, monitoring of conditions as development progresses, and a consistent plan across the Gulf Coast administered by the USACE (GICA, 2008).

Calhoun County representatives not only permit and police shoreline development, but also represent the public at large for use of the county shoreline. These officials can

identify prospective development, zoning, and subdivision regulations that may impact GIWW navigation. Therefore, this group of stakeholders is a key group in determining the impacts on GIWW navigation of shoreline development according to Mileski et al. (2010).

Development of the shoreline may lead to encroachment into the GIWW and affect navigation. Therefore, developers must be included in any discussion of plans along the GIWW. The structures that may be built into the waterway include piers, wharves, docks, dolphins, moorings, pilings, breakwaters, excavation, dredging, filling, riprap, revetments, retaining, walling, marinas, and marina/canal connections (Taylor Engineering, 2007). These encroachments may pose a navigation hazard particularly to commercial navigation since commercial vessels require large stopping distances, have substantial blind spots, and lack the maneuverability of a recreational boat (Taylor Engineering, 2007). Therefore, coastal developers and the economic development groups that represent them are important stakeholders in maintaining the GIWW corridor (Mileski et al. 2010). Finally, the shippers whose traffic needs have an impact on the navigation, according to Mileski et al. (2010), must be considered.

As mentioned above, these findings show that Calhoun County has direct interaction with potential uncontrolled development of shoreline structures along the GIWW, which in turn may have important safety implications for the visitors accessing the bays from the boat ramps located on the GIWW.

### **Construction permits needed along the GIWW**

According to the USACE, the factors considered when issuing a permit for development along the GIWW include:

- Each permit is reviewed on a case-by-case basis.
- Each project is subject to internal review by the Corps.
- Each project is sent to the USACE environmental department for review.
- All structures must be at least 50 feet from the top cut of the GIWW channel.
- All lights must be directed downward.
- Loose riprap is not allowed in any development plan.
- All permits require “no wake” zones in and around neighborhood developments along the GIWW.

The USACE meets regularly with the Gulf Intracoastal Association to discuss pending development along the GIWW. USACE engineers closely review any development permit request for project proximity to bridges with strong currents, to bends within the channel, and to any known navigation hazards. The Navigation/Operations Division reviews the project plan for navigation hazards. The Real Estate Division and Programs/Project Management Division have a legal right to deny a poorly designed project based on solid information.

The USACE has begun to develop and refine a navigation system computer simulation to assist in its duties in permitting. Additionally, the USACE keeps a library of digital photos that show all the features they have constructed and maintained (channels, disposal areas, etc.) marked on aerial photos.

## **Zone C**

### **Shoreline Erosion, Sediment Issues, and Environmental Recommendations**

#### **Beneficial use of dredge material (BUDM) opportunities at King Fisher Park.**

Sediments coming from BUDM activities at the GIWW are coordinated by the U.S. Army Corps of Engineers (USACE) and the County for the benefit of King Fisher Beach Park (Figure B10 and B11). Dredged sediments improve the recreational opportunities and environmental conditions of the shorelines and submerged habitats. Seagrass and migratory birds tend to come to the new shallow sand bars. This BUDM project has created a wider beach in a large section of the park, protecting also the original bulkhead from erosion (Figure B12). The southern portion of the park has a dry beach ~200 feet wide, but the northern portion has limited sand, where erosion and wave action are affecting the bulkhead. North of the park, the intense erosion rates are affecting the habitats and private properties.

One of the strongest assets in Port O'Connor is a long fishing pier located in the middle of the center area of the park. Unfortunately, its shallow depth makes the pier an underutilized resource. If the BUDM project continues as it is today, more shoaling problems will occur at the pier, making this important infrastructure obsolete.

A long-term solution to this erosion and accumulation problem near King Fisher Park may be obtained through a close collaboration with the USACE in identifying a more



specific location for the sediment disposal north of the park. The entire bay shoreline in this area needs sediments to reduce the erosion and shoreline retreat processes. Figure B4 shows the source of the sediments dredged at the GIWW and the disposal area near King Fisher Park. It appears that the predominant longshore processes in that portion of the bay tend to move the sediments to the south several months of the year (McGowen and Brewton 1975), disposing the dredged sediments north of King Fisher Park along the shorelines. This process may provide a natural longshore source of sediments to the park beach, thereby reducing the shoreline retreat rates. According to McGowen and Brewton (1975), the erosion rates are up to -32 ft/yr just 1.5 miles north of the park.

Another alternative to reduce the severe erosion problem may be to negotiate with the USACE and the Calhoun County Port Authority about the placement of sediments from the Matagorda Ship Channel along the shorelines located north of the park as a BUDM alternative, as presented in Figure B11.



Figure B10. Dredging source for the sediments at the GIWW near Port O'Connor that are placed at the King Fisher Park. Source: Image modified from the GIWW USACE O&M Project Map Book, Galveston District.

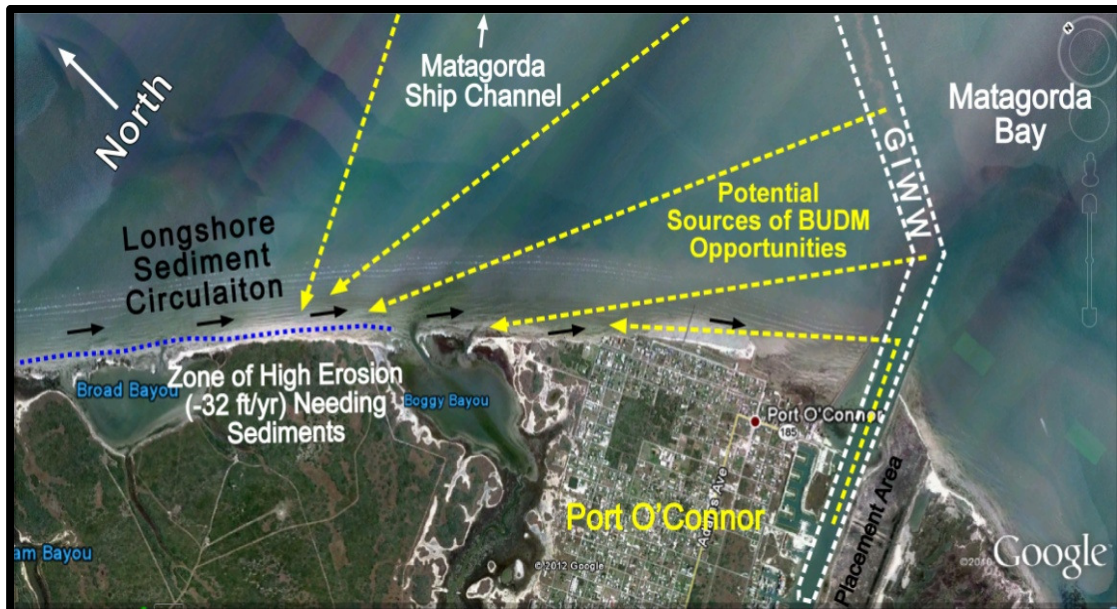


Figure B11. Potential sources of sediments for BUDM opportunities coming from the navigation channels north of Port O'Connor. Sediments coming from future dredging projects may reduce the erosion rates on the county shorelines.

**King Fisher Park recommended sediment management alternatives.** The bay bottom at King Fisher Park is shallow due to the accumulation of sand bars formed by the beneficial use of dredge material projects developed by the county in a partnership with the by U.S. Army Corps of Engineers. The sediments consist mainly of sands. The placement of these sediments has improved the beach park, but has shoaled the pier. The creation of a nice beach has provided relative protection to the original park bulkhead, which is more evident on the southern portion. However, on the northern portion of the park, the bulkhead is exposed to wave action and it needs sediments to reduce the wave action. Sediments at the base of the fishing pier may be used to expand the beach and protect the north side of the bulkhead as shown in Figure B12. Dredging the pier area between two and three feet deep along the last 300 feet of the pier may provide enough sediment to widen the beach and allow for better fishing at the pier.



Figure B12. Potential dredging at the King Fisher Park may allow for more depth at the end of the fishing pier. The dredged sediments may be placed on the north side of the bulkhead, thereby reducing the shoreline erosion problems.

**Erosion affecting the habitats of Brad, Big Dam, Huckleberry and Boggy Bayous.**

The high amount of erosion is also affecting the shorelines of the Brad, Big Dam, Huckleberry, and Boggy Bayous (Figure B13). Brad Bayou bay shorelines appear to be affected by -32 ft/yr of shoreline retreat according to McGowen and Brewton (1975). Although these processes may be affecting private property, the protection of the habitats in these bayous may be in the best interest of the natural conditions. Protecting these shorelines should be also a priority for the natural resources groups and agencies working in the area since the marsh ecosystems are disappearing.

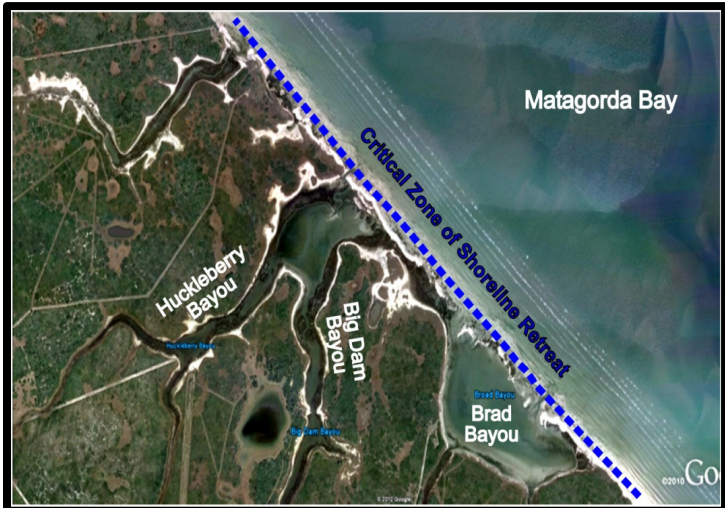


Figure B13. The marshes observed on the shorelines of Huckelberry Bayou, Big Dam Bayou and Brad Bayou have retreated drastically due to severe shoreline retreat.

**Erosion at Powderhorn Lake Peninsula.** The inlet that connects Powderhorn Lake with Lavaca Bay consists of a shallow access, which is used intensively by fishermen. The analysis of historical aerial photos in the Powderhorn Lake Peninsula, which separates Lavaca Bay from Powderhorn Lake, shows that the high erosion rates in the area have started to impact the lake habitats (Figure B14). The peninsula has breached in recent years and created two inlets. The breaching happened just before 2005, as shown in the Google Earth images, and occurred on a marsh area south from the original inlet (Figure B14). The breaching created a new island that is now eroding on the lake and the bay sides. More than five acres of marshes were lost between 1996 and 2009 and will continue disappearing due to wave action.

The aerial photos in Figure B14 show that the breached area is affecting marshes and shoreline and submerged habitats, such as oyster reefs. A large shoreline protection project is needed in the area to save these important habitats. The project needs new sediments for marsh restoration and a shoreline protection measure on the bay side, which may control or delay the shoreline retreat.

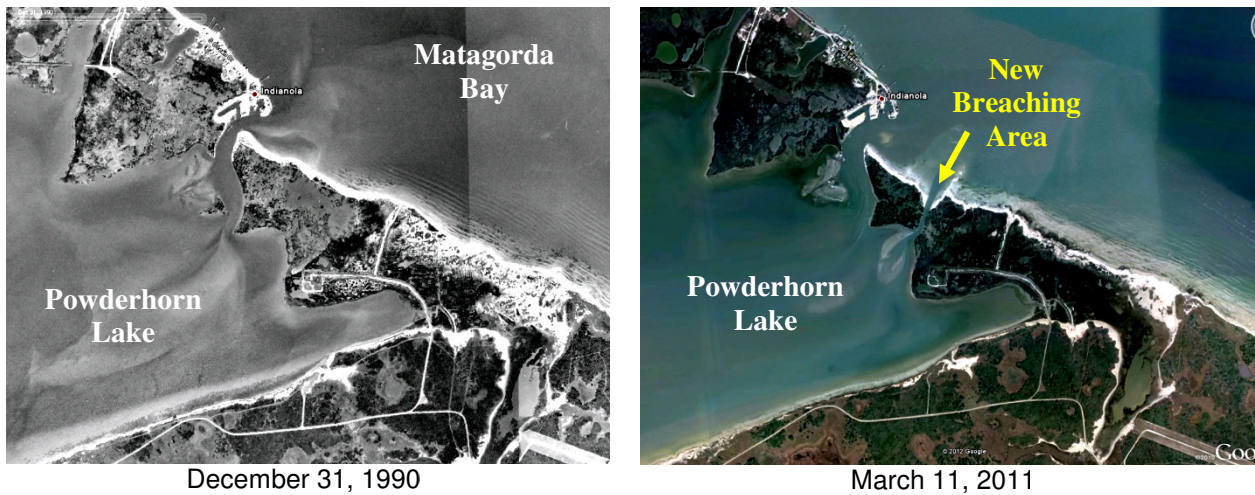


Figure B14. Historical comparison of shoreline retreat at the shorelines, marshes, and sand bars of Powderhorn Lake in contact with Matagorda Bay. Aerial photos show a new breached area, which is now eroding marshes and submerged habitats on the lake side.

**Riprap and shoreline protection at Indianola.** The shoreline erosion between Magnolia and Indianola beaches is intense. As a way to reduce erosion on public lands,

the Texas General Land Office and Calhoun County installed different types of riprap. In general, the riprap consisted of concrete slabs and concrete blocks, which have reduced the shoreline retreat, but have not stopped the general sediment loss from these beaches. Beach scouring is now evident behind the riprap, as can be seen in Figure B15. Sediments behind the riprap barriers are vitally needed to maintain the beach. Since Indianola and Magnolia Beaches are historic assets to the coast and contain thousands of acres of healthy marshes, shoreline protection measures should be considered an environmental emergency project. The county should search for financial resources from state and federal agencies as these areas are critical habitats for environmental, natural resources, ecologic, and historic values to the State of Texas. The filling of these scouring areas with beach material should be a priority for the State due to the value of the resources in the area.



Figure B15. Distribution of concrete riprap between Magnolia and Indianola beaches. Erosion is creating a beach-scouring process behind the riprap, making the area more susceptible to environmental damage and impacts to the marshes behind these barriers.

**BUDM plan for the southeastern portion of Calhoun County.** The shoreline erosion or shoreline retreat affecting this portion of the county is severe (McGowen et al. 1975). Erosion is affecting important ecosystems that are a source of recreation and which contain important natural resources in the region. Shoreline retreat is also affecting bay shorelines connected with fresh water bodies. The critical aspect is where the shorelines that protect the bayous are disappearing, taking the land that is protecting the marshes. The sandy shoreline that separates Lavaca Bay from Powderhorn Lake,

Blind Bayou, Old Town Lake Huckelberry Bayou, Big Dam Bayou, Brad Bayou, and Boggy Bayou is losing large volumes of bay shallow habitat due to these active processes.

One of the main aspects that the public may not know about shoreline retreat is the fact that shoreline erosion has a 3-D component. When you have a shoreline retreat rate of -32 ft/yr (McGowen et al. 1975), it means the shorelines are not only losing sediments on the surface, but also on the bay submerged slopes. Figure B16 shows the depths of the bay bottoms next to the shorelines. When comparing these bay depths with the shoreline loss, it is clear that erosion represents millions of cubic yards of sediments that go to the bay and never return to the shorelines.

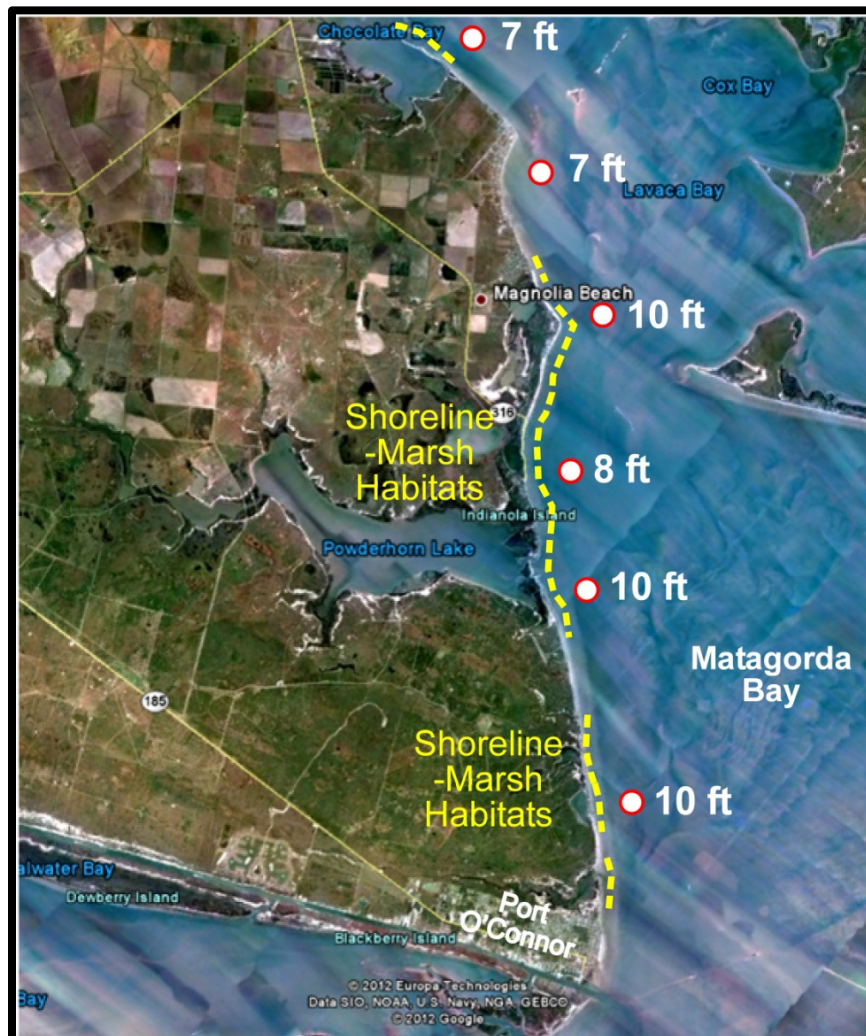


Figure B16. The numbers represent bay depths in feet next to the shorelines and habitat areas along of South Lavaca and Matagorda Bays (Source: NOAA, 2008).

One area that requires attention is the Powderhorn Lake peninsula, which is breaching and disappearing significantly. The shoreline retreat problem should be considered a major problem in the county and should be coordinated with different natural resources groups, federal and state agencies, non-profit organizations, land owners, and the local navigation districts. It requires coordination, funding, and the development of a Beneficial Use of Dredge Material (BUDM) Master Plan for Restoration.

This BUDM Master Plan may be strongly associated with the sediments coming from the maintenance dredging of the GIWW and the Matagorda Ship Channel between Port O'Connor and of Magnolia Beach as a habitat restoration and beach nourishment initiative. The BUDM restoration concept may be expanded to private properties to include all the mentioned bayous as part of the BUDM plan since some of the habitat loss areas are located in private lands.

Some of the dredge sediments may be placed on the shorelines of these water bodies as an alternative to the placement areas (PA's) located on submerged areas next to the Matagorda Ship Channel (MSC). The beach nourishment areas marked in Figure B17 were presented as potential alternatives. They consist of BN 1, BN 2, and BN 3. New proposed BN4 and BN5 projects have been recommended here. Although the plan was developed a few years ago, these areas can be also considered as alternatives to the submerged PAs. The sediments in the channel may be dredged independently from U.S. Army Corps or Calhoun Port Authority participation if coordination with the potential project partners is synchronized in advance.

Fine sediments available in the channel may also be used for restoration of the marshes, mainly on the Powderhorn Lake shoreline areas. Since some of the properties where the bayous, lakes, and marshes are located are private properties, these projects should be considered as habitat projects for the benefit of the environment and protection of the natural resources in the county.

The Calhoun Port Authority has already considered the shoreline protection of some beaches in Magnolia and Indianola beaches as part of its BUDM Plan for the dredging maintenance of the ship channel. As a continuous effort to coordinate some potential environmental benefits out of the dredging activities in the navigation channels, Calhoun County should create a BUDM Team. The presence of the Victoria Navigation Channel, Matagorda Ship Channel, and GIWW present a need for the creation and coordination of a proactive BUDM Team. This BUDM Team can discuss the long-term goals of the

dredging projects evaluating the best environmental alternatives for the dredge materials, which can be translated into better environmental projects such as the creation of marshes, wetlands, beaches, bird islands, oyster reefs, etc.

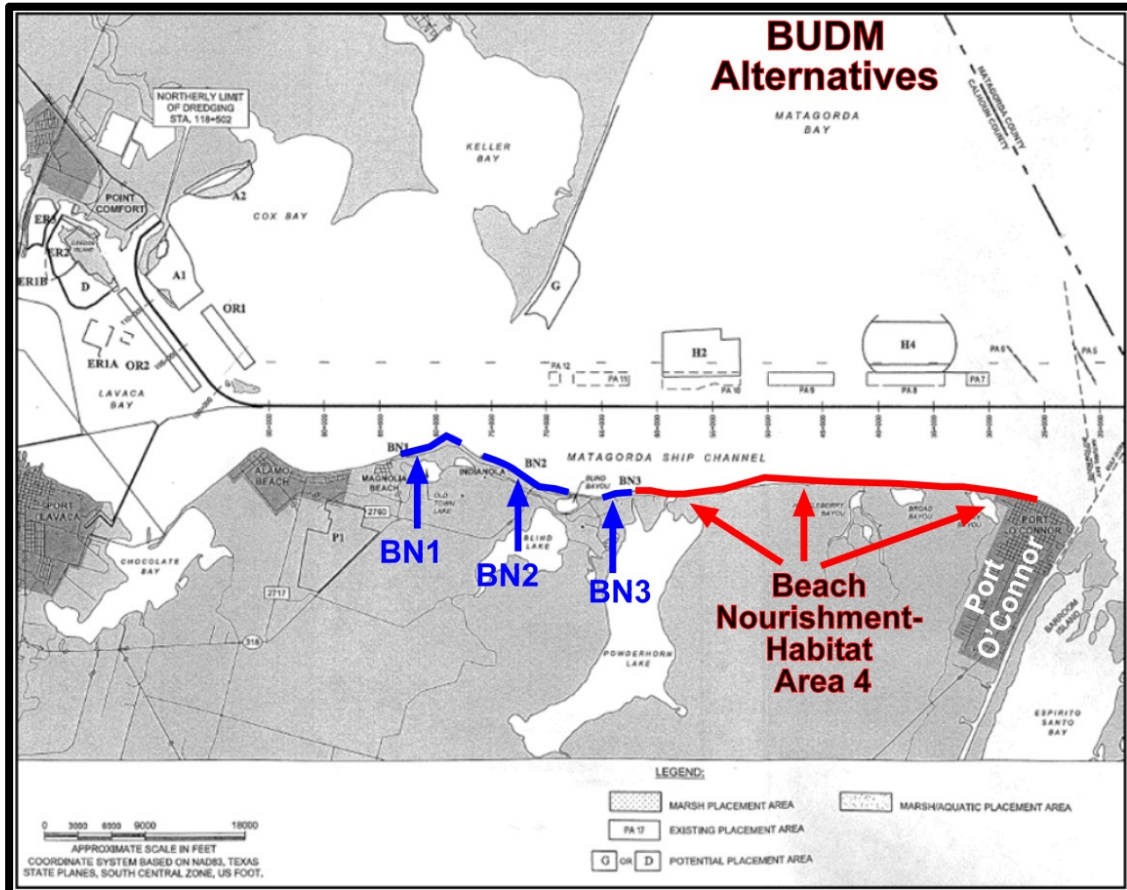


Figure B17. The available BUDM Plan for the Matagorda Ship Channel shows in blue the recommended Indianola and Magnolia placement areas (PAs), as preliminary proposed by the Calhoun Port Authority. BN1, BN2 and BN3 PAs correspond to potential beach nourishment projects. The beach nourishment-habitat Area 4 is proposed in this report as part of the potential plan searching for dredged sediments to restore the marshes and water bodies affected by shoreline retreat. Source: (USACE 2006).

**Shoaling at the Magnolia Beach inlet.** Although erosion is the predominant factor on the bay shorelines, there is a sediment-shoaling problem on the west side of Magnolia Beach (Figure B18). The figure shows shoaling problems in different areas next to the inlet or channel entrance to Old Town Lake and at the boat ramp located on the bay shorelines. The boat ramp is protected by a rock groin, but sediment circulation is abundant and shoaling and sediment transport which are affecting the boat ramp. A groin of about 250 feet was built recently by Texas Parks and Wildlife to protect the boat



ramp from shoaling problems. The shoaling problem at the inlet may be resolved by developing a local sediment management plan to use the shoaling sediments at the inlet in beach nourishment or marsh restoration projects.



Figure B18. Shoaling areas in Magnolia next to the inlet channels connecting Matagorda Lavaca Bay with Old Town Lake.

## Zone D

### Shoreline Erosion, Sediment Issues, and Environmental Recommendations

**Point Comfort Park shoaling problems.** Shoaling is a problem at the Point Comfort boat ramp access channel. Comparison of historical aerial photos shows that the access channel is shoaled with sediments coming mainly from the north, perhaps from the suspended sediments from Lavaca River and Swan Lake, which move through longshore processes toward Lavaca Bay. The county should explore the possibility of using future dredged sediments coming from this channel on the marshes on the north side of the park (Figure B19), which may create a barrier and prevent further shoaling. A combination of marsh buildup and a rock groin may reduce the shoaling of the boat access channel. The shoreline erosion problems on the south side of the bulkhead should also be addressed. The area has favorable conditions to develop the concept of living-shorelines in the water using natural and sustainable habitat solutions. A marsh

habitat area may be created in the water, using oysters and rock revetments to create fish habitat.



Figure B19. Potential BUDM opportunities and improvements to the boat ramp area, where dredged sediments could be used for the creation of marshes.

Zone D includes the entire northern shorelines on the east and west sides of Lavaca Bay. These are located on the old delta Pleistocene deposits (Figure B1). These deposits are characterized by hard clays that tend to leave shoreline bluffs up to five feet high. Due to the semi-protection of the bay and the hard clays on the shorelines, the shoreline erosion rates along these shorelines are less than other bays (Figure B4) (White and Morton 1987).

## Zone E

### Shoreline Erosion, Sediment Issues, and Environmental Recommendations

**Marshes in Cox and Carancahua Bays.** The shorelines on Lavaca Bay are located on Pleistocene delta sediments (McGowen et al. 1976). Physically, both geologic units are expressed by hard clays, forming shoreline cliffs up to five feet in elevation (McGowen and Brewton, 1975) (Figure B20).

Due to the semi-protection of these small bays and the hard clays on the shorelines, the shoreline erosion rates vary according to the exposure to waves and wind. Values up to -9 ft/yr of shoreline retreat rates are observed on the frontal effects of Matagorda Bay shorelines due to the strong fetches (McGowen and Brewton, 1975) (Figure B20). The western shorelines of Keller and Carancahua Bays have values between -6 and -5 ft/yr. Sandy shorelines appear to have lower erosion rates than the ones formed by hard clays.

The shorelines on these bays are composed mainly of hard clays with cliffs and marsh systems (Figure B1). Comparison of historic aerial photos of the bay shorelines show that these marshes are quickly disappearing due to erosion and relative sea level rise.



Figure B20. Distribution of shorelines types in the Keller and Carancahua bays. Yellow dashed lines are steep shorelines on hard Pleistocene clays. White lines depict recent marsh habitats.

## Historical Shoreline Resources in Calhoun County

Nationally recognized historical resources can be accessed and observed along the shorelines of Indianola beaches. Some of these resources can be accessed from the waters of Lavaca and Matagorda Bays and from North Ocean Drive between Magnolia and Indianola (Figure B21).

**Indian Point.** Indian Point has been identified as a place visited by the 1685-1687 La Salle Colonization Expedition and in the 1840s. It served as an entry port for German immigrants in route to the Texas Hill Country. Several historical piers appear to be submerged on the shorelines of Indian Point, which make it attractive for divers. The location is shown in Figure B21 on the south side of the map. The majority of the remains of Indian Point are now underwater.

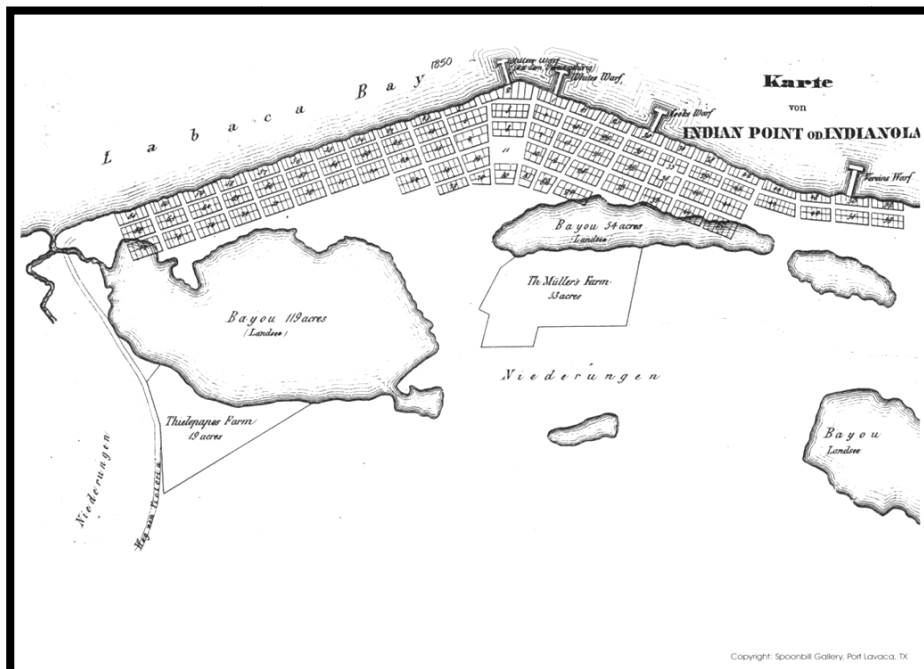


Figure B21. Location of Indian Point in Lavaca Bay, north of Indianola.

**Indianola and the La Salle Monument.** The town of Indianola was founded in 1846 and, over the years, became a major port that covered Indian Point and the shorelines of Powderhorn Lake. Indianola was destroyed by storms in 1875 and 1886. In 1875, when the city was hit by its first major storm, the city had a population of 5,000. The original plat of the city is shown in Figure B22. Minimum remains can be observed today of what used to be this important port and town. Erosion and storms left very little of the area occupied and the majority of the remains are underwater. The La Salle Monument

marks the area where the Indianola Courthouse used to be located. The La Salle Monument consists of the statue of René-Robert Cavelier, Sieur de La Salle (Figure B23). The monument is used as a point of reference by fishermen in Lavaca and Matagorda Bays.

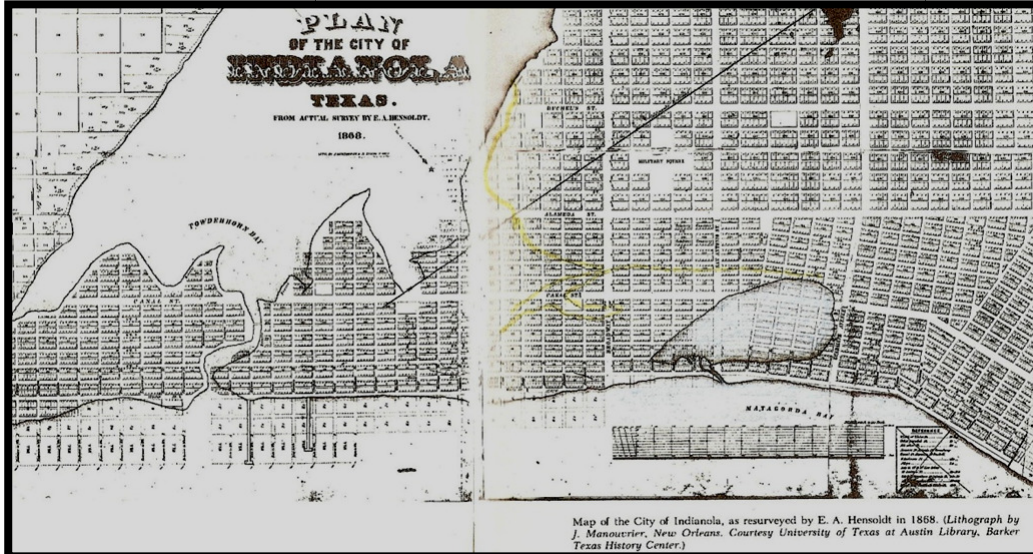


Figure B22. The original plat of the town of Indianola in 1858. Courtesy of Mr. Keith Schmidt.



Figure B23. The La Salle Monument, located along the Indianola shoreline.

## **Calhoun County Texas Shoreline Access Plan**

### **Appendix C**

**Distribution of Boat Ramps, Kayaking Sites, Fishing Piers and Observation Decks  
in Calhoun County, Texas.**



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**Photo: Seadrift Shoreline Park**



Figure C1. Boat ramps located in Calhoun County.



Figure C2. Kayaking access point (launching sites) in Calhoun County.





Figure C3. Location of the active fishing piers and wildlife observation decks in Calhoun County.



Figure C4. Location of the paddling access areas and paddling trails in Calhoun County.