



## **San Antonio Bay Rookery Island Management Plan**

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A Great Egret is shown in profile, facing left. It has a long, straight yellow beak and a black cap with long, thin black plumes extending from the back. Its neck is long and curved. The bird's body is covered in grey feathers, with a prominent reddish-brown patch on its wing. It is standing on a nest made of a tangle of brown sticks and green leaves. In its beak, it holds a thin, leafy branch. The background is plain white.

By

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The logo for the San Antonio Bay Partnership, featuring the text "San Antonio Bay Partnership" in a serif font, with "San Antonio Bay" on the top line and "Partnership" on the bottom line, separated by a horizontal line.

## IN COOPERATION WITH:

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Coastal Bend Bays & Estuaries Program  
1305 N. Shoreline Blvd.  
Suite 205  
Corpus Christi, Texas 78401



## FUNDING PROVIDED BY:

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Environmental Protection Agency  
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## TABLE OF CONTENTS

Preface .....	ii
Introduction .....	1
The San Antonio Bay System .....	1
Planning for San Antonio Bay .....	1
colonial waterbirds .....	2
Managing San Antonio Bay Rookery Islands.....	4
Seadrift islands (609-280) .....	6
Location.....	6
Description .....	7
TCWS Estimated Breeding Pairs: Seadrift Island.....	7
Recommendations: Seadrift Island .....	8
Turnstake / Turnstake Spoil ISLANDS (609-320) .....	10
Location.....	10
Description .....	10
TCWS Estimated Breeding Pairs: Turnstake / Turnstake Spoil Islands .....	11
Recommendations: Turnstake / Turnstake Spoil Islands .....	11
South Pass Islands A/B (609-341/609-342).....	12
Location.....	12
Description .....	13
TCWS Estimated Breeding Pairs: South Pass Islands A/B .....	13
Recommendations: South Pass Islands A/B.....	14
Second Chain of Islands (609-422) .....	15
Location.....	15
Description .....	16
TCWS Estimated Breeding Pairs: Second Chain of Islands.....	16
Recommendations: Second Chain of Islands .....	17
Third Chain of Islands (609-424) .....	19
Location.....	19
Description .....	19
TCWS Estimated Breeding Pairs: Third Chain of Islands .....	20
Recommendations: Third Chain of Islands .....	21
Discussion .....	22
Literature Cited .....	24
Appendix .....	25

## PREFACE

The authors of the *San Antonio Bay Rookery Island Management Plan* would like to thank the Environmental Protection Agency for providing the funding to complete this planning effort. The Plan would also not have been possible without the project management support of the Coastal Bend Bays & Estuaries Program. We would also like to thank Owen Fitzsimmons, Amanda Hackney, Beau Hardegree, David Newstead, and Brent Ortego for their commitment to rookery islands on the Texas Coast and for providing invaluable input to the development of the Plan. Finally, we would like to thank Liz Smith and Wendy McSwain for their generous contributions of photos which helped to enhance the Plan. We are hopeful that the information provided in this Plan will provide the impetus for the San Antonio Bay Partnership and its' volunteer stakeholders, as well other conservation partners in the San Antonio Bay region, to support on-going and future management efforts of rookery islands.

This document should be cited as:

Stanzel, K.M. 2015. *San Antonio Bay Rookery Island Management Plan*. Coastal Bend Bays and Estuaries Program Publication CBBEP-97. pp. 1-25.



## INTRODUCTION

### THE SAN ANTONIO BAY SYSTEM

The San Antonio Bay System is located along the central Texas coast and supports significant natural resource dependent economic activities including commercial and recreational fisheries, ecotourism, and boating. Water quality in the bay system is generally good, and the area is home to one of the nation's most iconic endangered species, the Whooping Crane (*Grus americana*). The San Antonio Bay System is located between Matagorda and Aransas bays along the Texas coast and at the terminus of the San Antonio River and the Guadalupe River watersheds. The system is composed of Espiritu Santo Bay, Hynes Bay, Guadalupe Bay, Mesquite Bay, Carlos Bay, Ayres Bay, Mission Lake, and Pringle Lake, and the average depth within the bays is approximately four feet with a maximum natural depth of seven feet. The San Antonio Bay system exchanges water with Matagorda Bay, located to the northeast, and with Aransas - Copano Bay, located to the southwest. Marine water is exchanged between the Gulf of Mexico and the estuarine system through the Pass Cavallo tidal inlet, the Matagorda ship channel, and through Cedar Bayou.



This large (531 km<sup>2</sup>) estuarine complex is one of the seven major estuaries along the Texas coast and is extremely unique in that wetlands associated with large portions of the surrounding shoreline provides critical wintering habitat for the last wild flock of the endangered Whooping Crane (*Grus americana*). This iconic species is part of the higher biodiversity that is also dependent on a healthy, functioning ecosystem. Focal avian guilds representative of the San Antonio Bay system also include nesting colonial waterbirds and migratory/wintering waterfowl and shorebirds. Additionally, San Antonio Bay also supports important commercial (oysters and shrimp) and recreational fisheries, which depend on surrounding wetlands for maintaining water quality and providing nursery grounds for fish and shellfish.

### PLANNING FOR SAN ANTONIO BAY

The San Antonio Bay Partnership (SABP) is a regional, non-profit, stakeholder-driven planning and management program for the San Antonio Bay System. The purpose of the Partnership is to create and sustain a working partnership of committed stakeholders in order to *protect, restore, and enhance* the natural resources of the San Antonio Bay System for the benefit of the ecosystem and its human uses.

SABP stakeholders include businesses, conservation organizations, local governments, and resource agencies. SABP received funding from the Texas General Land Office, Coastal Management Program, Cycle 16 funding to begin the process of developing a Comprehensive Management Plan for San Antonio Bay. SABP decided to adopt the community- and consensus-based approach used during the development of the Environmental Protection Agency's National Estuary Programs (NEPs) because of the strategy's effectiveness in fostering the long-term protection and sustainable enjoyment of coastal



resources. The planning process was able to build upon the previous partnerships and collaborations that have been formed since the creation of the SABP. This resulted in strong stakeholder input throughout the development of the plan, ensuring a higher-likelihood of its implementation following completion. Under the guidance of stakeholder groups, the SABP and private contractors worked to draft both a habitat conservation plan (Davis and Smith, 2011, 2012) and a coastal public access plan (Stanzel et al., 2014).

As part of the habitat conservation planning effort, a preliminary inventory (Phase I) of potential wetland projects was developed in 2011 and included sites aimed at wetland protection, restoration, and enhancement within the San Antonio Bay System (Davis and Smith, 2011). The recommended sites were mapped and made accessible to stakeholders via the open access Google Earth software. The effort resulted in a total of 53 recommended sites representing a range of conservation, restoration, and education strategies as well as a range of geomorphological types. The site locations and strategies were discussed and prioritized for each geomorphic assemblage within the San Antonio Bay system. It was the intent of the project to provide a framework that could be expanded to include additional sites as more information becomes available. The inventory was further refined during Phase II of the project (Davis and Smith, 2012). Generally, the Phase II approach followed the sequence of activities developed in the Phase I project.

In total, 67 protection, restoration, and enhancement sites were developed during Phases I and II of the habitat conservation planning process for the San Antonio Bay System (Davis and Smith, 2012). Several of these sites identified the need to protect, restore, and enhance the rookery islands of San Antonio Bay, as well as the development of enhanced management planning for some of the islands. Therefore, the San Antonio Bay Partnership, with funding from the Environmental Protection Agency and guidance from SABP stakeholders, began the process of updating the management strategies identified for several of the major rookery islands used by colonial nesting waterbirds in San Antonio Bay.

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## COLONIAL WATERBIRDS

As their name implies, colonial waterbirds rely on aquatic habitats to complete their life cycle. They also play a key functional role within these ecosystems, serving as predators, herbivores, and vectors of seeds,



invertebrates, and nutrients. Waterbirds help maintain the diversity of other organisms, assist in controlling pests, and are effective bioindicators of ecological conditions. They also provide important provisioning (e.g., meat, feathers, eggs, etc.) and cultural services to both indigenous and westernized societies (Green and Elmberg, 2014). In Texas, colonial waterbirds are an important component of the growing ecotourism and birdwatching industry.

The Texas coast serves as a major nesting area for numerous species of colonial waterbirds. Colonial waterbirds utilize the Texas coast as a nursery area and require plentiful nesting habitat and food supply. Nesting colonies can range in size from a few birds to thousands of nesting pairs. The nesting season along the Texas coast occurs annually from February to August. Colonies are most often located on islands, but birds may also use marsh, trees in swamps, peninsulas, mainland beaches, or even urban

habitats to nest. Most colonial waterbirds rely on open water, mud flats, salt marshes, and seagrass beds for foraging, but they can also be found feeding along the shores of local bayous, forested riparian areas, and inland freshwater wetlands (HARC, 2011).

Key characteristics for a successful colonial waterbird rookery include a lack of predators, good foraging habitat nearby, proper nesting substrate/vegetation, and lack of human disturbance (HARC, 2011). As a result, the following can have negative impacts on colonial waterbird nesting populations along the Texas coast:

- Human disturbance of nesting sites, especially during nesting season.
- Erosion of nesting islands due to dredging, wakes, and loss of shoreline vegetation.
- Subsidence of nesting habitat and conversion to open water.
- Habitat conversion for human uses and subsequent loss of foraging habitat.
- Mortality of colonial waterbirds due to predation by mammalian predators (e.g., raccoons, coyotes, feral hogs) and red-imported fire ants.

In recent years, the number of colonial waterbird nesting pairs has decreased in many areas along the Texas coast. Data used to describe colonial waterbird status and trends comes from annual surveys of rookeries coordinated by the Texas Colonial Waterbird Society (TCWS). The TCWS is a scientific group dedicated to monitoring colonial waterbirds in Texas and is made up of staff from Texas Parks and Wildlife Department, Texas General Land Office, Texas A&M University, U.S. Fish and Wildlife Service (USFWS), Audubon Texas, The Nature Conservancy, Coastal Bend Bays & Estuaries Program, and Welder Wildlife Foundation. Surveys are performed annually during the last week of May and the first week of June. The TCWS has been collecting data since 1973, but participation of various groups has varied annually depending on staff interest, availability, and budgets. Surveys attempt to collect data along the entire



Texas coast, including San Antonio Bay, and the data collected includes: number of adults, number of nests, and estimated number of breeding pairs. The survey excludes waterfowl and solitary nesters, such as osprey and kingfishers, but includes the herons, egrets, gulls, terns, ibises, etc. (Hardegree, 2014).

There are 24 within-bay colonies listed in the TCWS database for the San Antonio Bay System. One of these colonies, Chester Island, is actually located in Matagorda Bay, but many birds nesting on Chester Island probably rely on San Antonio Bay habitats for feeding and provisioning young. Chester Island has the most species richness and diversity of all sites. A total of 585,782 nesting attempts by breeding pairs of colonial waterbirds were recorded in the San Antonio Bay System from 1973 through 2009, of which 82.4% were reported from Chester Island (Hardegree, 2014). Excluding Chester Island, within-bay colonies in the San Antonio Bay System contributed a total of 102,745 breeding pairs of colonial waterbirds during the same time period. When excluding Chester Island, breeding birds were, for the most part, found in four island colonies: Second Chain of Islands (59.6%), Seadrift Island (13.2%), Steamboat Island/South Pass Island (9.9%), and Third Chain of Islands (6.1%) (Hardegree, 2014).

With the exception of Brown Pelicans, most colonial waterbird populations in San Antonio Bay show signs of varying degrees of decline in the system. Lack of islands, erosion of existing islands, human disturbance, and predators are implicated as most problematic for colonial waterbirds within San Antonio Bay (Chaney and Blacklock, 2005; Coste and Skoruppa, 1989; Hardegree, 2014). San Antonio Bay has extensive wetlands and should be capable of supporting large numbers of colonial waterbirds if there was suitable nesting habitat. When new areas become available they are quickly colonized (Hardegree, 2014).

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## MANAGING SAN ANTONIO BAY ROOKERY ISLANDS

In 2005, the *Colonial Waterbird and Rookery Island Management Plan* was published to provide site-specific management recommendations for the 186 rookery sites extending from the Land Cut in the Laguna Madre northward to San Antonio Bay (Chaney and Blalock, 2005). The *Plan* included field observations and broad, site-specific recommendations for all 186 rookery sites. The plan identifies management strategies for restoring, enhancing, and protecting waterbird habitat. Recommendations were designed to achieve the following objectives:

- Sustain healthy colonial waterbird species populations and habitats;
- Identify prospective areas for rookery island creation and enhancement
- Identify impacts to avian resources; and
- Provide management actions to minimize or eliminate impacts to colonial waterbird populations and habitat.

In San Antonio Bay, most of the currently active rookery islands are leased by the National Audubon Society and are managed through a partnership between Audubon Texas and the Coastal Bend Bays & Estuaries Program (CBBEP). Over the years, these groups have implemented a number of management efforts to try and enhance these nesting habitats for colonial waterbirds, including controlling predators, improving vegetation, developing plans to protect islands from erosion, and posting signage to discourage human disturbance.

The goal of this plan is to update the management strategies previously identified for San Antonio Bay rookery islands (Chaney and Blalock, 2005) by incorporating up-to-date TCWS data, information on current impacts / threats, and knowledge of on-going and future management efforts. The Plan focuses on the major rookery islands in San Antonio Bay that currently support active colonies of waterbirds (i.e.,

Second Chain of Islands, Seadrift Island, South Pass Islands, and Third Chain of Islands) or could support large numbers of waterbirds in the future with proper management (i.e., Turnstake Island). Chester Island was not included in this Plan because it is located in Matagorda Bay and is managed by part-time wardens employed by Audubon Texas that are responsible for overseeing the site year-round, conducting surveys, completing management work, and reporting back to the USFWS Coastal Program.



There is a strong interest in the San Antonio Bay area in restoring rookery islands that historically supported colonial waterbirds but have suffered from severe erosion and are now submerged. Although SABP supports these efforts and recognizes the need to restore submerged rookery islands, as well as create new islands, the focus of this Plan is on management strategies that could enhance existing islands that support (or could support) nesting birds. The Plan was written to directly build upon several of the projects identified in the *Habitat Conservation and Public Access Plan for the San Antonio Bay System* (Stanzel et al., 2014), and it supports other rookery island management and restoration efforts that are underway in the region.

## SEADRIFT ISLANDS (609-280)



Photo credit: Kiersten Stanzel

### LOCATION

**LATITUDE:** 28.396680° N **LONGITUDE:** -96.722973° W





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## DESCRIPTION

**OWNERSHIP:** Seadrift Islands are owned by the Texas General Land Office and leased by Audubon Texas. Management is accomplished through a partnership between Audubon Texas and the Coastal Bend Bays & Estuaries Program (CBBEP), with Audubon Texas providing supplies and CBBEP performing the on-the-ground management.

**SUMMARY:** The Seadrift Islands site consists of a series of small dredge material islands located in San Antonio Bay south of the City of Seadrift. The islands in this chain have decreased in size due to erosion, with the southernmost island degraded to a sand bar/reef. Currently, only a small portion of one dredged island (approx. 0.5 acres) is used by colonial waterbirds for nesting. Three nesting platforms have been installed on this island, but they are in need of stabilization and maintenance in order to ensure proper function.

**NESTING HISTORY/USE:** One remaining island is used by colonial waterbirds, and there has been a gradual decline in the number of breeding pairs observed following a peak in nesting activity in 1997 (Figure 1). In 2010 the island still supported six species of shrub nesters and one ground nesting species. No data is available for 2011, and from 2012 to 2014 only four to five species (both shrub and ground nesters) were counted. Multiple pairs of nesting Brown pelicans were recorded on the island in both 2013 and 2014. Several ground nesting species (i.e., Black skimmer, Forster's tern, Royal tern, and Sandwich tern) have used the island chain in the past, but degradation of habitat due to erosion has destroyed these former nesting areas.

**SUBSTRATE TYPES:** shell

**IMPACTS:** Historically, disturbance has been minimal, but increased use of the Seadrift boat ramp in recent years, has resulted in a higher potential for human disturbance in this area. Signs have been installed warning boaters that it is a violation of state and federal laws to disturb nesting birds and that violators will be prosecuted. The site continues to be threatened by erosion, and encroachment from mangroves is a potential threat to ground nesting species. Fire ants are also a threat to nesting birds, and egg taking has occurred in this area in the past.

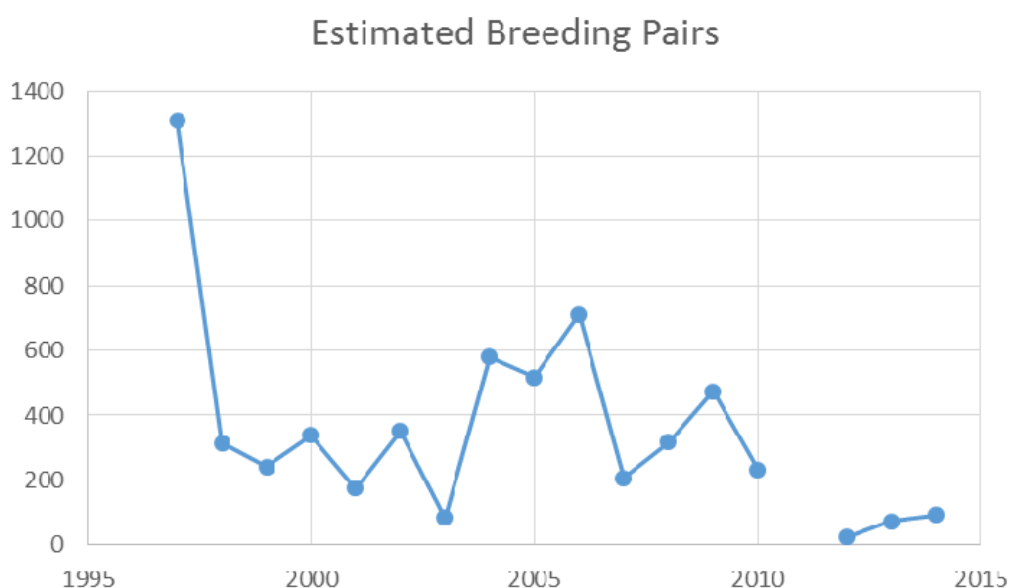
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## TCWS ESTIMATED BREEDING PAIRS: SEADRIFT ISLAND

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
BCNH	0	0	0	1	0	0	0	0	0	2	0	0	0	0	ns	0	0	0
BLSK	478	60	0	43	14	19	0	0	83	6	12	6	2	0	ns	0	0	0
BRPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ns	0	18	20
CAEG	222	147	78	110	38	116	45	306	165	298	56	63	230	179	ns	0	0	0
CATE	0	0	5	0	0	2	0	0	5	0	0	0	0	0	ns	0	0	0
FOTE	239	11	3	32	7	0	0	34	114	13	8	76	36	0	ns	5	28	21
GBHE	4	3	5	25	2	2	0	1	0	11	6	5	5	5	ns	0	0	0
GBTE	107	8	0	0	8	3	0	0	0	0	0	0	0	0	ns	0	0	0
GREG	89	23	41	42	13	64	0	62	10	70	63	44	59	0	ns	0	10	49
LAGU	0	0	12	11	22	58	0	4	3	0	13	5	23	5	ns	0	0	0

<b>LBHE</b>	0	2	0	4	0	0	0	2	0	0	0	0	0	0	ns	0	0	0
<b>REEG</b>	5	1	0	4	0	0	0	6	1	16	4	13	3	12	ns	0	0	0
<b>ROSP</b>	84	16	39	27	57	32	0	10	19	22	12	17	11	7	ns	7	7	3
<b>ROYT</b>	0	0	17	0	0	0	0	0	0	0	3	27	11	0	ns	0	0	0
<b>SATE</b>	0	0	0	0	0	3	0	0	0	0	20	1	4	0	ns	0	0	0
<b>SNEG</b>	36	13	22	14	5	2	10	56	35	122	13	16	17	15	ns	0	0	0
<b>TRHE</b>	47	31	20	26	10	50	28	100	81	152	16	35	74	10	ns	2	0	0
<b>WHIB</b>	0	0	0	0	0	0	0	0	2	0	0	8	0	0	ns	8	6	0
<b>TOTAL</b>	1310	316	241	338	175	350	83	580	518	712	206	316	475	233	ns	24	72	93

Note: ns = not surveyed



**Figure 1. Total estimated breeding pairs at Seadrift Island from 1997-2014.**

#### RECOMMENDATIONS: SEADRIFT ISLAND

1. Decrease potential for human disturbance by maintaining current warning signs near rookery islands.
2. Decrease potential for human disturbance by maintaining current warning signs near boat ramps and installing additional warning signs at boat ramps where they do not currently exist.
3. Decrease potential for human disturbance by instituting an educational campaign with the Seadrift community and conservation partners to educate local residents and visitors about impacts of human disturbance on rookery islands.
4. Monitoring for mammalian predators and red-imported fire ants prior to nesting season and apply control measures if needed.
5. Stabilize existing nesting platforms and perform continued maintenance prior to nesting season to ensure efficient use.



6. Strategically control erosion by adding dredge spoil material to the island to increase elevation and/or install low breakwater to protect the shoreline. The northernmost island has the greatest potential for addition of dredge material. Calhoun County and the City of Seadrift maintain channels into Seadrift and should be consulted on utilizing dredge material for restoration. At the time this plan was published, this site was being investigated for restoration/enhancement as part of a joint planning process for rookery island creation.
7. Consolidate material on the southern island (currently not used for nesting) to increase elevation to a level that would prevent overwash.
8. Institute volunteer monitoring program that would allow for visual inspection of island at multiple points throughout nesting season to monitor nesting success and record potential impacts from predators/human disturbance.

## TURNSTAKE / TURNSTAKE SPOIL ISLANDS (609-320)

### LOCATION

**LATITUDE:** 28.316135° N **LONGITUDE:** -96.679183° W



### DESCRIPTION

**OWNERSHIP:** Turnstake / Turnstake Spoil Islands are owned by the Texas General Land Office and the local navigation district.

**SUMMARY:** Historically, three dredge material islands were located in the southeastern corner of San Antonio Bay near the junction of the Victoria Barge Canal and the Gulf Intracoastal Waterway. Currently, two islands remain following the near-complete erosion of one island. Vegetation on the remaining islands is dense and numerous invasive species are present.

**NESTING HISTORY/USE:** Prior to 1980, a considerable number and diversity of wading birds and bare ground nesting species utilized the three islands for nesting. However, thick vegetation and presence of invasive species has limited the number of nesting birds. Since 1997 only two shrub nesting species with a total of four breeding pairs have been counted, the most recent of which was observed in 2010. The site has been modified greatly over the years due to erosion and vegetative succession and major management efforts are needed in order to restore it for use by colonial waterbirds.

**SUBSTRATE TYPES:** sand and shell

**IMPACTS:** Due to their location near the Victoria Barge Canal and the GIWW, there is a high potential for human disturbance in this area. The islands are also subject to major wave action and therefore have a

high potential for erosion. The islands that currently remain have dense vegetation and large mesquite trees that support mammalian predator populations. It might be possible to reduce vegetative cover and control predators, but given the sites close proximity to the mainland controlling mammalian predators in the long-term may not be feasible. Red-imported fire ants pose a problem for newly hatched birds and must be monitored and controlled.

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#### TCWS ESTIMATED BREEDING PAIRS: TURNSTAKE / TURNSTAKE SPOIL ISLANDS

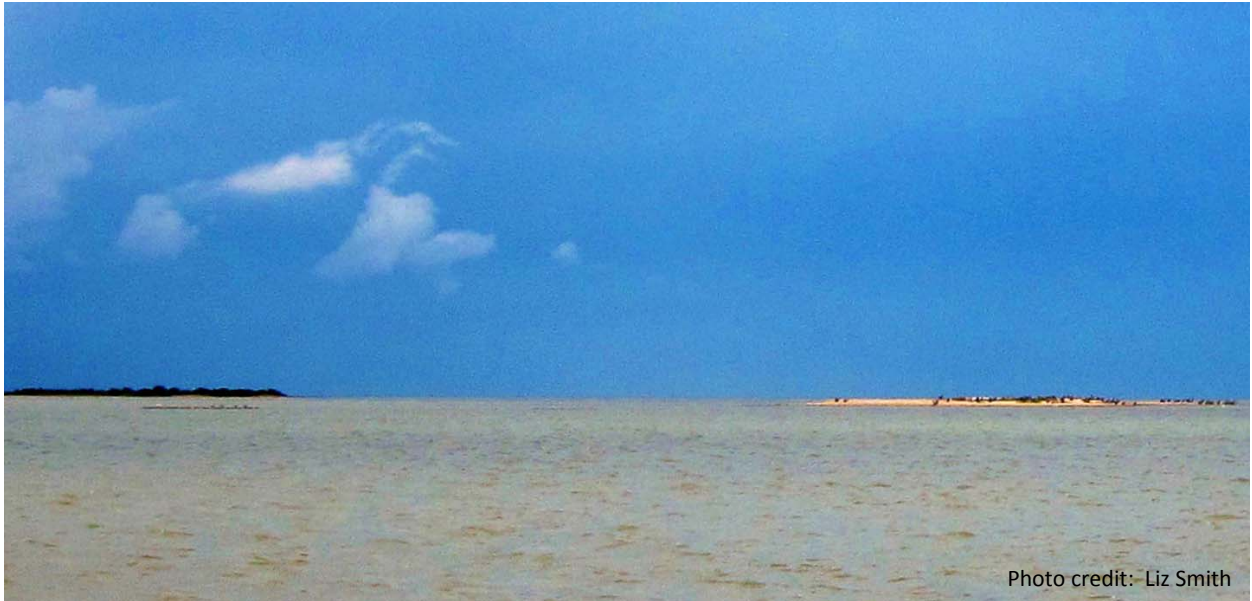
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
BCNH	1	0	0	0	0	0	0	0	ns	ns	ns	ns	ns	0	ns	ns	ns	0
GBHE	0	0	0	0	0	0	0	0	ns	ns	ns	ns	ns	3	ns	ns	ns	0
TOTAL	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0

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#### RECOMMENDATIONS: TURNSTAKE / TURNSTAKE SPOIL ISLANDS

1. Decrease potential for human disturbance by installing warning signs near rookery islands.
2. Decrease potential for human disturbance by maintaining current warning signs near boat ramps and installing additional signs at boat ramps where they do not currently exist.
3. Decrease potential for human disturbance by instituting an educational campaign with local community to educate residents and visitors about impacts of human disturbance on rookery islands.
4. Use of prescribed fire for large-scale vegetation management.
5. Use of herbicide for invasive species control.
6. Continued monitoring and removal of mammalian predators is required due to close proximity to mainland and large size of the islands.
7. Monitoring for red-imported fire ants prior to nesting season and apply treatment if needed.
8. Strategically control erosion by adding dredge spoil material to the islands, plant shrubs and other plants to stabilize shorelines, and/or construct a low breakwater to protect the shoreline.
9. Institute volunteer monitoring program that would allow for visual inspection of island at multiple points throughout nesting season to monitor nesting success and record potential impacts from predators/human disturbance.

## SOUTH PASS ISLANDS A/B (609-341/609-342)



### LOCATION

**LATITUDE:** 28.297083° N **LONGITUDE:** -96.622024° W



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## DESCRIPTION

**OWNERSHIP:** South Pass Islands are owned by the Texas General Land Office and leased by Audubon Texas. Management is accomplished through a partnership between Audubon Texas and the Coastal Bend Bays & Estuaries Program (CBBEP), with Audubon Texas providing supplies and CBBEP performing the on-the-ground management.

**SUMMARY:** Prior to 2003, these islands were included in Colony 609-340 (Steamboat Island). At that time, they were separated out and given their own colony codes. The islands are both small with the largest being approximately 0.9 acres in size. The two islands are separated by South Pass, a deeply scoured channel now used for navigation.

**NESTING USE/HISTORY:** Despite the small size of these two islands and the potential for disturbance related to boaters and facility operations, this is one of the few sites in San Antonio Bay that supports Black skimmers, Royal terns, Sandwich terns, and other ground nesters. Recent TCWS data shows that in 2010, 2013, and 2014, four ground nesting and four shrub nesting species were observed in each year, with Laughing gulls and Royal terns comprising the majority of observations. The lowest number of breeding pairs was counted in 2002, which was followed by a large increase in 2003. Following 2003, there has been a general decline in the number of breeding pairs, although fluctuations from year to year are common (Figure 2). Data is not available for 2011 and 2012.

**IMPACTS:** There is an oil and gas facility on the larger of the two islands, which leads to disturbance due to boaters and facility operations. There is also the potential for disturbance on the smaller of the two islands, which is known to be used for camping. A small number of signs have been installed warning boaters that it is a violation of state and federal laws to disturb nesting birds and that violators will be prosecuted, but maintenance of existing signs and installation of additional signs is needed. These islands also suffer from erosion and the smaller of the two is prone to overwash. As with most rookery islands, red-imported fire ants and mammalian predators pose a threat and must be monitored and controlled.

**SUBSTRATE TYPES:** sand, shell, and silt

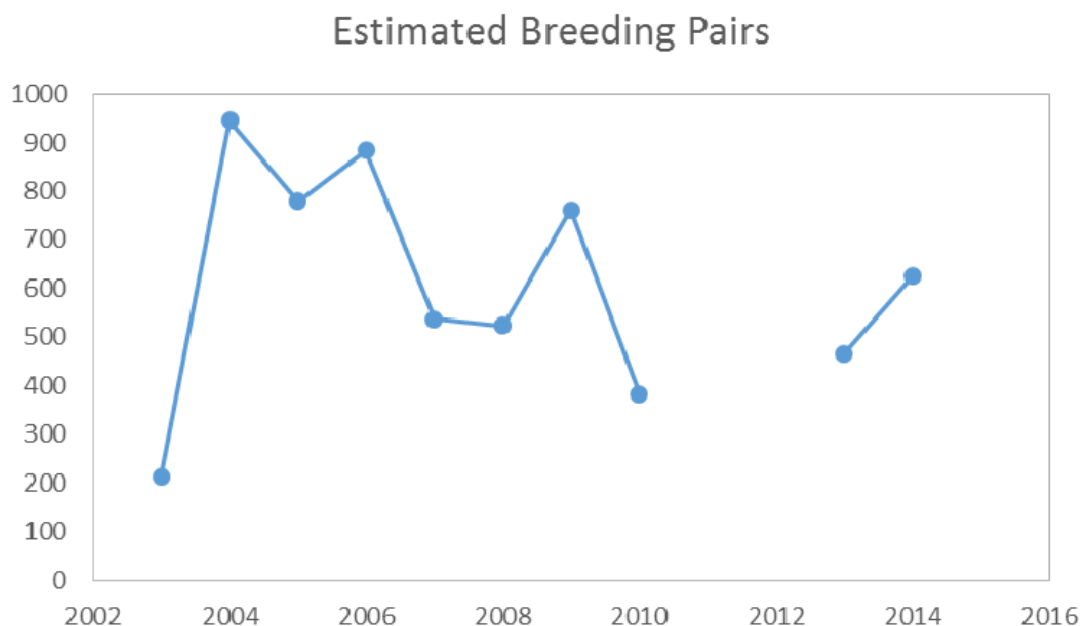
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## TCWS ESTIMATED BREEDING PAIRS: SOUTH PASS ISLANDS A/B

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>BLSK</b>	included with Steamboat Island						0	158	52	112	41	71	158	52	112	41	65	20
<b>BRPE</b>							0	0	12	0	0	0	0	0	ns	ns	0	0
<b>CAEG</b>							0	0	0	0	0	0	0	2	ns	ns	0	0
<b>CATE</b>							2	50	0	0	0	0	0	0	ns	ns	0	0
<b>GBHE</b>							1	0	1	1	1	1	1	2	ns	ns	8	9
<b>GREG</b>							0	20	1	0	1	3	1	0	ns	ns	0	2
<b>LAGU</b>							47	574	354	293	321	185	312	157	ns	ns	138	207
<b>REEG</b>							10	5	5	5	4	2	26	2	ns	ns	2	9
<b>ROTE</b>							0	0	127	152	54	114	244	130	ns	ns	175	284
<b>SATE</b>							0	7	63	265	39	84	111	45	ns	ns	78	13
<b>SNEG</b>							54	14	25	0	1	1	0	0	ns	ns	4	0

TRHE							27	118	140	56	75	70	47	8	ns	ns	21	61
TOTAL							212	946	779	884	537	524	762	383	ns	ns	466	627

Note: ns = not surveyed



**Figure 2. Total estimated breeding pairs for South Pass Islands (A and B) from 2003-2014.**

#### RECOMMENDATIONS: SOUTH PASS ISLANDS A/B

1. Decrease potential for human disturbance by maintaining current warning signs and installing additional signs near rookery islands.
2. Decrease potential for human disturbance by maintaining current warning signs near boat ramps and installing additional signs at boat ramps where they do not currently exist.
3. Decrease potential for human disturbance by instituting an educational campaign with local communities and conservation partners to educate residents and visitors about impacts of human disturbance on rookery islands.
4. Monitoring for red-imported fire ants prior to nesting season and apply treatment if needed.
5. Strategically control erosion by adding dredge spoil material to the islands, plant shrubs and other plants to stabilize shorelines, and construct a low breakwater to protect the shoreline.
6. Installation of nesting platforms on the smaller rookery island could increase numbers of shrub-nesting species.
7. Institute volunteer monitoring program that would allow for visual inspection of island at multiple points throughout nesting season to monitor nesting success and record potential impacts from predators/human disturbance.



## SECOND CHAIN OF ISLANDS (609-422)



### LOCATION

**LATITUDE:** 28.192780° N **LONGITUDE:** -96.815000° W



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## DESCRIPTION

**OWNERSHIP:** Second Chain of Islands are owned by the Texas General Land Office and leased by Audubon Texas. Management is accomplished through a partnership between Audubon Texas and the Coastal Bend Bays & Estuaries Program (CBBEP), with Audubon Texas providing supplies and CBBEP performing the on-the-ground management.

**SUMMARY:** This site consists of a series of natural islands located in Ayres Bay near the Aransas National Wildlife Refuge, east of the Gulf Intracoastal Waterway. These islands represent some of the few natural islands remaining on the Texas coast that support colonial waterbirds, and these islands support the largest numbers of nesting birds within the San Antonio Bay. This chain of islands has been leased by the National Audubon Society for nearly 90 years.

**NESTING HISTORY/USE:** Second Chain has had an average of 1,440 nesting pairs from 1997-2014, with 10-16 different species of colonial waterbirds represented each year. A wide variety of both ground nesting and shrub nesting species utilize these islands, including seven species of terns, nine species of herons/egrets, Roseate spoonbills, and both species of ibis that are found in Texas. When originally leased in 1923 these islands were noted as the largest Roseate spoonbill colony in the United States. Following an increase in the total number of breeding pairs in the mid to late 1990's, there has been a general decrease in the number of nesting pairs at Second Chain (Figure 3). Total number of breeding pairs reached a low in 2011 of only 443 pairs of all colonial nesters. Second Chain was also noted as one of 15 high priority Reddish egret nesting sites by the Gulf Coast Joint Venture (Vermillion and Wilson, 2009).

**SUBSTRATE TYPES:** shell beaches, ridges, and spits

**IMPACTS:** Historically, disturbance to this rookery site was minimal, but increased human visitation to the islands in recent years has become a major threat to nesting birds. Boats have been observed in close proximity to the islands and reports have even been made of individuals walking on the islands in order to take photographs of rare birds during nesting season. A small number of signs have been installed warning boaters that it is a violation of state and federal laws to disturb nesting birds and that violators will be prosecuted, but maintenance of existing signs and installation of additional signs is needed. The islands also suffer from severe erosion, and encroachment by mangroves threatens some ground nesting species. Red-imported fire ants can also pose a problem for newly hatched birds and must be monitored and controlled. At their current size, mammalian predators are not a major issue, but these predators could become a problem if restoration efforts are implemented to control erosion and increase the size of the islands.

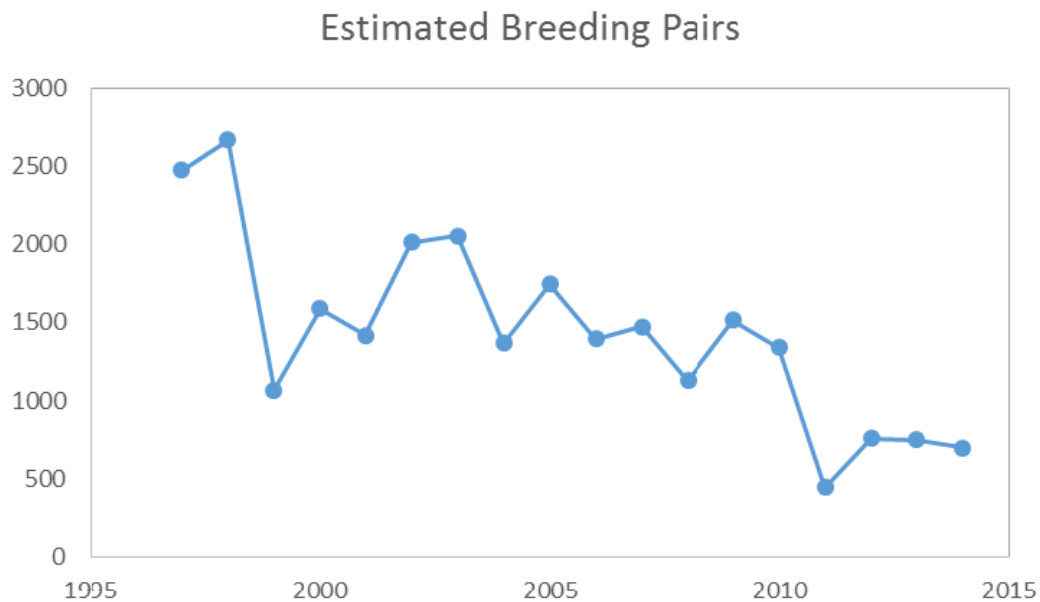
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## TCWS ESTIMATED BREEDING PAIRS: SECOND CHAIN OF ISLANDS

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
BCNH	3	40	15	21	5	17	21	6	19	36	16	8	3	11	8	25	59	19
BLSK	133	105	9	111	88	91	61	1	46	2	0	49	15	42	6	46	42	62
BRPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
CAEG	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0
CATE	272	133	5	0	100	2	102	0	0	86	47	0	154	15	71	0	0	9
FOTE	129	1	0	45	0	62	71	13	33	13	18	0	4	37	0	17	19	49

GBHE	25	35	14	21	22	40	25	37	36	47	24	38	33	26	26	31	19	40
GBTE	57	20	0	65	54	69	15	0	18	4	0	1	0	16	0	2	23	37
GREG	168	207	95	21	91	197	283	286	330	109	369	360	182	250	68	118	42	91
LAGU	1264	1429	586	469	602	610	645	254	654	645	572	254	482	578	132	265	213	268
LBHE	0	0	30	0	18	0	0	0	0	0	0	4	0	0	0	0	0	0
LETE	0	6	1	0	29	1	0	0	0	0	0	0	1	0	1	0	0	0
REEG	20	95	38	128	41	88	61	65	49	67	54	56	43	36	37	32	47	14
ROSP	44	94	54	62	126	87	250	146	28	12	32	66	71	77	2	33	7	19
ROTE	8	4	1	71	0	65	0	0	11	0	0	6	0	0	0	0	0	0
SATE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SNEG	82	194	67	85	88	194	194	40	281	153	74	38	117	68	22	54	102	15
SOTE	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRHE	274	309	145	490	146	470	179	521	241	213	249	196	405	129	66	131	159	61
WFIB	0	0	0	0	0	0	149	0	0	0	0	0	0	0	0	0	0	0
WHIB	0	2	5	1	10	21	0	0	2	7	18	23	4	57	3	3	18	14
YCNH	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
TOTAL	2479	2674	1065	1589	1419	2014	2057	1368	1748	1394	1472	1128	1514	1342	443	757	750	698

Note: ns = not surveyed



**Figure 3. Total number of breeding pairs at Second Chain Islands from 1997-2014.**

#### RECOMMENDATIONS: SECOND CHAIN OF ISLANDS

1. Decrease potential for human disturbance by maintaining current warning signs and installing additional signs near rookery islands.

2. Decrease potential for human disturbance by maintaining current warning signs near boat ramps and installing additional signs at boat ramps where they do not currently exist.
3. Decrease potential for human disturbance by instituting an educational campaign with local communities and conservation partners to educate residents and visitors about impacts of human disturbance on rookery islands.
4. Monitoring for mammalian predators and red-imported fire ants prior to nesting season and apply control measures if needed.
5. Strategically control erosion by adding dredge spoil material to the islands, plant shrubs and other plants to stabilize shorelines, and construct a low breakwater to protect the shoreline.
6. Utilize wildlife cameras to capture potential impacts of disturbance.
7. Institute volunteer monitoring program that would allow for visual inspection of island at multiple points throughout nesting season to monitor nesting success and record potential impacts from predators/human disturbance.

## THIRD CHAIN OF ISLANDS (609-424)

### LOCATION

**LATITUDE:** 28.148890° N **LONGITUDE:** -96.872780° W



### DESCRIPTION

**OWNERSHIP:** Third Chain of Islands are owned by the Texas General Land Office and leased by Audubon Texas. Management is accomplished through a partnership between Audubon Texas and the Coastal Bend Bays & Estuaries Program (CBBEP), with Audubon Texas providing supplies and CBBEP performing the on-the-ground management.

**SUMMARY:** This site consists of several tiny natural islands and spits. The islands feature areas of bare shell beaches and ridges, halophytes, grasses, and various forbs.

**NESTING HISTORY/USE:** Historically, the islands were used by wading birds, gulls, terns, and skimmers, but their usage has declined over time (Figure 4). In 2010, five shrub nesting species and two ground nesting species were observed using the site, with a total of 78 pairs counted. In 2012 these numbers declined dramatically to only one shrub nesting species with a total of three breeding pairs. In 2013, there was a slight increase to 21 nesting pairs that represented four species of ground nesting birds, but the island was reported as completely inactive during the 2014 nesting season (Figure 4).

**SUBSTRATE TYPES:** shell

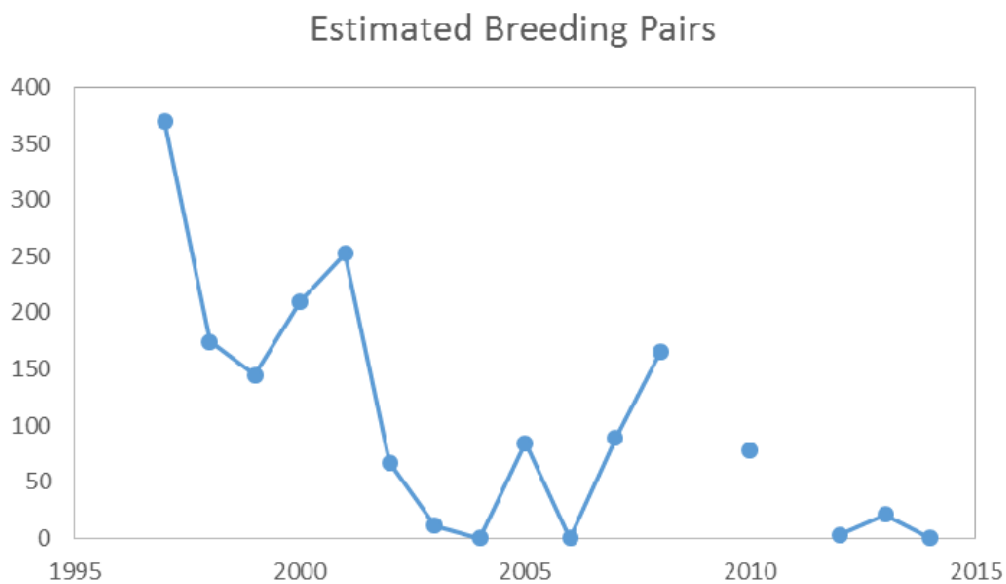
**IMPACTS:** Historically, disturbance to this rookery site was minimal, but increased boating traffic near the islands in recent years has become a threat to nesting birds. There are currently no signs posted warning boaters to maintain a minimum distance from the rookery islands. Third Chain of Islands also

suffers from severe erosion problems, and many of the smaller islands are prone to overwash. Due to the close proximity of these islands to the mainland, the threat for impacts from mammalian predators is high. At their current size, the impacts from mammalian predators is minimal, but these predators could become a problem if restoration efforts are implemented to control erosion and increase the size of the islands. Red-imported fire ants can also pose a problem for newly hatched birds and must be monitored and controlled. Encroachment by mangroves could also change the vegetative landscape of the existing islands.

#### TCWS ESTIMATED BREEDING PAIRS: THIRD CHAIN OF ISLANDS

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>BLSK</b>	166	120	98	158	123	18	6	0	0	0	28	55	ns	18	ns	0	5	0
<b>CATE</b>	0	0	0	0	0	5	0	0	0	0	0	0	ns	0	ns	0	0	0
<b>FOTE</b>	130	27	29	35	48	28	0	0	71	0	53	60	ns	36	ns	0	7	0
<b>GBHE</b>	1	3	0	0	0	4	1	0	0	0	0	0	ns	2	ns	3	0	0
<b>GBTE</b>	48	18	0	18	25	0	0	0	3	0	8	8	ns	0	ns	0	4	0
<b>LAGU</b>	23	5	11	0	29	9	0	0	5	0	0	15	ns	9	ns	0	0	0
<b>LETE</b>	0	0	7	0	29	0	4	0	6	0	0	0	ns	0	ns	0	5	0
<b>REEG</b>	0	0	0	0	0	0	0	0	0	0	0	0	ns	2	ns	0	0	0
<b>ROTE</b>	0	1	0	0	0	0	0	0	0	0	0	8	ns	0	ns	0	0	0
<b>SATE</b>	0	0	0	0	0	0	0	0	0	0	0	4	ns	0	ns	0	0	0
<b>SNEG</b>	0	0	0	0	0	0	0	0	0	0	0	0	ns	4	ns	0	0	0
<b>TRHE</b>	2	0	0	0	0	3	0	0	0	0	0	14	ns	7	ns	0	0	0
<b>TOTAL</b>	370	175	145	210	253	67	11	0	85	0	89	165	ns	78	ns	3	21	0

Note: ns = not surveyed



**Figure 4. Total number of breeding pairs at Third Chain Islands for 1997-2014.**



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## RECOMMENDATIONS: THIRD CHAIN OF ISLANDS

1. Decrease potential for human disturbance by installing warning signs near rookery islands.
2. Decrease potential for human disturbance by maintaining current warning signs near boat ramps and installing additional signs at boat ramps where they do not currently exist.
3. Decrease potential for human disturbance by instituting an educational campaign with local communities and conservation partners to educate residents and visitors about impacts of human disturbance on rookery islands.
4. Monitoring for mammalian predators and red-imported fire ants prior to nesting season and apply control measures if needed.
5. Installation and continued maintenance of nesting platforms on islands that currently lack vegetative structure for shrub nesting birds.
6. Strategically control erosion by adding dredge spoil material to the islands, plant shrubs and other plants to stabilize shorelines, and construct a low breakwater to protect the shoreline.
7. Institute volunteer monitoring program that would allow for visual inspection of island at multiple points throughout nesting season to monitor nesting success and record potential impacts from predators/human disturbance.

## DISCUSSION

There are a limited number of rookery islands remaining in San Antonio Bay, and there is a great need to conserve and enhance these remaining sites, while also looking for opportunities to create new colonial waterbird nesting areas. Most colonial waterbird rookery islands in San Antonio Bay show signs of varying degrees of decline. Lack of islands, erosion of existing islands, human disturbance, and predators are implicated as most problematic for colonial waterbirds within San Antonio Bay (Chaney and Blacklock, 2005; Coste and Skoruppa, 1989; Hardegree, 2014). In this Plan, specific management and monitoring recommendations are identified for five existing rookery sites in San Antonio Bay. The recommendations provided in the Plan are intended to enhance each particular site, while also complementing other rookery island enhancement projects that are currently underway or are planned for San Antonio Bay.

For example, a joint planning effort is currently underway among numerous participants representing environmental organizations and agencies (i.e., The Nature Conservancy, Audubon Texas, SABP, San Antonio Bay Foundation, CBBEP, U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, and Texas General Land Office) to identify suitable sites within the San Antonio Bay system for rookery island restoration and creation; to develop the technical, environmental, and engineering information to support the design and permitting of the project; and to prepare construction plans ready for funding. The need to control erosion through the deposition of dredge material was listed as a recommendation for every island in this Plan, re-emphasizing the strong need to conduct this type of project within San Antonio Bay. Efforts for this project are currently focused on identifying the most suitable site, but if one of the existing rookery islands is chosen for deposition of dredge material (e.g., Seadrift Island), the Plan will provide recommendations for how to best manage the site following restoration.

Audubon Texas is also in the process of designing a new citizen science monitoring program called the Texas Estuarine Research Network (or TERN). The program is currently being piloted in the Galveston Bay area, but implementation of a similar program in San Antonio Bay in the future could have significant benefits for rookery islands. The primary focus of TERN is to collect data on colonial waterbirds, the secondary purpose is to collect data on other bird species (shorebirds/coastal area migrants), and the tertiary purpose is to provide a network of trained volunteers to assist with other local projects (e.g., marsh plantings). Specifically, the colonial waterbird data gathering will consist of two parts: rookery monitoring and foraging habitat monitoring. For rookery islands, active monitoring will take place from February through August. In the months prior to the nesting season, volunteers will be trained to report observations of rookeries using a form similar to the one currently used by the TCWS. In addition to survey counts of adults and active nests, this program will develop methods to measure disturbance in and around nesting areas. Increased monitoring of San Antonio Bay rookery islands throughout nesting season would enhance opportunities to monitor for potential impacts from predators and/or human disturbance, two of the major threats to these rookery sites. If impacts to nesting birds are observed, corrective action could be taken more quickly to try and minimize the threat (i.e., remove predator, alert authorities of human disturbance). Productivity of nest could also potentially be monitored through this program. Productivity information is not available for most of these sites and is not collected as part of the annual TCWS census, but this information would be extremely helpful in determining sources of waterbird declines and appropriate management strategies.

TERN is also designed to enhance outreach and education efforts within the communities in which it is implemented. Education and outreach events would be hosted to engage the community in stewardship

activities such as environmental workshops, bird surveys, beach clean-ups, growing and planting of native rookery island species, removal of invasive and noxious species, predator control, and shoreline protection and erosion control. Throughout the year the majority of these events would be focused on the specific needs of the colonial waterbirds within that community. This Plan provides specific recommendations upon which the TERN program could build any future outreach and education efforts within San Antonio Bay. Implementing outreach and education efforts within the communities that surround San Antonio Bay, whether through the TERN program or some other effort, would help provide the much needed awareness that colonial waterbirds require in this region. Education and outreach efforts could be especially helpful for trying to lessen impacts from human disturbance at rookery islands in San Antonio Bay.

Developments in technology also offer opportunities to better monitor and manage the rookery islands in San Antonio Bay. Wildlife cameras provide another method for monitoring the impact of predation and human disturbance on nesting productivity. As additional studies continue to evaluate the effectiveness of this tool, it should be assessed for its effectiveness at San Antonio Bay rookery islands. This method could also prove beneficial for providing an effective means of communicating about the importance of rookery islands to the general public.

There are numerous entities involved in the enhancement of rookery islands and colonial waterbirds in San Antonio Bay, either through management, monitoring, planning, etc. This Plan was intended to try and capture some of these on-going efforts, while also providing recommendations for additional management and monitoring activities. Recommended next steps following the creation of this Plan include: (1) prioritize sites and management/monitoring recommendations, (2) build upon existing partnerships and develop new collaborations based on prioritization, and (2) pursue funding to implement prioritized recommendations. This document is intended to be a “living” document that can be revisited as management recommendations for these sites change and projects are implemented.

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### COLONIAL WATERBIRD ACRONYMS

<b>BCNH</b>	Black-Crowned Night-Heron
<b>BSK</b>	Black Skimmer
<b>BRPE</b>	Brown Pelican
<b>CAEG</b>	Cattle Egret
<b>CATE</b>	Caspian Tern
<b>COTE</b>	Common Tern
<b>FOTE</b>	Forster's Tern
<b>GBHE</b>	Great Blue Heron
<b>GBTE</b>	Gull-Billed Tern
<b>GREG</b>	Great Egret
<b>LAGU</b>	Laughing Gull
<b>LBHE</b>	Little Blue Heron
<b>LETE</b>	Least Tern
<b>REEG</b>	Reddish Egret
<b>ROSP</b>	Roseate Spoonbill
<b>ROTE</b>	Royal Tern
<b>SATE</b>	Sandwich Tern
<b>SNEG</b>	Snowy Egret
<b>SOTE</b>	Sooty Tern
<b>TRHE</b>	Tri-Colored Heron
<b>WFIB</b>	White-Faced Ibis
<b>WHIB</b>	White Ibis
<b>YCNH</b>	Yellow-Crowned Night-Heron