Beach-nesting Bird Demography & Public Engagement on the Texas Gulf Coast

Contract: **22-045-001-D077**
Project Name: **Beach-nesting Bird Demography & Public Engagement on the Texas Gulf Coast – FINAL REPORT**

This report was funded in part by a Texas Coastal Management Program grant approved by the Texas Land Commissioner, providing financial assistance under the Coastal Zone Management Act of 1972, as amended, awarded by the National Oceanic and Atmospheric Administration (NOAA), Office for Coastal Management, pursuant to NOAA Award No. NA21NOS4190136. The views expressed herein are those of the author(s) and do not necessarily reflect the views of NOAA, the U.S. Department of Commerce, or any of their subagencies.

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Project Description:
American Bird Conservancy (ABC) and their partners Houston Audubon Society (HAS), Gulf Coast Bird Observatory (GCBO), and Coastal Bend Bays and Estuaries Program (CBBEP) work to implement ongoing management measures to increase the reproductive success and survival of declining coastal breeding bird species. ABC and partners work to protect Coastal Natural Resource Areas (CRNAs) by collecting and analyzing bird demographic data, a resource currently lacking in the Gulf of Mexico for this project's priority species. These priority species include Snowy and Wilson's Plovers, Black Skimmer, and Least Tern, all of which are on the Texas Priority Species List in the Texas Parks and Wildlife Department's Conservation Action Plan. The demographic data ABC and partners collect helps land and natural resource managers more effectively manage sensitive habitats that support bird species in decline, such as beach-nesting birds.

ABC and partners used CMP Cycle 26 funds to increase the reproductive success of priority bird species by protecting habitat, conducting education and outreach, and monitoring the birds' response to management actions. Protecting habitat involves working closely with land managers to identify sensitive breeding areas and protecting those areas via seasonal postings, allowing the public to still have access to beach resources. ABC and partners will also engage the public to become stewards for the land and the birds by talking to recreationists at coastal locations where there are high human impacts to the birds and the habitat. ABC and partners will also coordinate conservation activities with land and natural resource managers prior to the breeding season,

collect data during the breeding season, analyze and summarize data after the breeding season, and report the results to local stakeholders.

This project is invaluable to land managers because it provides an added resource to assist in protecting CNRAs and to educate visitors at the monitoring sites. This project will empower the public and managers to protect CNRAs and their bird species by providing helpful information on beach-nesting birds. This project may also lead to economic benefits because nature-based tourism provides opportunities for the public to enjoy nature while promoting habitat conservation and economic growth.

Task 1: Identify Sites and Coordinate with Land and Resource Managers

ABC established agreements with their partners (CBBEP, HAS, and GCBO). ABC and partners identified areas where birds were breeding at 12 sites when the breeding season began (March - April 2022). The 12 sites included Anahuac National Wildlife Refuge (NWR), Bolivar Flats Shorebird Sanctuary, East Beach, San Luis Pass- Galveston, San Luis Pass County Park, Sargent Beach, DOW Chemical Plant, Matagorda Peninsula, Colorado River Mouth Flats, Port Aransas Nature Preserve, Packery Flats, and the Village. ABC informed the managers at Anahuac NWR, Galveston Park Board of Trustees, the City of Galveston, Brazoria County, TPWD, GLO, and the City of Port Aransas of these breeding areas. ABC and partners worked with the managers to identify nesting areas, install seasonal postings, cease trash collections via vehicles in nesting areas, suggested putting lids on trash cans or relocating cans (to reduce avian predators), worked with managers to plan for large event layouts to minimize impacts to bird areas, and coordinated beach cleanups. Season postings included signs and symbolic fencing that lets beachgoers know where birds are nesting and do not prevent access to beach resources.

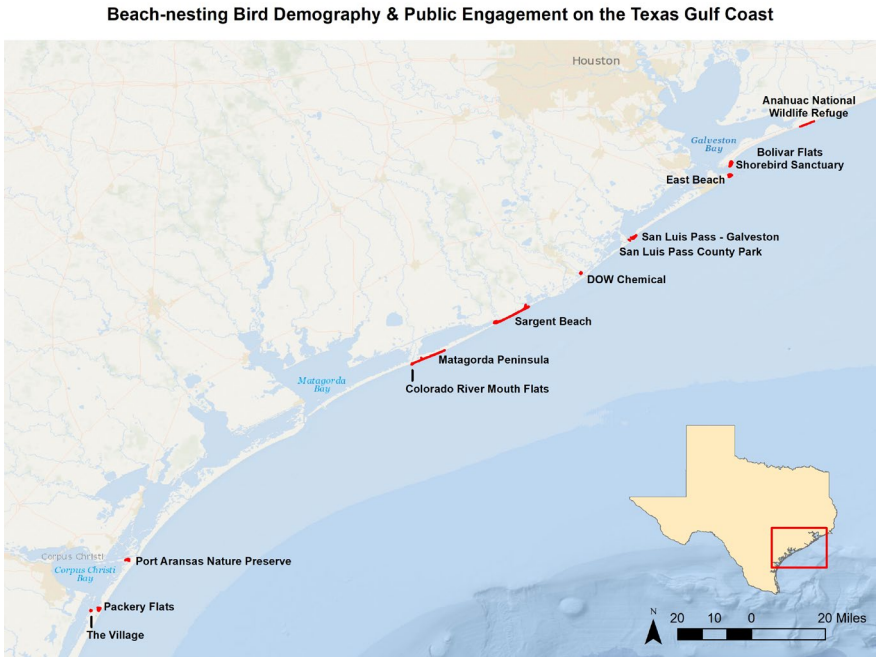

Figure 1. Map of sites for American Bird Conservancy and partners' Beach-nesting Bird Demography & Public Engagement on the Texas Gulf Coast project in 2022.

Deliverables:

1. Executed agreements with CBBEP, HAS, and GCBO
   This was submitted by the due date 12/31/2021.
2. List of land/resource managers contacted prior to beginning of 2022 field season
   This was submitted by the due date 1/1/2022, but is also included in this final report.
3. Maps of breeding locations
   This was submitted by the due date 1/1/2022, but is also included in this final report.

Task 2: Data Collection

ABC and partners monitored the reproductive output of the focal bird species to provide important data to natural resource managers. The key outcomes/metrics ABC and partners monitored are number of breeding pairs, nest fates (success or failure and causes of failure, if known), and number of fledges produced per pair per site (upper Texas coast only). Bird surveys were conducted approximately two – three times per week, site dependent, according to an established protocol. ABC and partners will use productivity targets as part of an existing long-term data set that will contribute to setting conservation goals for these bird species along the Gulf of Mexico.

A summary of these data are presented in Table 1 and was shared with land managers in the reports in Appendix 1. Data presented here is cumulative across all sites. Reports for land managers (Appendix 1) present results by site or region. Nest success for plover species was relatively high compared to previous nesting seasons. We had fewer rain and high tide events, which allowed nests to hatch successfully.

Table 1. 2023 reproductive metrics for ABC and partners' collaborative Beach-nesting Bird Demography & Public Engagement on the Texas Gulf Coast for Wilson's and Snowy Plovers, Least Tern and Black Skimmer at selected sites along the Texas coast. Apparent Nest Success is presented as a percentage based on successfully hatched nests divided by the total number of nests. Nest fate percentages may not add up to exactly 100% due to rounding error.

Reproductive Metric	2023
# of Sites Monitored (effort)	12
# of Acres Monitored	1716
# of Acres Protected	797.7
# of Breeding Pairs	1,435

Reproductive Metric	2023
Wilson's Plover	*114*
Snowy Plover	*12*
Least Tern	*398*
Black Skimmer	*911*
# of Nests Monitored (**Plover species ONLY**)	92
Apparent Nest Success (**Plover species ONLY**)	44/92 = **47.8%**
Failure – Predation	22/92 = **23.9%**
Failure – Washout	6/92 = **6.5%**
Failure – Abandonment	2/92 = **2.2%**
Failure – Human Caused**	10/92 = 1**0.9%**
Failure – Unknown	8/92 = **8.7%**
# of Fledges (All species)	599

Deliverables:

1. Breeding bird protocol
   This was submitted by the due date 12/31/2021.
2. Photo of data collection efforts tied to species monitoring.
   This was submitted in each monthly progress report, is attached in reports in Appendix I, and was submitted as a deliverable on February 10, 2023.
3. Total number of acres monitored and protected, number of breeding pairs, nest fates, and number of fledges produced per pair per site (upper Texas coast only)
   This was submitted by the due date 1/31/2023, but a summary of this data is also included in this final report.
4. Copy of 2022 raw data sets.
   This will be submitted by the due date of 3/31/2023.

Task 3: Education and Community Outreach

ABC staff, partners, and trained volunteers interacted with beach goers during holidays and weekends at high use impact sites, and beach events to provide educational materials and information about the birds – we refer to this as nest site stewardship. Volunteers were recruited at local educational events ABC and partners attended from years past and in 2023 such as meetings of local Audubon chapters and Master Naturalist groups. ABC set up educational table displays and gave presentations at local community events to teach the public about how they can modify their behaviors to reduce disturbance to breeding birds before they reach the beach.

We stayed busy with education and community outreach during the 2023 season. We had organized pre-nesting season cleanup events at a few of our monitoring sites to provide safe nesting habitat, including Anahuac NWR, Bolivar Flats Shorebird Sanctuary, East Beach, and Packery Flats; and one post-nesting season cleanup at East Beach to clean up trash accumulated throughout the nesting season, and to provide safe habitat for nonbreeding birds using the site. ABC provided wildlife training to Galveston Park Board of Trustees and Galveston County Road & Bridge staff, who work on the beach all summer and are likely to encounter beach-nesting birds, and informed them of ways to reduce impacting the nesting birds. The following are a few of the tabling events we attended: Wings Over Surfside Birding Festival in Surfside, Salty Easter Bash in Galveston, Galveston Bay Day in Kemah, Earth Day Bay Day at Heritage Park in Corpus Christi, Earth Day at UTMB in Galveston, and World Oceans Day in Galveston. We engaged with more local school groups in 2022 during field trips to some of our sites where we educated them about the importance of the site, what species of birds nest on the ground, showed mock nests in the sand, showed them birds in the scope, and had them clean up trash around the nesting area. School groups we engaged with include Alvin ISD AP Environmental Science class, Clear Creek ISD AP Science class, Flour Bluff ISD, and Audubon's Conservation Leaders Program for Young Women. We reached a cumulative total of 2,400 people directly and in-person through our education and community outreach efforts. We received help from 22 volunteers who put in a total of 69.5 hours to assist us in stewardship and cleanup activities for this project.

Deliverables:

1. List of community outreach events
   This was submitted as a deliverable on February 10, 2023 before the due date of 3/31/2023.
2. Photos of ABC staff, partners, and volunteers participating in outreach events
   This was submitted as a deliverable on February 10, 2023 before the due date of 3/31/2023.
3. Copies of outreach materials provided at events
   This was submitted as a deliverable on February 10, 2023 before the due date of 3/31/2023.

Task 4: Report for Land and Resource Managers

ABC and partners provided site reports to land/resource managers that includes (1) the activities undertaken with the land managers (Task 1), (2) reproductive outcomes for the birds (Task 2), and (3) a summary of education efforts (Task 3). In the same site report, ABC and partners made recommendations to land/resource managers to improve the site for breeding birds (in terms of promoting reproductive success) and to increase opportunities for the public to learn about and be stewards for the natural resources at any given site. ABC and partners also scheduled meetings or phone/virtual calls to discuss the outcomes and recommendations contained in the report with local managers and stakeholders, to the extent possible.

ABC and our partners stayed regularly engaged will the land and resource managers of our sites, often providing outcomes and recommendations throughout the season to immediately mitigate any issues. Notes from these conversations and meetings include:

- Anahuac NWR management reached out to ABC mid-season and stated one of their deputy regional managers would be making a site visit to Anahuac and they wanted to show them the area we protect on their refuge. They asked to provide a summary of current and past project operations, nesting outcomes, and recommendations. We provided them with the report attached in Appendix 1 and thoroughly explained the human disturbance issues at the site, including how the beach erosion created numerous unofficial beach access points and reduced the number of nesting pairs. We had a follow-up call with Anahuac NWR management and they informed us they are working with Texas Department of Transportation and Galveston County regarding this issue and persuaded them to only have two beach access points adjacent to the Anahuac NWR beach property line. They recommended fewer beach access points but were told they have to at least have the two. Anahuac NWR management also recommended we reach out to Texas Department of Transportation and Galveston County to provide the same recommendations, which we will. We consider this a win for the site and birds, and are hopeful we will continue to make improvements.
- Bolivar Flats Shorebird Sanctuary is owned and managed by Houston Audubon, one of our partners on this project. They were monitoring this site and were aware of the unauthorized vehicles trespassing onto their property. Vehicles would drive around the bollard fencing at low tide or cut the cables along the bollards. They would regularly fix the cables and secure the site to the best of their abilities. Houston Audubon has been in the process of receiving an updated permit to extend the bollards seaward and re-securing the existing bollards and cable to reduce vehicles from trespassing into the sanctuary. They are still waiting on their permit.
- East Beach is managed by the Galveston Park Board of Trustees (Park Board). We regularly provided immediate recommendations throughout the summer to the East Beach manager, their Environmental Coordinator, and their Coastal Zone Management staff. Recommendations included locating a port-o-john in the parking lot adjacent to the nesting habitat to reduce disturbance from visitors using the bathroom in the fenced nesting habitat. They immediately followed our recommendation and disturbances decreased significantly. We also recommended they alter their mowing schedule to reduce disturbance to birds nesting in their parking lot they mow. We recommended they stop placing driftwood around the fencing nesting habitat until after the nesting season, and they halted that activity. We also shared reproductive outcomes with staff regularly.

We had a meeting with the Park Board in February 2023 and shared these past recommendations and outcomes, as well as prepared for the 2023 breeding season.

- San Luis Pass – Galveston Beach is managed by the Galveston Park Board on the Gulf side, and City of Galveston on the bayside. The property is actually owned by an LLC based in Austin, Texas. ABC contacted the land owner in the summer of 2022 and we informed them of the disturbances from vehicles and trash accumulating on the property. Specifically, someone installed two flag poles and solar lighting within the dunes where the birds nest. We gained permission from the owner to remove the poles and lighting. We also encouraged the owner to consider selling the property to a conservation organization because of the ecological importance of their property and the valuable nesting habitat it provides. They stated they would consider the recommendation.
- San Luis Pass County Park is managed by Brazoria County Parks Department. We engaged with the manager and staff on a regular basis regarding the nesting outcomes and disturbances from vehicles trespassing onto the 'no driving' section of their park where the sand is growing around the bollards. They increased their presence on the beach and regularly ask people to relocate their vehicle to the designated parking lot. We asked if they would be installing more bollards to reduce this disturbance to the nesting birds and they did not have immediate plans because the beach regularly erodes and changes with each high tide.
- The east section of Sargent Beach is owned by San Bernard National Wildlife Refuge. Our partners GCBO reached out to Refuge management regarding vehicle disturbances and received permission to install protective signs and fencing. We also contacted the Matagorda County Commissioner, Precinct 2 regarding surveying Sargent Beach.
- Port Aransas Nature Preserve is managed by the City of Port Aransas. Our partners CBBEP spoke with the manager several times regarding the feral hog issue within the preserve and the disturbance it caused to the nesting birds. They increased some hog control efforts within the preserve in the past year. They are also in the planning phases for their new boardwalk to replace what was destroyed by Hurricane Harvey in 2017. We provided recommendations in the past of where to re-install the boardwalk to reduce impact to sensitive nesting habitat. They valued our recommendations and updated us that they are not in a position to install the boardwalk at this time; their attention is focused on securing the bulkhead that was also destroyed during the hurricane.
- Our partners CBBEP coordinated management activities at University Beach with Conrad Blucher Institute and Texas A&M University-Corpus Christi (TAMU-CC). Recommendations we provided them, and continue to recommend, include when to grade their beach to reduce vegetation growth to allow greater public access for the students and community, as well as to provide suitable habitat for beach-nesting birds. We recommended that they grade the beach before the nesting season to reduce any harm to nesting birds, and they have been good about keeping with the schedule. We also coordinated, and continue to coordinate, with a TAMU-CC professor about adopting University Beach for cleanups their students conduct two times a year, before the nesting season and later in the fall and winter. We also integrated them into monitoring efforts, providing guidance to students who want to do a small project, including a student that completed a capstone project.

- Packery Flats is owned and managed by the Texas GLO. Our partner CBBEP is in regular communication with the GLO but there was limited interaction with them in 2022 regarding the nesting habitat, which is a sign of positive progress regarding disturbance issues. CBBEP is working on a project to replace some of the bollards along the highway that have deteriorated over the years. The bollards prevent vehicles from driving within the flats and nesting habitat, as they have in years past. This is a preventative project to ensure the area stays protected from vehicles.

Deliverables:

1. Copy of written reports provided to land/resource managers/stakeholders, which include photos of site activities and metrics that are outlines in Task 2.
   This was submitted by the due date 1/31/2023, but is also included in this final report as Appendix 1.
2. Notes from meetings with local managers and stakeholders
   Information was provided in past monthly progress reports, but is also provided in this report.

Task 5: Project Reporting

ABC prepared monthly reports and deliverables on time and sent them to CMPReceipts@GLO.TEXAS.GOV. This final report summarizes all work completed under each task, including finalized breeding and outreach metrics, and photos from community-based events in Appendix 1.

Deliverables:

3. Monthly progress reports and reimbursement requests were sent monthly by the 10th with the exception of March 2023 when we were preparing the final report.
4. The draft final report was shared with the GLO-CMP by March 15, 2023, as agreed upon in the work plan.
5. Final Report
   Due Date: 3/31/2023
6. Project closeout form
   Due Date: 3/31/2023

Appendix 1.
Reports and Recommendations to Land Managers

Beach-nesting Bird Demography & Public Engagement on the Texas Gulf Coast

Wilson's Plover breeding pair at San Luis Pass County Park on April 9, 2022 in Freeport, TX. Photo by Kristen Vale, American Bird Conservancy.

Prepared By:

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Richard Gibbons, American Bird Conservancy

Contract #: 22-045-001-D077

SITES

Table 1. List of sites surveyed, acres monitored and protected, habitat description, and survey frequency and number along the upper Texas coast during the 2022 breeding bird season.

Site Name	Acres Monitored	Acres Protected	Habitat Description	Survey Frequency	# of Surveys
High Island Beach (East)	11	0	Beach front, Salt marsh	1/week or biweekly	12
Anahuac National Wildlife Refuge	29	4	Beach front	1/week or biweekly	25
Rollover Pass	3	0	Bayside Beach	2/week	26
Bolivar Flats Shorebird Sanctuary	331	331	Beach front, Salt marsh, Algal Flat, Sand flat	2/week	39
East Beach Complex	129	56	Beach front, Salt marsh, Algal flat, Sand flat	2-3/week	44
San Luis Pass County Park	27	3	Beach front, Salt marsh	2-3/week	32
San Luis Pass-Galveston Beach	66	42	Beach front	1/week or biweekly	16
TOTALS	**596**	**436**			**194**

We monitored and protected five primary sites this 2022 breeding season, including Anahuac National Wildlife Refuge (Anahuac NWR) and Bolivar Flats Shorebird Sanctuary (Bolivar Flats) on the Bolivar Peninsula, East Beach Complex (East Beach) and San Luis Pass-Galveston Beach (SLP-G Beach) on Galveston Island, and San Luis Pass County Park (SLPCP) on Follets Island. We monitored, but did not install fencing, at two additional opportunistic sites on the Bolivar Peninsula, Rollover Pass and High Island Beach-East. This is our second year monitoring Rollover Pass after it was closed in the winter of 2020-2021 and target beach-nesting bird species nested there temporarily in 2021. This was our first year monitoring High Island Beach-East (High Island), the beach immediately east of High Island, which follows an established Audubon Coastal Bird Survey route. We began monitoring High Island in June after scouting for potential nesting habitat in the area and locating target species with active nests. A section of the beach was closed to the public at the end of the breeding season as beach renourishment activities began. We will provide monitoring results for the five sites in our tables and graphs, and brief summary results for the two addition sites in the text.

Figure 1. Monitoring sites (in yellow) on the upper Texas coast (2022) include San Luis Pass County Park, San Luis Pass Galveston Beach, East Beach Complex, Bolivar Flats Shorebird Sanctuary, Rollover Pass, Anahuac National Wildlife Refuge, and High Island Beach-East.

POSTING SITES

American Bird Conservancy (ABC) and Houston Audubon Society (HAS) posted protective signage and fencing at East Beach and Bolivar Flats on March 16. We also posted signage only at Anahuac NWR on March 18 with the help of Anahuac NWR staff and Friends of Anahuac NWR volunteers. The team also had a pre-nesting trash cleanup at the same time to help provide a clean beach for the birds at Anahuac NWR. ABC and HAS posted signage and fencing at SLPCP on April 2, followed by signage only at SLP-G Beach on April 2. We only posted signage and no fencing at Anahuac NWR and SLP-G Beach because vehicle disturbance is too frequent and the fencing creates more risk to the habitat and humans if driven through.

Posts and fencing were removed after all nesting was complete and the last chicks fledged. ABC and HAS removed the symbolic fencing at SLPCP on July 20, and East Beach and Bolivar Flats on August 24. HAS removed the posts at Anahuac NWR on August 4. The posts were left installed at SLP-G Beach at the end of the season but the signs were switched out to protect roosting areas for nonbreeding birds.

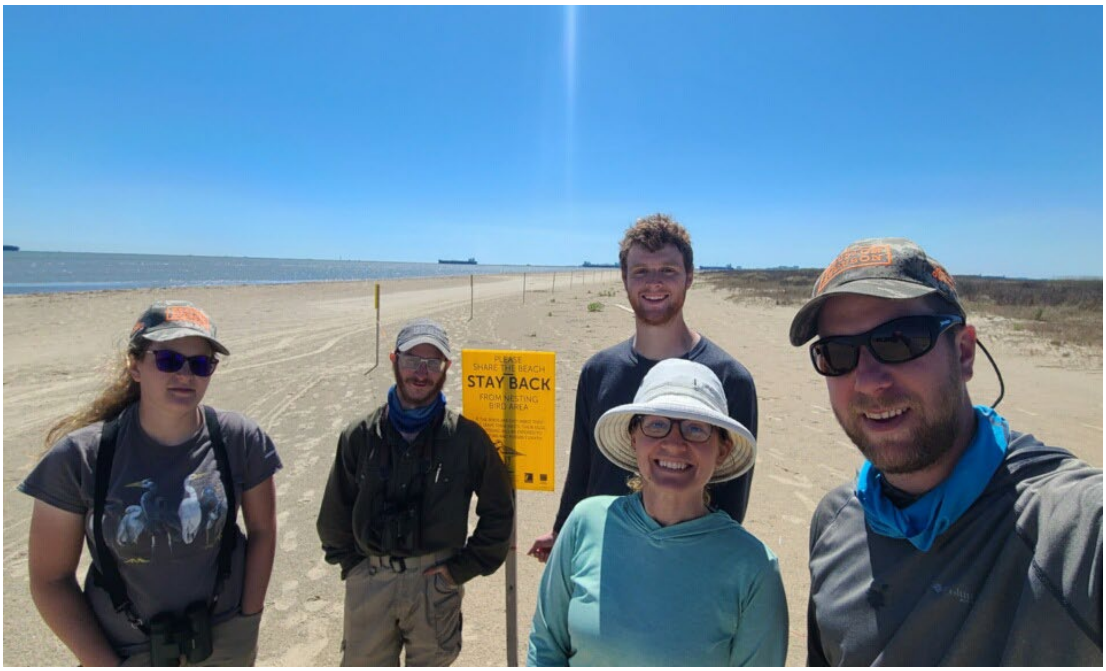


Figure 2. Houston Audubon and American Bird Conservancy staff posing for a selfie after posting Bolivar Flats nesting habitat on March 16, 2022 in Port Bolivar, Texas. Photo by Kristen Vale.


Figure 3. Friends of Anahuac NWR volunteers helping pick up trash within the nesting are at Anahuac NWR at the same time we posted the site on March 18, 2022 in Gilchrist, TX. Photo by Kristen Vale.

RESULTS

The estimated number of breeding pairs observed across our five primary monitoring sites were 23 Wilson's Plovers, 122 Least Terns, and two Snowy Plover breeding pairs (Table 2). The total number of nests monitored across all sites were 13 Wilson's Plover and one Snowy Plover nests. The number of fledged chicks we estimated from our five monitoring sites include 10 Wilson's Plover chicks, 14 Least Tern chicks, and zero Snowy Plover fledged chicks.

Target species documented nesting at Rollover Pass and High Island only include Least Terns. High Island had a max of 14 Least Tern breeding pairs and at least four fledged chicks. Least Tern nesting activity was only active at Rollover Pass from April 27 – June 3. We documented three breeding pairs and no fledged chicks. A downy chick was observed on June 3 but not seen again during subsequent surveys, nor any other nesting activity from our target species.

Table 2. Average number of adults during the core breeding season (April-July), estimated number of breeding pairs, total nests located, and max high counts for chicks observed during a single survey in the 2022 season. WIPL=Wilson's Plover, SNPL=Snowy Plover, LETE=Least Tern.

Metric / Description	**Anahuac NWR**		**Bolivar Flats Shorebird Sanctuary**		**East Beach Complex**			**San Luis Pass County Park**		**San Luis Pass - Galveston Beach**		**TOTAL**		
	WIPL	LETE	WIPL	LETE	WIPL	LETE	SNPL	WIPL	LETE	WIPL	LETE	WIPL	LETE	SNPL
Average # of Adults (Apr-July)	0	11	6	137	11	60	1	4	0	1	0	22	208	1
Estimated # of Breeding Pairs	0	7	8	65	13	50	2	2	0	1	0	23	122	2
Total Nests Monitored	0	0	0	1	9	0	1	2	0	1	0	13	0	1
# of Successful Nest Hatches	0	0	0	0	7	0	1	2	0	1	0	10	0	1
# of Failed Nests	0	0	0	0	2	0	0	0	0	0	0	2	0	0
Max # Downy Chicks	0	2	1	3	4	3	3	5	0	1	0	11	8	3
Max # Feathered Chicks	0	0	2	2	2	1	0	3	0	0	0	7	3	0
Max # Flight Capable/Fledged Chicks	0	4	4	9	3	1	0	3	0	0	0	10	14	0

Wilson's Plover

We estimated 24 Wilson's Plover breeding pairs between the five sites, with zero at Anahuac NWR, eight at Bolivar Flats, 13 at East Beach, two at SLPCP and one at SLP-G Beach. Average Wilson's Plover adult counts during the breeding season include zero adults at Anahuac NWR, six at Bolivar Flats, 11 adults at East Beach, four adults at SLPCP, and one at SLP-G Beach (Figure 4). We estimated ten chicks fledged between the sites, four at Bolivar Flats, three at East Beach Complex, and three at SLPCP. No Wilson's Plovers were documented nesting at Rollover Pass or High Island.

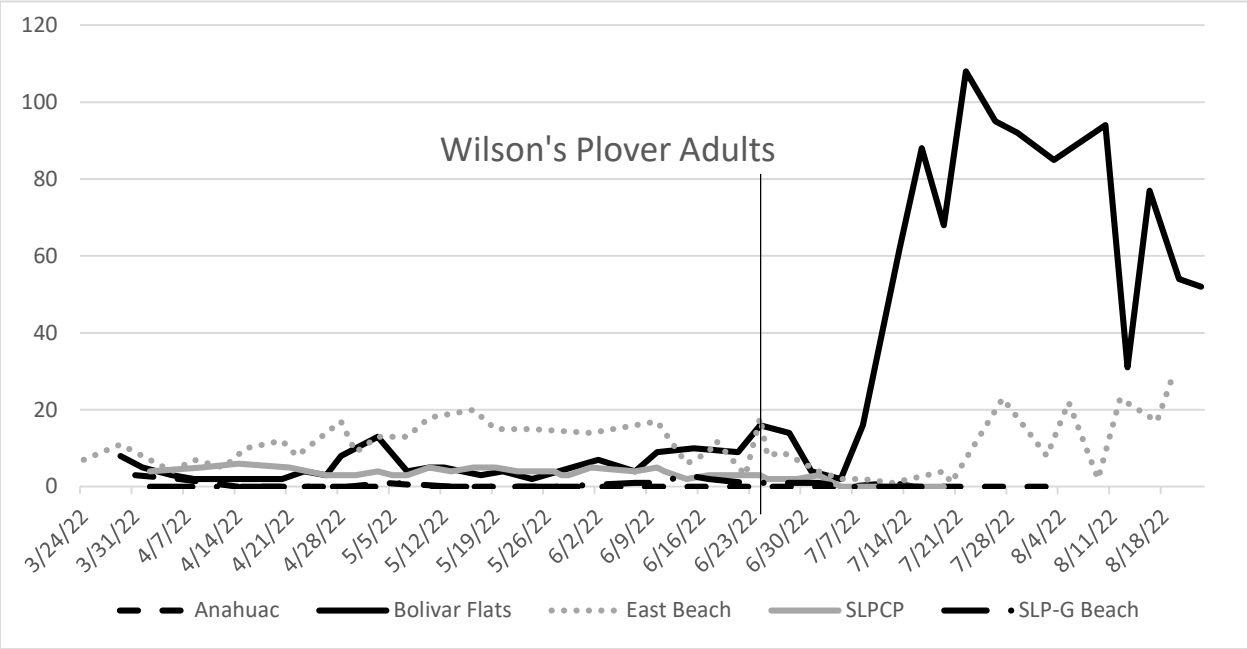


Figure 4. Survey counts of adult Wilson's Plovers at five monitoring sites (Anahuac NWR, East Beach, San Luis Pass County Park (SLPCP), and San Luis Pass-Galveston Beach (SLP-G Beach)) on the upper Texas coast from March 24 through August 23, 2022. The vertical line indicates the beginning of pre-migratory staging on June 24 at Bolivar Flats.

The first nest was found April 20 at East Beach and the last nest fate was documented on July 12 at the same site. We located and monitored 13 nests between the five sites: zero at Anahuac NWR, one at Bolivar Flats, nine at East Beach, two at SLPCP, and one at SLP-G Beach (Table 3). There was an apparent nest success (raw percentage of nests that hatched at least one egg) of 76.9% between all five sites, 0.0% at Bolivar Flats, 77.8% at East Beach Complex, 100% at SLPCP, and 100% at SLP-G Beach. This is the first successful nest hatching at SLP-G Beach since we began monitoring in 2019. The chicks unfortunately did not survive long after hatching. We only located one nest at Bolivar Flats; however, we know more pairs nested at the site based on nesting behavior and downy chicks observed within the site.

There was a lack of rain this season that allowed nests to hatch but made it hard for chicks to find food. A significant rain event on during July 4th weekend caused Wilson's Plovers to halt re-nesting attempts. The first signs of pre-migratory staging were observed on June 15 at Bolivar Flats when five birds were observed roosting together, increasing to 16 birds on June 24. We observed a roost of 60 Wilson's Plovers at Bolivar Flats on July 13.

Table 3. Wilson's Plover nest fates monitored at five monitoring sites (Anahuac NWR, Bolivar Flats, East Beach Complex, San Luis Pass County Park, and San Luis Pass-Galveston Beach (SLP-G Beach) on the upper Texas coast during the 2022 nesting season.

Nest Fates	Anahuac NWR	Bolivar Flats	East Beach Complex	San Luis Pass County Park	SLP-G Beach	Total
Hatched	0	0	7	2	1	10
Unknown	0	0	0	0	0	0
Washout	0	0	0	0	0	0
Depredated	0	1	2	0	0	3
Abandoned	0	0	0	0	0	0
Human Caused	0	0	0	0	0	0
Unknown Failure	0	0	0	0	0	0
Total	**0**	**1**	**9**	**2**	**1**	**13**

Figure 5. Two freshly fledged Wilson's Plover chicks on the shoreline on July 2, 2022 at San Luis Pass County Park in Freeport, TX. Photo by Kristen Vale.

Snowy Plover

We estimated two Snowy Plover breeding pairs at East Beach and no other monitoring site. We monitored one nest, locating it on April 20 and documenting it hatching on April 29. This is the first successful nest to hatch at East Beach since 2018. The female was an individual we banded at East Beach in 2018 as a breeding adult. The chicks were only observed on April 30 and were not seen again. There

was evidence of them hiding in the dunes during one subsequent survey but soon disappeared. The banded female was last seen at East Beach on April 30 and was observed at Bolivar Flats on August 16.

A second pair was documented, was observed nest scraping, but a nest was never found. The female soon left and the male was seen defending the territory alone the remainder of the breeding season.

Figure 6. Snowy Plover adult brooding three freshly hatched chicks, with one behind the adult (red circle) on April 30, 2022 at East Beach in Galveston, TX. Photo by Kristen Vale.

Least Tern

We estimated 32 Least Tern breeding pairs between the five sites, with seven at Anahuac NWR, 65 Bolivar Flats, 50 at East Beach Complex, and zero at SLPCP and SLP-G Beach (Table 2). These are the peak counts of breeding birds recorded per site. Average Least Tern adult counts during the breeding season were 11 adults at Anahuac NWR, 137 adults at Bolivar Flats, 60 adults at East Beach, and zero at SLPCP and SLP-G Beach. Three chicks fledged from Anahuac NWR. We estimated four chicks fledged from Anahuac NWR, nine from Bolivar Flats, one from East Beach, and zero from SLPCP and SLP-G Beach.

High Island had a max of 14 Least Tern breeding pairs and at least four fledged chicks. Least Terns nesting activity was only active at Rollover Pass from April 27 – June 3. We documented three breeding pairs and no fledged chicks. One downy chick was observed on June 3 but not seen again during subsequent surveys. All breeding activity at Rollover Pass ceased after June 3.

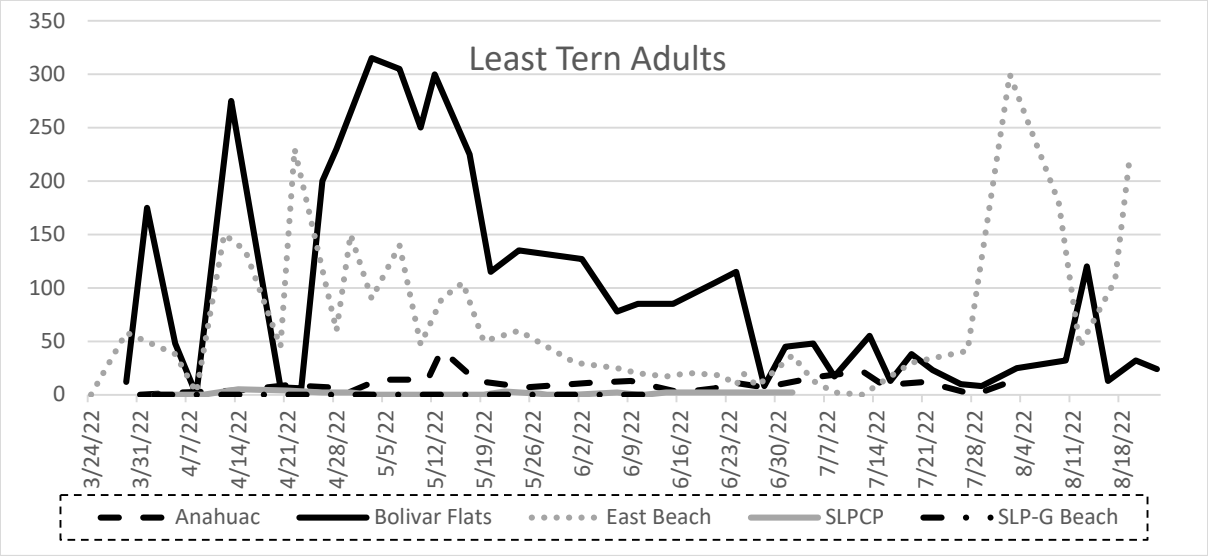


Figure 7. Survey counts of adult Least Terns at five monitoring sites (Anahuac NWR, Bolivar Flats, East Beach, San Luis Pass County Park (SLPCP), and San Luis Pass-Galveston Beach (SLP-G Beach)) on the upper Texas coast from March 24 through August 23, 2022.

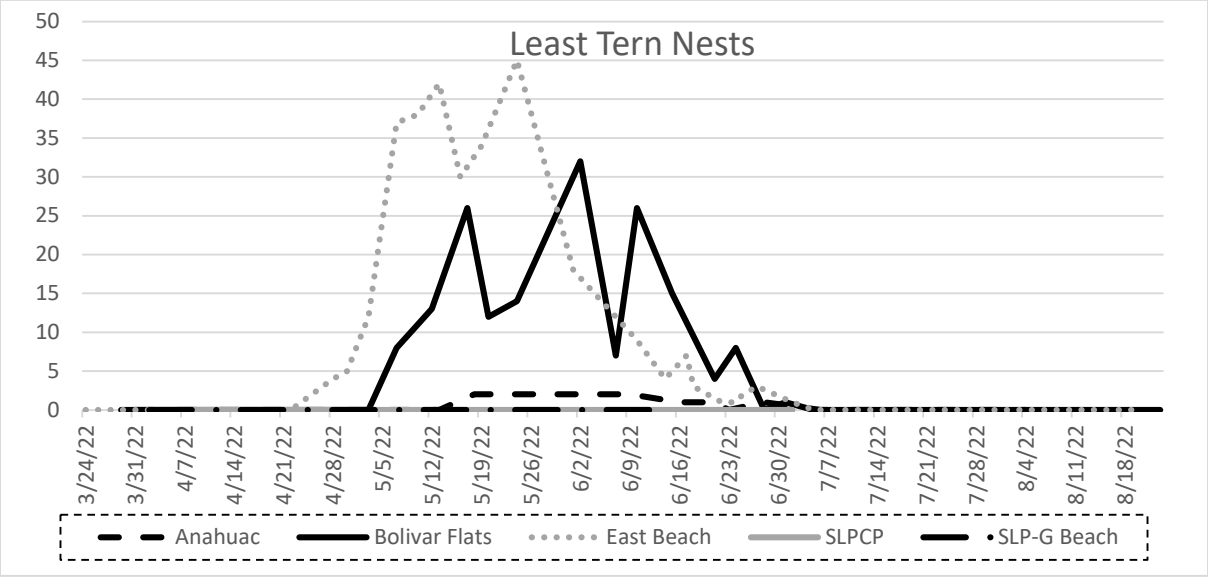


Figure 8. Counts of active Least Tern nests at five monitoring sites (Anahuac NWR, Bolivar Flats, East Beach, San Luis Pass County Park (SLPCP), and San Luis Pass County Park (SLP-G Beach)) on the upper Texas coast during the 2022 breeding season.

Figure 9. Least Tern incubating nest at East Beach in Galveston, TX. Photo by Kristen Vale.

Black Skimmer (and other colonial nesting species)

No monitoring site supported nesting Black Skimmers this season. The first immature (hatch year) birds were observed on August 4 at Rollover Pass.

Non-focal Solitary Nesting Species

We did not explicitly monitor any nests of non-focal species, though we did take note of all species attempting to breed within each study site. Three to four pairs of Common Nighthawks nested within Bolivar Flats, and approximately three pairs at East Beach. Two broods of Horned Larks were encountered at Bolivar Flats, and approximately four breeding pairs were observed at East Beach, as well as a few fledged chicks. Willets were another regular non-focal species found breeding within the Bolivar Peninsula sites, East Beach, and both San Luis Pass sites. Willets and Killdeer chicks were documented in the west parking lot of East Beach, likely fledging two chicks each (Figure 10). We also saw a brood of Clapper Rail chicks feeding along the tidal creek shoreline protected within the fenced habitat.

As many as two pairs of Gull-billed Terns also bred within Bolivar Flats. Adults were observed provisioning two recently fledged young along Rettilon Road at Bolivar Flats in late June. It is believed these same adults were responsible for the predation observed at East Beach by Gull-billed Terns on recently hatched Least Tern and Wilson's Plover chicks throughout the season.

Figure 10. Willet chick (left) and Killdeer chicks (right) that fledged in the west parking lot of East Beach in Galveston, TX. Photo by Kristen Vale.

Disturbances

We recorded disturbances when something traveled close enough to the target species to disrupt ordinary behavior. Fresh predator tracks within 50 yards of known nesting habitat were considered disturbances in addition to sightings. The most common source of disturbance across our four sites were grackles, Laughing Gulls, humans, and vehicles (Table 4). Grackles continue to be an increasing source of disturbance and are becoming prominent throughout our sites. One new increased threat this season came from Gull-billed Terns at East Beach. We regularly observed them flying low and hunting over the nesting habitat at East Beach, and twice we observed them predating a Least Tern chick. Many downy chicks disappeared soon after hatching and we suspect Gull-billed Terns contributed to this loss. We confirmed at least two Gull-billed Tern pairs nested at Bolivar Flats and fledged two chicks. We proceeded with extra caution while monitoring throughout the nesting habitat to make sure we didn't increase predation risk to the nesting birds.

Vehicle disturbance was an issue at multiple monitoring sites. Tracks were observed through and around the shifting bollards and accreting beach at Bolivar Flats, and a few times beachgoers cut the cables to allow their vehicles to drive into the sanctuary where vehicles are prohibited. Houston Audubon management is aware of this issue and working on their permit to restore and add more bollards to protect the habitat for all birds. A similar issue is happening at SLP-G Beach, where the beach is accreting and vehicles are able to drive around the sunken bollards and into the no driving section of the beach. Park staff try to keep up with telling vehicles to move to the designated parking areas but sometimes they miss vehicles and it increases the threat and disturbance to eggs or chicks that may be outside of the fencing.

Vehicle disturbance at SLP-G Beach decreased this season compared to previous years. Although we did not survey this site as frequently as other sites, the amount of vehicle tracks was less wide-spread and less destructive as in past years. One reason for this may be the dunes were thicker and softer this season for the lack of rain, making it harder for vehicles to enter the beach without getting stuck, therefore reducing the amount of vehicles adjacent to the site. This allowed dunes to revegetate and heal from past vehicle disturbances and even grow in areas. However, there was a noticeable increase of vehicle disturbance in the habitat during holiday weekends.

Table 4. Types and number of disturbance occurrences observed within the nesting habitat at Anahuac NWR, East Beach Complex, San Luis Pass County Park (SLPCP), and San Luis Pass-Galveston Beach (SLP-Galv) in Texas during the 2022 breeding season.

	Anahuac NWR		Bolivar Flats		East Beach		SLPCP		SLP-Galv	
Predator Disturbance	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**
Grackle	53		61		117		40		29	
Laughing Gull	2		11		202		11		51	
Coyote				8	1	21		6	1	3
Gull-billed Tern			9		27		1			
Tern Sp.					11					
Night Heron			7		22				2	
Crested Caracara			1		17					
Ghost Crab					5		12			1
Loggerhead Shrike					5		6			
Ruddy Turnstone					5		4			
Great Blue Heron					3		5			
Bird of Prey			1		2					
Rat					1					
Snake						1				
Human Disturbance	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**
Human	13	8	11	4	21	15	6	2		2
Vehicle	39			6	26	3	14	7	7	8
ATV/Golf Cart					1		23			
Helicopter Tour					31					
Helicopter Other			2							
Paraglider					2				7	
Banner Plane					4					
Airplane					1					
Horse Tour					45	1				
Dogs unleashed			1		24	1	2			
Dogs leashed			2		1	1				
Cat										
Abandoned Kite					3					
Balloon	2		22		11		1			

Vehicle disturbance was also a common issue at Anahuac NWR. The beach is equally as narrow and eroded as last year from past storm damage that connected the beach to the road. This allowed for vehicles to enter the beach wherever they want versus at designated beach access points. This will continue to limit the amount of beach-nesting birds at the site and be a serious threat to the birds until the beach is renourished. We have been informed by the U.S. Fish & Wildlife Service that there is a request to renourish the beach and consultations are in the works.

We resolved two disturbance issues early in the breeding season at East Beach and SLP-G Beach. The first being when the Galveston Park Board Coastal Zone Management team deposited sections of driftwood directly adjacent to a section of protective fencing at East Beach (Figure 11). We immediately reached out to management and ask they halt this activity and work together at finding another location that won't impact the nesting habitat. Management immediately stopped and we worked towards a solution. The logs create perches for avian predators and reduces habitat quality for the nesting birds. The public also started making large teepees with the wood and we tore them down immediately.

The second disturbance was at SLP-G Beach when a beachgoer installed two flag poles surrounded by solar lighting, as well as lighting and yellow caution tape attached to our protective signage (Figure 12). We reached out to the land owner to inform them of the issue and to determine the source. They were not aware of the flags and gave us permission to remove everything. The combination of the flapping from the flags and caution tape and new lighting create a constant disturbance in an area of the site where Wilson's Plover regularly nest.

Figure 11. Driftwood placed directly in front of the symbolic fencing at East Beach by the Galveston Park Board coastal zone staff (left) and a teepee created by beachgoers (right). Photo by Kristen Vale.

Figure 12. Two American flags, solar lighting, and yellow caution tape were installed by a beachgoer within the nesting habitat at San Luis Pass-Galveston Beach. With permission from the landowner, ABC and HAS removed the material. Photo by Kristen Vale.

The beginning of the nesting season we documented beachgoers using the bathroom within the fenced nesting habitat at East Beach. We addressed this issue with East Beach management and asked if they can install a port-o-john in the jetty parking lot adjacent to the disturbances, and they did within one week. This immediately stopped the issue and provided an extra service for customers paying to enter the beach park.

Documented disturbances at our opportunistic monitoring site at Rollover Pass include grackles, one set of coyote and cat tracks, and humans and vehicles and their tracks. Disturbances at High Island include vehicles and grackles.

Banding Efforts and Resights

Two Wilson's Plovers were banded this season, both at SLPCP on June 29th. The pervasive presence of nest-predators and high anthropogenic disturbance across all sites meant that monitoring and stewardship activities were prioritized over attempting to band more individuals. Low nesting success overall made for few opportunities to reliably capture unmarked birds.

Current return rates for Snowy Plovers include zero adults (0%) banded in 2020, one of one adults (100%) banded in 2018 and one of 6 chicks (16.7%) banded in 2018, zero adults (n=1) or chicks (n=2) banded in 2017, and zero adults (n=4) banded in 2015. No Snowy Plovers were banded in 2014, 2016, 2019, 2021, or 2022.

While most nests were either hatched or predated by early July (with little renesting effort after mid-June), this allowed for a concerted effort be made to resight banded post-breeding Wilson's Plovers. The first large congregations of plovers (ca. 65) were observed at Bolivar Flats on July 13th. Average counts typically ranged from about 75 to 95 individuals for the next month, with a high count of 108 on July 22nd. Within the large group of birds, a total of nine unique marked individuals were detected for a total of 22 encounters.

OUTREACH

Relaxed public health restrictions allowed for a greater outreach effort as compared to 2020 and 2021. ABC and HAS representatives were able to attend several outdoor public outreach events this season, both as a joint table and singly. Having a seasonal HAS field technician this year also allowed for a greater stewardship effort at sites on the Bolivar Peninsula as compared to the 2021 season. We started the season off by giving a wildlife training to Galveston Park Board and Galveston County coastal zone staff on February 18 at East Beach. We informed the staff of the beach-nesting bird and groups of roosting and foraging birds they may encounter while working on the beach. In partnership with SPLASh, we had a pre-nesting season and post-nesting season trash cleanup within the nesting habitat to help provide clean and safe habitat for nesting, foraging, and roosting birds. We collected a total of 85 pounds and 52.6 pounds of trash during each cleanup.

We tabled at annual events as in years past, such as Wings Over Surfside in Surfside, World Oceans Day at East Beach in Galveston, and Bay Day in Kemah. We tabled at three new events this season, including UTMB Earth Day in Galveston, FeatherFest in Galveston, and Galveston's Own Farmers Market. A local partner, Turtle Island Restoration Network, invited us on three field trips to educate high school students and professionals about beach-nesting birds and issues they face. We also partnered with Audubon Texas and provided a lesson for their Audubon's Conservation Leaders Program for Young Women at East Beach.

We received help from 22 volunteers who put in a total of 69.5 hours to assist us in stewardship and cleanup activities.

Table 5. The number of people reached per education function in various locations along the upper Texas Gulf coast during the 2021 breeding season.

Event, Presentation, Meeting	Location	Activity	Date	People Reached
Wildlife Training	East Beach	ABC gave training to Galveston Park Board and Galveston County staff on birds they may encounter on the beach	February 18	50
Pre-nesting Cleanup	East Beach	Cleanup to have a clean beach for the beach-nesting birds	February 23	5
Galveston County Audubon Group monthly presentation & field trip	Rosenberg Library & Bolivar Flats	Presentation to GCAG about the Beach-nesting Bird Program and a field trip to Bolivar Flats	March 24 March 26	20
Science Environmental Journalism Conference	Galveston Island SP	Field Trip for Science & Environmental Journalists describing problems facing beach-nesting birds (and Sea Turtles)	March 31	34
Wings Over Surfside Birding Festival	Surfside Bird & Butterfly Trail	Beach-nesting bird education table. GCBO also present	April 9	29
Galveston's Own Farmers Market	Galveston's Own Farmers Market	Joint table with GINTC explaining beach-nesting bird program and other City of Galveston bird initiatives	April 10	53

Clear Creek ISD AP Science Class		East Beach		Field Trip with Turtle Island Restoration Network, teach students about birds, turtles, and plastic pollution		April 14		62
UT Medical Branch Earth Day Event		UT Medical Branch		Earth Day event		April 15		87
Salty Easter Bash		East Beach		Beach-nesting birds outreach table		April 16		65
FeatherFest Bird Festival		Moody Gardens		Beach-nesting birds outreach table		April 21 – 23		78
Alvin ISD AP Environmental Science Class		East Beach		Field Trip with Turtle Island Restoration Network, teach students about birds, turtles, and plastic pollution		April 26		26
Event, Presentation, Meeting		**Location**		**Activity**		**Date**		**People Reached**
Galveston Bay Day		Kemah Boardwalk		Beach-nesting birds outreach table		May 14		114
Jones Academy Career Day		Zoom		Career Day for Elementary Class		May 17		130
World Oceans Day		East Beach		Beach-nesting birds outreach table		June 4		111
Audubon's Conservation Leaders		East Beach		Field trips with students, teach about birds and plastic pollution		July 13		5
Women In Coastal Science		East Beach		Galveston Park Board interviewed ABC's Kristen Vale		July 22		17
Master Naturalist Monthly Meeting		Carbide Park		Beach-nesting bird presentation		August 4		40
Post-nesting Cleanup		East Beach		Cleanup to have a clean beach for nonbreeding birds		Sept.22		10
On-site Stewardship		East Beach & Bolivar Flats		Share information about target species, reducing disturbance to birds, and assist in identifying		All Season		276
Opportunistic Outreach		All Sites		Outreach conducted opportunistically during monitoring		All Season		70
						TOTAL		**1282**

Figure 13. HAS's Wyatt Egelhoff and ABC's Kristen Vale table at World Oceans Day at East Beach on June 4, 2022. Photo by Kristen Vale.

Figure 14. HAS's Wyatt Egelhoff engages with a family at Bay Day in Kemah, TX on May 14, 2022. Photo by Galveston Bay Foundation.

Figure 15. Master Naturalist stewardship volunteers engage with a beachgoer and show them birds incubating nests through the spotting scope at East Beach. Photo by Kristen Vale.

Figure 16. ABC's Richard Gibbons point out birds to field trip participants of the Science Environmental Journalism Conference. Photo by Kristen Vale.

Figure 17. Clear Creek ISD high school students point to a mock beach-nesting bird nest during a school friend trip to East Beach in Galveston, TX on April 14, 2022. Photo by Kristen Vale.

Figure 18. ACL students looking for fake eggs at East Beach with ABC staff Kristen Vale (right). Photo taken on July 13, 2022 by Yvette Stewart.

DISCUSSION

This nesting season was significantly dry during peak nesting season, reaching near drought conditions at times. We also didn't have a significant spring high tide washout event as in years past. There were advantages and disadvantages to the lack of moisture. Some benefits were that many Wilson's Plover, Least Tern, and even a Snowy Plover pair had high nest success rates. The lack of rain also caused areas of compacted sand to dry up and become too thick to drive on, reducing the amount of vehicle disturbances and vehicle traffic at certain sites, like SLPCP and SLP-G Beach. However, the lack of rain caused reliable foraging areas to dry up for the plovers and other nesting species, causing birds to move their chicks to vulnerable areas or potentially perishing. We suspected some chicks died from starvation after we wouldn't see them on subsequent surveys during the drought, though were never able to confirm this. The loss of chicks may also attributed to predation to Gull-billed Terns, which were frequently seen hunting in the habitat and twice were observed predating Least Tern chicks.

The relatively large number of successful Least Tern and Wilson's Plover broods along the beach 1.5-2 miles east of High Island is encouraging, and the quality of this site is predicted to improve in the future given the beach renourishment activities that began in early August 2022. Accessing this site via a vehicle required high clearance and 4WD is highly recommend. However, the distance can be easily walked and lies along an established Audubon Coastal Bird Survey (ACBS) route regularly completed by HAS staff in High Island during the colder months. It would be worth continuing to monitor the breeding effort along this stretch of beach, especially as erosion and human disturbance continues to degrade the quality of the adjacent Anahuac and Rollover Pass sites, displaced birds may well use these High Island beach sites.

It is worth investigating the feasibility of capturing and banding Wilson's Plovers at sites where they are known to congregate (such as Bolivar Flats) in the post-breeding period of late-July and August. Using a swoop or canon net, it would be possible to capture many more individuals with greater efficiency than targeted capture. It would also alleviate the possibility of negatively affecting the productivity of birds within the study sites. This would not have to replace the current site-specific banding effort, but could be used to augment the number of banded individuals in the greater population and provide more information about migration timing, site use, and relative site importance.

RECOMMENDATIONS

At High Island Beach-East, we recommend continuing to do opportunistic monitoring for beach-nesting bird nesting activity. This will allow us to monitor if nesting activity will increase with the recently renourished beach and protect the nesting habitat if needed. The degradation of Anahuac NWR may drive more birds to nest at High Island.

At Anahuac NWR, we recommend refuge management to explore closing the beachfront to vehicles and making it a pedestrian beach only. The area is a historic nesting site for Least Terns and evidence on why to close the beach to vehicles is increasing. Management has supported the idea and we'd like to pursue conversations to investigate how to make it happen.

At Bolivar Flats, we recommend Houston Audubon continue to work on securing their permit to restore and increase their bollards and cables to protect the beachfront habitat from vehicles trespassing into the vehicle free zone of the sanctuary.

At East Beach, we recommend the Galveston Park Board allow us to provide training to their and Galveston County coastal zone staff during their annual wildlife training in late February or early March, like we did in 2022. It's important for us to share what birds they may be coming in contact with while maintaining the beaches. We also ask management to continue to keep the port-o-john in the jetty parking lot during the nesting season to reduce disturbance from beachgoers going to the bathroom inside the fenced nesting habitat. We also recommend they do not place driftwood around the perimeter of the nesting habitat and continue to work with us on more suitable placement areas that won't increase disturbance to nesting birds at East Beach or other areas on Galveston Island.

At San Luis Pass County Park, we recommend management restore and increase their bollards down the beach to reduce vehicles from trespassing onto the no driving section of the beach. Park staff will frequently tell people to move their vehicles to the designated parking areas, but there are times when they miss vehicles and it can cause threats to nests or chicks that may be outside of the protective fencing.

Beach-nesting Bird Monitoring at Anahuac NWR

2017 – 2022

Submitted June 12, 2022

AMERICAN BIRD CONSERVANCY

HOUSTON AUDUBON

Beach-nesting Bird Survey Area

Red line, survey area = 1.5 miles

Coordinates = approx. center

2017

Nesting

Black Skimmers

We started protection here when someone alerted to us of the nesting skimmers and Least Terns

We were later told by a local bird expert that Least Terns have historically nested here

2017

Combination of temporary signs and fencing used to protect the nesting area

Where the beach is too narrow, we just use signs and no fencing

2017

2017


POR FAVOR
COMPARTA la PLAYA
ALEJESE
de LAS AREAS
de ANIDACION de AVES
WATCH FOR
FLIGHTLESS CHICKS
PROCEED WITH
EXTREME CAUTION

2017

Black Skimmer egg believed to be predated by Grackle, a common and frequent disturbance/predator to the nesting birds at Anahuac NWR

2017

Post

Hurricane Harvey

2018

Boy Scouts, Houston Audubon, American Bird Conservancy

2018

Least Tern nest

2018

Least Tern nest between vehicle tracks

This nest, like many others, were subsequently run over

2019

Least Tern nest

2019

Vehicles bypassing Hwy 87 construction

Very disturbing to nesting Least Terns, seen flushed here. Flightless chicks in wrack line in danger

2019

2020

Wilson’s Plover incubating nest

Wilson’s Plover flightless chick

2020

Least Tern nest between vehicle tracks

This nest didn’t survive

2020

Least Tern incubating nest

2020

Post Hurricane Hanna

Sand shifting closer to concrete berm from storm surge

2020

Post Tropical Storm Cristobal

Sand pushed even closer to concrete berm

2021

Multiple storms/ high tides during 2020 hurricane season pushed sand over concrete berm.

Beach now meets the road within most of beach-nesting bird habitat

Vehicle disturbance even greater issue

2021


PLEASE
SHARE THE BEACH
STAY BACK
FROM NESTING
BIRD AREA
IF THE BIRDS ARE DISTURBED THEY WILL LEAVE THEIR NESTS. THEIR EGGS AND YOUNG WILL BE EXPOSED TO PREDATORS AND POSSIBLY DEATH.
AMERICAN BIRD CONSERVANCY

2021

2021

Least Tern incubating nest between high tide line and road

2021

Least Tern with 2 flightless chicks

2021

Wilson’s Plover brooding 2 feathered chicks

Nested outside survey area, moved into survey area once big enough

2022

Trash cleanup + nesting sign install

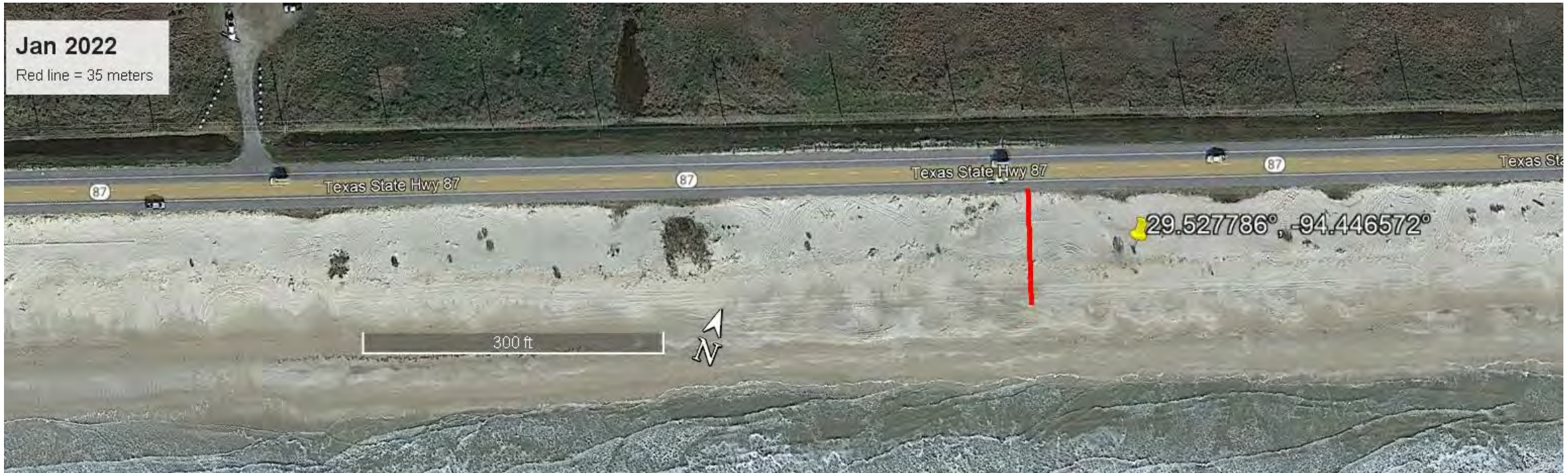
No fencing is used now, beach too narrow and too many vehicles driving off the road into the nesting habitat

Multiple storm surges pushed sand into ditch

2017

2021


Jan 2018
Red line = 35 meters
Texas State Hwy 87
87
Texas State Hwy 87
87
29.527786°, -94.446572°
300 ft
N


Jan 2022
Red line = 35 meters
87
Texas State Hwy 87
87
Texas State Hwy 87
87
29.527786°, -94.446572°
300 ft
N

Anahuac NWR

2017 – Current	
Acres Monitored	29
Acres Protected	1.5 - 4

WILSON'S PLOVER	**2017***	**2018**	**2019**	**2020**	**2021**	**2022***
# Breeding Pairs	0	3	2	3	1	0
Nest Success	-	100%	100%	50%	-	-
# Fledges	0	1	2	0	2	0

LEAST TERN	**2017***	**2018**	**2019**	**2020**	**2021**	**2022***
# Breeding Pairs	19	40	15	15	6	7
# Fledges	19	1	5	0	3	

BLACK SKIMMER	**2017***	**2018**	**2019**	**2020**	**2021**	**2022***
# Breeding Pairs	3	2	0	0	0	0
# Fledges	0	0	0	0	0	0

2017* Started monitoring late in nesting season. There may have been more breeding pairs and/or chicks than what was recorded.

2022* Preliminary data. Nesting season still active.

2022 – June 9 Update

29.527286°, -94.447380°

- Current Least Tern (LETE) nests. There are 2-4 nests within each cluster, though the more western group (right behind the start of the symbolic fencing) seemed to be faring better. A pair of Wilson's Plovers (WIPL) seemed to be looking to nest just east of the more easterly LETE cluster, though those birds moved on after the Easter Holiday and I haven't observed any WIPL there since.
- In terms of disturbance, there have been one or two especially high tide events (both within a week of each other in late April/early May) at which time the entire stretch was submerged/washed over at some point.
- Daily disturbance by folks driving on the beach is usually limited to near the surfline (though the terns still behave antagonistically and leave the nests). Weekends often see an influx of campers within the nesting area (usually between the symbolic signage). Many people drive off Hwy 87 directly into the site. Fortunately the sand has become progressively looser, so fewer people are attempting this to avoid getting stuck.
- Easter weekend saw the heaviest use of the site with a vehicle/camping set up between virtually every symbolic sign. Memorial Day weekend was significantly less busy, with only about a half-dozen vehicles in the BNB area (though traffic along the surfline was certainly higher). Last visit I observed LETE on nests, though there should be some chicks running around soon. Predator pressure seems mostly confined to Grackles and LAGU, plus any dogs brought in by beach-goers. Vehicles seem to be the most significant threat to chicks.

Conservation Recommendations

Long Term Action

- Beach Renourishment
- Change Anahuac NWR beach to a pedestrian only beach. Install bollards on either side of the property/nesting area to allow for vehicle parking and pedestrian access.
  - Restricting vehicles can also help with dune re-growth.
  - The beach has eroded so much that it's almost too narrow to drive on. Vehicles are forced to drive in the 'dunes'/vegetation in places, which has created enough disturbance to the nesting birds that many have abandoned the site.

Immediate Action

- request appropriate agency (TxDOT or Galveston County) to dig out the sand-covered ditches adjacent to the concrete berm.
  - Beach went from ~2 vehicle access points when the ditches were exposed pre-storms, to an unlimited number of access points now that the beach meets the road.

Beach-nesting Bird Demography & Public Engagement on the Texas Gulf Coast

East Beach
2022 Results

Submitted by:
Kristen Vale [1], Wyatt Egelhoff[2], and Richard E. Gibbons[1]
[1]American Bird Conservancy, [2]Houston Audubon

INTRODUCTION

American Bird Conservancy (ABC), Houston Audubon Society (HAS), and other Texas partners have implemented a Beach-nesting Bird Conservation Program along the Texas coast since 2012. Through this program, we seek to advance conservation efforts for the species Least Tern (*Sternula antillarum*) and Watch List species Wilson's Plover (*Charadrius wilsonia*, Red status), and Snowy Plover (*Charadrius nivosus,* Red status), and Black Skimmers (*Rynchops niger,* Yellow status) by implementing protective measures (i.e. signs and fencing) and public outreach at sites where these declining species occur. The goal of the program is to maintain and increase these threatened populations through conservation activities we implement on the ground.

We began monitoring East Beach in 2014, making 2022 our ninth season monitoring the site. This year we monitored 129 acres of nesting habitat and protected 56 acres with protective signs and fencing. The area monitored and protected is part of the Conservation Area the Galveston Park Board of Trustees has designated the area. We also protected approximately 1 acre in the west parking lot while active nests and chicks were on the ground. The ecosystem in the area comprises of high and low salt marsh, intertidal pools, sand and mud flats, and a growing area of coastal prairie. The combination of these habitats makes the area suitable nesting habitat for at least 10 species of ground-nesting birds, including the four beach-nesting bird species listed above, and the Willets, Common Nighthawks, Horned Larks, Clapper Rail, Killdeer, Black-necked Stilts, and Eastern Meadowlarks.

Figure 1. Area monitored (red polygon) and protected (yellow polygon) during the 2022 breeding season at East Beach in Galveston, Texas.

RESULTS

Protection, monitoring, and outreach for beach-nesting birds began on March 16, 2022 when we installed the symbolic fenced and continued through August 23 when we removed the fencing, documenting the last chick fledged. We report data here during that time.

We use a combination of signs at East Beach to help alert the area is closed and to create awareness about the important birds nesting in the area. This is our second nesting season of using the 'Area Closed; Do Not Enter' signs posted around previous pedestrian access points or around the bollard line that separates parking from the conservation area. This is also our second season the former pedestrian trail is closed that used to lead through the back side of the conservation area from the free parking lot. The 'Area Closed' signs help alert the public and significantly reduced any disturbance through the area.

Figure 2. The combination of temporary protective (top) and permanent interpretive signs (bottom) posted around the nesting habitat and conservation area at East Beach.

Table 1. Average number of adults during the core breeding season (April-July), estimated number of breeding pairs, total nests located, and max high counts for chicks observed during a single survey in the 2022 season.

Metric / Description	Wilson's Plover	Least Tern	Snowy Plover
Average # of Adults (Apr-July)	11	60	1
Estimated # of Breeding Pairs	13	50	2
Total Nests Monitored	9	0	1
# of Successful Nest Hatches	7	0	1
# of Failed Nests	2	0	0
Max # Downy Chicks	4	3	3
Max # Feathered Chicks	2	1	0
Max # Flight Capable/Fledged Chicks	3	1	0

Wilson's Plovers

We estimated 13 Wilson's Plover breeding pairs and three fledged chicks that fledged from East Beach. The first nest was found April 20 and the last nest fate was documented on July 12. We monitored nine nests and documented 77.8% nests hatching successfully. Seven hatched and two were depredated, one by a coyote and the other avian. One Wilson Plover nest was located in the west parking lot but it did not hatch.

Snowy Plovers

We estimated two Snowy Plover breeding pairs at East Beach and no other monitoring site in the region. We monitored one nest, locating it on April 20 and documenting it hatching on April 29. This is the first successful nest to hatch at East Beach since 2018. The female was an individual we banded at East Beach in 2018 as a breeding adult. The chicks were only observed on April 30 and were not seen again (Figure 3). There was evidence of them hiding in the dunes during one subsequent survey but soon disappeared. The banded female was last seen at East Beach on April 30 and was observed at Bolivar Flats on August 16.

A second pair was documented, was observed nest scraping, but a nest was never found. The female soon left and the male was seen defending the territory alone the remainder of the breeding season.

Figure 3. Snowy Plover adult brooding three freshly hatched chicks, with one behind the adult (red circle) on April 30, 2022 at East Beach in Galveston, TX. Photo by Kristen Vale.

Least Terns

We estimated 50 Least Tern breeding pairs and one fledged chick. The level of nesting activity was higher and sustained longer than last year. Many nests hatched this year but many chicks were not seen after hatching. One known cause of this is from Gull-Billed Terns hunting the chicks, and twice were seen carrying away a Least Tern chick.

Black Skimmers

We did not observe Black Skimmers attempting to nest at East Beach this season. The last time they nested at the site was in 2020 when one pair nested late in the season and their nest was soon washed out by a significant rain event.

Non-focal Ground-nesting Species

We documented Willets, Horned Larks, Common Nighthawks, Clapper Rails, Killdeer, and Eastern Meadowlarks nesting at East Beach. Willets, Killdeer successfully nested in the west parking lot and we believe fledged two chicks each.

Figure 4. Willet chick (left) and Killdeer chicks (right) that fledged in the west parking lot of East Beach in Galveston, TX. Photo by Kristen Vale.

Nest Site Disturbance

Disturbances within the nesting habitat, either those observed causing stress to the birds or tracks left in the sand, were tallied to provide an index of the types and disturbance occurrences at East Beach Complex (Table 4). We separated the disturbances into those caused by natural predators and human-influenced disturbances.

Natural disturbances, those caused by natural predators or other environmental factors, were frequently documented. Avian predators were the most significant cause of disturbance to the nesting birds. Grackles continue to be a threat and frequently hunt and disturb the birds within the nesting habitat. Grackles are attracted to humans and their trash, resulting in increased presence to the area and threat to the nesting birds. One new avian predator that caused significant harm was the Gull-billed Tern. We regularly observed them flying low and hunting over the nesting habitat at East Beach, and twice we observed them predating a Least Tern chick. Many downy chicks disappeared soon after hatching and we suspect Gull-billed Terns contributed to this loss. We confirmed at least two Gull-billed Tern pairs nested at Bolivar Flats and fledged two chicks. We proceeded with extra caution while monitoring throughout the nesting habitat to make sure we didn't increase predation risk to the nesting birds.

Table 2. Types and number of disturbance occurrences observed within the nesting habitat at East Beach, Galveston, Texas, during the 2022 breeding season.

Predator Disturbance	Observed	Tracks	Human Disturbance	Observed	Tracks
Grackle	117		Human	21	15
Laughing Gull	202		Vehicle	26	3
Coyote	1	21	ATV/Golf Cart	1	
Gull-billed Tern	27		Helicopter Tour	31	
Tern Sp.	11		Paraglider	2	
Night Heron	22		Banner Plane	4	
Crested Caracara	17		Airplane	1	
Ghost Crab	5		Horse Tour	45	1
Loggerhead Shrike	5		Dogs unleashed	24	1
Ruddy Turnstone	5		Dogs leashed	1	1
Great Blue Heron	3		Abandoned Kite	3	
Bird of Prey	2		Balloon	11	
Rat	1				
Snake		1			

Human disturbance was mostly observed around the perimeter of the fenced nesting habitat. There was one instance a vehicle drove through the symbolic fencing near the jetty parking lot and caused some disturbance within the habitat. This is fortunately an infrequent disturbance. The horse vendor and Galveston Police ride their horses along the beach shoreline more frequently on the weekends. They are not tallied each time they are observed along the shoreline, rather when they are seen as a disturbance to the nesting birds or chicks. We were able to reach out to the majority of staff and inform them about the nesting birds, fencing, and the possibility of chicks being on the shoreline and they respected posted areas.

There was an instance early in the season when the Galveston Park Board Coastal Zone Management team deposited sections of driftwood directly adjacent to a section of protective fencing at East Beach (Figure 5). We immediately reached out to management and ask they halt this activity and work together at finding another location that won't impact the nesting habitat. Management immediately stopped and we worked towards a solution. The logs create perches for avian predators and reduces habitat quality for the nesting birds. The public also started making large teepees with the wood and we tore them down immediately.

Figure 5. Driftwood placed directly in front of the symbolic fencing at East Beach by the Galveston Park Board coastal zone staff (left) and a teepee created by beachgoers (right). Photo by Kristen Vale.

Outreach

We educated 501 people at East Beach about beach-nesting birds through opportunistic public outreach to beach-goers while monitoring and nest-site stewardship, community engagement, and outreach events (Table 3). Stewardship is conducted by the HAS-ABC avian technicians and volunteer stewards. We focus our volunteer efforts more intensely at East Beach than other upper coast focal sites because the most people visit this location. We received help from 7 volunteers who put in a total of 34.5 hours to assist us in stewardship activities.

Table 6. Number of people reached through stewardship and community outreach at sites in Texas (2018).

Outreach Function	**# of People Reached**
Monitoring	14
Stewardship (including volunteers)	151
Community Engagement & Outreach Event	
Wildlife Training	50
Pre-nesting & Post-nesting Trash Cleanup	
Clear Creek & Alvin ISD AP Science Field Trip	88
Audubon's Conservation Leaders Field Trip	5
Women In Coastal Science	17
Salty Easter Bash	65
World Ocean's Day	111
TOTAL	**501**

Figure 6. Volunteers removing a stand of invasive salt cedar (left) and picking up trash (right) during our post-nesting trash cleanup at East Beach on September 22, 2022. Photos by Kristen Vale.

Figure 7. Master Naturalist stewardship volunteers engage with a beachgoer and show them birds incubating nests through the spotting scope at East Beach. Photo by Kristen Vale.

Figure 7. HAS's Wyatt Egelhoff and ABC's Kristen Vale table at World Oceans Day at East Beach on June 4, 2022. Photo by Kristen Vale.

Figure 8. Clear Creek ISD high school students point to a mock beach-nesting bird nest during a school friend trip to East Beach in Galveston, TX on April 14, 2022. Photo by Kristen Vale.

Figure 9. ACL students looking for fake eggs at East Beach with ABC staff Kristen Vale (right). Photo taken on July 13, 2022 by Yvette Stewart.

DISCUSSION

This nesting season was significantly dry during peak nesting season, reaching near drought conditions at times. We also didn't have a significant spring high tide washout event as in years past. There were benefits and cons to the lack of moisture. Some benefits were that many Wilson's Plover, Least Tern, and even a Snowy Plover pair had high nest success rates. The lack of rain also caused areas of compacted sand to dry up and become too thick to drive on, reducing the amount of vehicle disturbances and vehicle traffic at other monitoring sites. However, the lack of rain caused reliable foraging areas to dry up for the plovers and other nesting species, causing birds to move their chicks to vulnerable areas or potentially perishing. We suspected some chicks died from starvation after we wouldn't see them on subsequent surveys during the drought, though were never able to confirm this. The loss of chicks was also attributed to predation to Gull-billed Terns, which were frequently seen hunting in the habitat and twice were observed predating Least Tern chicks.

RECOMMENDATIONS

At East Beach, we recommend the Galveston Park Board allow us to provide training to their and Galveston County coastal zone staff during their annual wildlife training in late February or early March, like we did in 2022. It's important for us to share what birds they may be coming in contact with while maintaining the beaches.

We also ask management to continue to keep the port-o-john in the jetty parking lot during the nesting season to reduce disturbance from beachgoers going to the bathroom inside the fenced nesting habitat.

We also recommend they do not place driftwood around the perimeter of the nesting habitat and continue to work with us on more suitable placement areas that won't increase disturbance to nesting birds at East Beach or other areas on Galveston Island.

APPENDIX

Reproductive Metrics for Wilson's Plover, Snowy Plover, and Least Tern

2014 – 2022

Wilson's Plover

Reproductive Metric	2014	2015	2016	2017	2018	2019	2020	2021	2022
# breeding pairs	15	17	10	20	18	35	19	14	13
Apparent Nest Success	57%	24%	53%	33%	68%	31%	25%	29%	89%
# Fledges	7	6	7	3	22	16	7	3	3
Productivity (fledges/pair)	**0.46**	**0.35**	**0.70**	**0.15**	**1.22**	**0.46**	**0.37**	**0.74**	**0.23**

Snowy Plover

Reproductive Metric	2014	2015	2016	2017	2018	2019	2020	2021	2022
# breeding pairs	3	5	3	3	3	2	2	3	2
Apparent Nest Success	80%	10%	0%	40%	50%	0%	0%	0%	100%
# Fledges	3	0	1*	0	2	0	0	0	0
Productivity (fledges/pair)	**1.00**	**0.00**	**0.33**	**0.00**	**0.66**	**0.00**	**0.00**	**0.00**	**0.00**

*This nest was not found but the chick/fledge was seen at a later date.

Least Tern

Reproductive Metric	2014	2015	2016	2017	2018	2019	2020	2021	2022
# breeding pairs	63	95	62	50	39	83	40	11	50
# Fledges	24	3	7	0	2	3	0	0	1
Productivity (fledges/pair)	**0.38**	**0.03**	**0.11**	**0.00**	**0.05**	**0.04**	**0.00**	**0.00**	**0.02**

Black Skimmer

Reproductive Metric	2014	2015	2016	2017	2018	2019	2020	2021	2022
# breeding pairs	0	0	0	0	1	0	1	0	0
# Fledges	0	0	0	0	0	0	0	0	0
Productivity (fledges/pair)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Texas Breeding Seabird and Shorebird Monitoring and Stewardship Project

August 25, 2022

First adult Wilson's Plover male (T6) to receive a light-level geolocator at Sargent Beach, TX. (Photo taken on May 3, 2022 by Susan Heath)

Submitted by:
Taylor Bennett and Susan Heath
Gulf Coast Bird Observatory
Funded by Texas General Land Office (Grant #22-045-001-D077)
and American Bird Conservancy (Grant #21122A)

SITES

Table 1. Acres monitored and protected for the upper and central Texas coast during the 2022 breeding season.

Site Name	Acres Monitored	Acres Protected	Habitat Description	Survey Frequency	# of Surveys
Matagorda Beach: Colorado River Mouth Flats (CRMF)	15	15	Sand/algal flat	Twice Weekly	17
Matagorda Beach: Mat Pen	200	0	Beach	Twice Weekly	21
Matagorda Beach: Three-mile cut	49	21	Mud flat	Twice Weekly	18
Matagorda Beach: Dunes Dr.	1	1	Mud/gravel	Twice Weekly	16
Sargent Beach: East	118	14	Beach	Weekly	18
Sargent Beach: West	55.6	0	Beach	Weekly	17
DOW Chemical Plant A	5.4	5.4	Oyster shell/limestone	Weekly	12

Figure 1. Map of Matagorda Beach survey sites on the upper Texas coast (2022). Gulf Coast Bird Observatory surveyed the western 18 km of Matagorda Beach, Texas (2022). CRMF = Colorado River Mouth Flats.

Figure 2. Map of Sargent Beach survey sites on the upper Texas Coast (2022). The site is divided into two areas: Sargent East and Sargent West. Sargent Beach is located in Sargent, TX.

Figure 3. Map of the Dow Chemical Plant A where Gulf Coast Bird Observatory monitors Black Skimmer, Gull-billed Tern, and Least Tern colonies on the upper Texas coast near Freeport (2022).

Posting Sites

Gulf Coast Bird Observatory (GCBO) posted 70 signs around Wilson's Plover and Least Tern habitat. We posted 48 signs on Matagorda Beach and 22 signs on Sargent Beach. The majority of Wilson's Plover nested within the signs at Matagorda Beach with the exception of those that nested along Matagorda Peninsula. The majority of the Wilson's Plover and Least Tern nested within the signs at Sargent Beach as well. We do not post along the beach because the nests are singly located and we do not want to provide predator cues to them.

Figure 4. (Left photo) GCBO interns, Adam Trujillo and Kenlynn Volz, switching out the signs at CRMF on Matagorda Beach, TX on March 28, 2022. (Right photo) Newly posted signs and symbolic fencing at the east end of Sargent Beach on May 27, 2022. (Both photos taken by Taylor Bennett)

RESULTS

The estimated number of pairs observed across all sites was 58 Wilson's Plover, 0 Snowy Plover, and 102 Least Tern (Table 2). The total number of nests located across all sites was 43 Wilson's Plover, 0 Snowy Plover, and approximately 591 Least Tern. We also monitored 15 mystery broods which were pairs with chicks for which we did not find a nest.

Table 2. Average number of adults during the core breeding season (April-June), estimated number of breeding pairs, total nests/broods monitored, number of successful nest hatches, number of failed nests, and max high counts for downy, feathered and flight capable chicks observed during a single survey and total number of broods, chicks, and flight capable chicks observed during the entire 2022 season. WIPL=Wilson's Plover, SNPL=Snowy Plover, LETE=Least Tern

Metric / Description	**Matagorda Beach**			**Sargent Beach**			**Total**		
	WIPL	SNPL	LETE	WIPL	SNPL	LETE	WIPL	SNPL	LETE
Average # of Adults (April-June)	4.3	0	6.3	10.6	0	73.3	6.03	0	25.4
Estimated # of Breeding Pairs	23	0	39	35	0	163	58	0	202
Total Nests	18	0	91	25	0	431	43	0	522
# of Successful Nest Hatches	7	0	36	12	0	125	19	0	161
# of Failed Nests	11	0	55	13	0	306	24	0	361
# of Mystery Broods	5	0	0	10	0	0	15	0	0
Max # of Downy Chicks	5	0	4	8	0	6	8	0	6
Max # of Feathered Chicks	3	0	1	4	0	6	4	0	6
Max # of Flight Capable/Fledged Chicks	1	0	10	2	0	21	2	0	21
Total # of Chicks	20	0	36	43	0	125	63	0	161

Metric / Description	Matagorda Beach			Sargent Beach			Total		
	WIPL	SNPL	LETE	WIPL	SNPL	LETE	WIPL	SNPL	LETE
Total # of Flight Capable/Fledged Chicks	7	0	16	16	0	65	23	0	81

Figure 5. Least Tern parent taking care of its brood of two chicks at Sargent Beach, TX. (Photo taken on June 3, 2022 by Taylor Bennett)

Figure 6. Newly banded adult female Wilson's Plover (T7) with her brood of two newly banded chicks. (Photo taken on May 17, 2022 by Susan Heath)

Wilson's Plover

We estimated 58 Wilson's Plover breeding pairs between our six sites with 23 breeding pairs at Matagorda Beach (7 CRMF, 11 Mat Pen, 4 Three-mi cut, and 1 Dunes Dr.) and 35 breeding pairs at Sargent Beach (14 Sargent East and 21 Sargent West). We believe pre-migratory staging began 27 July when the majority of the chicks had already fledged and we noticed an increase in the number of adults.

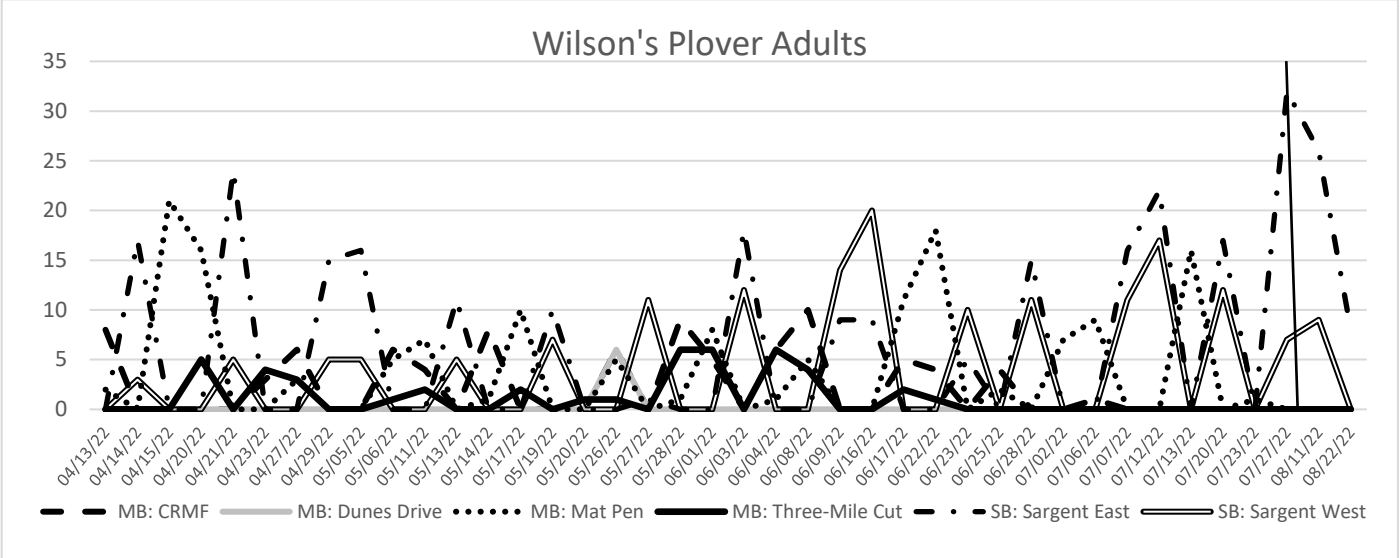


Figure 7. Survey counts of adult Wilson's Plover at Matagorda Beach (Colorado River Mouth Flats/CRMF, Dunes Dr., Matagorda Peninsula/Mat Pen, and Three-mi cut) and Sargent Beach (Sargent East and Sargent West) in Texas from April 13 -August 22, 2022. The vertical line indicates the beginning of pre-migratory staging on July 27, 2022. MB=Matagorda Beach; SB= Sargent Beach.

We found the first Wilson's Plover nest on April 15, 2022 along Matagorda Peninsula at Matagorda Beach. We found the last nest on June 28, 2022 at Sargent Beach (Figure 8).

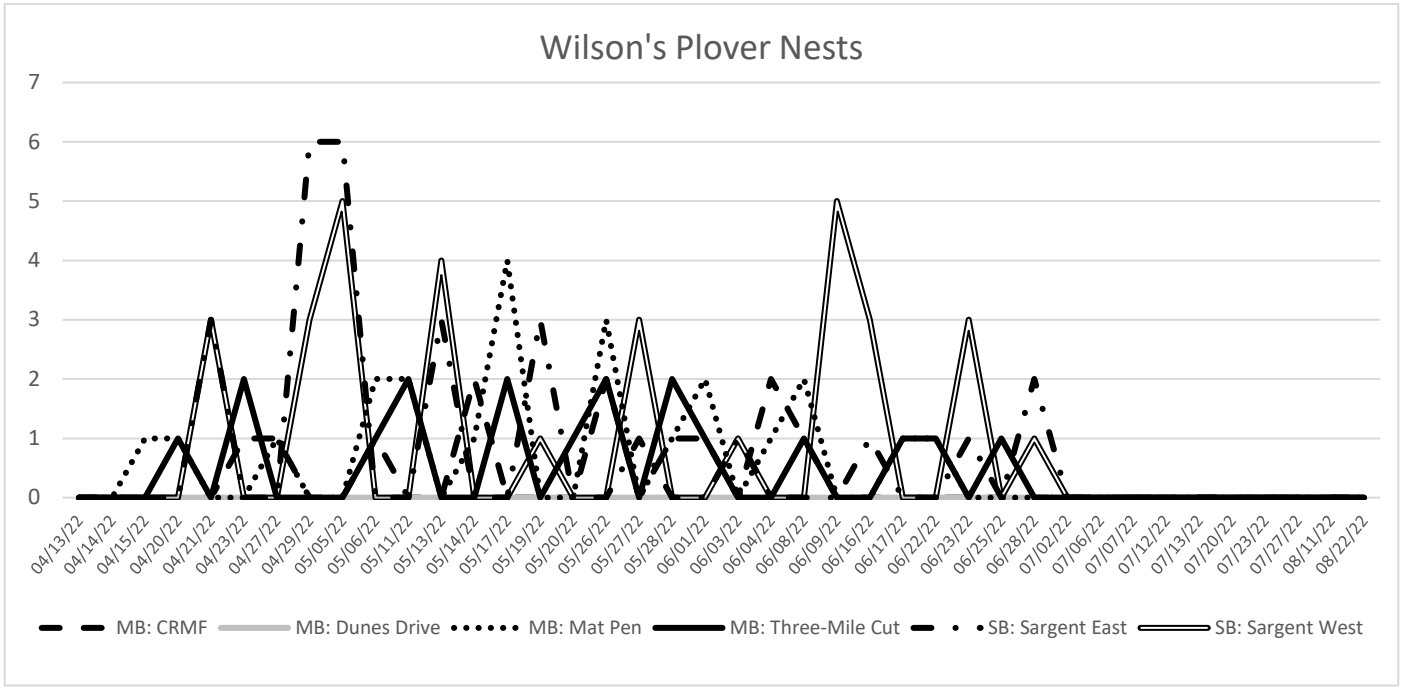


Figure 8. Survey counts of active Wilson's Plover nests at Matagorda Beach (Colorado River Mouth Flats/CRMF, Dunes Dr., Matagorda Peninsula/Mat Pen, and Three-mile Cut) and Sargent Beach (Sargent East and Sargent West) during the 2022 breeding season. MB=Matagorda Beach; SB= Sargent Beach.

We monitored 18 Wilson's Plover nests and 5 mystery broods between the four sites at Matagorda Beach. There were 4 nests and 1 mystery brood at CRMF, 9 nests and 3 mystery broods on Mat Pen, 5 nests at Three-mile Cut, and 1 mystery brood at Dunes Dr. This resulted in a total of 20 chicks for Matagorda Beach. We monitored 25 Wilson's Plover nests and 10 mystery broods between the two sites at Sargent Beach. There were 11 nests and 3 mystery broods at Sargent East and 14 nests and 7 mystery broods at Sargent West. This resulted in a total of 43 chicks observed for Sargent Beach. A total of 63 chicks were observed between Matagorda and Sargent Beach. There was an apparent nest success (raw percentage of nests that hatched at least one egg) of 38.8% between all four sites at Matagorda Beach (25% CRMF, 33.3% Mat Pen, 40% Three-mile Cut, and 0% Dunes Dr.) and 48% hatched at Sargent Beach (36.3% Sargent East and 57.1% Sargent West). Of the 24 nest failures: 10 were human caused, 7 were unknown cause, 4 were depredated, 2 were washed out, and 1 was abandoned. Most of the failures due to human cause were because of dogs. We observed multiple dogs off leash throughout the season especially on the west side of Sargent Beach. There are no signs or rules suggesting that dogs need to be leashed. We declared nest fates unknown when we were unsure exactly what had happened due to lack of evidence (Table 3).

Table 3. Wilson's Plover nest fates monitored at Matagorda Beach (CRMF, Matagorda Peninsula, and Three-mile Cut) and Sargent Beach (Sargent East and Sargent West) Texas, during the 2022 nesting season.

Nest Fates	MB: CRMF	MB: Mat Pen	MB: Three-mile Cut	SB: Sargent East	SB: Sargent West	Total
Hatched	1	4	2	4	8	19
Unknown	1	2	0	3	1	7
Washout	0	0	0	1	1	2
Depredated	0	1	1	2	0	4
Ghost Crab	*0*	*1*	*1*	*2*	*0*	-
Abandoned	0	0	1	0	0	1
Human Caused	2	2	1	1	4	10
Total	**4**	**9**	**5**	**11**	**14**	**43**

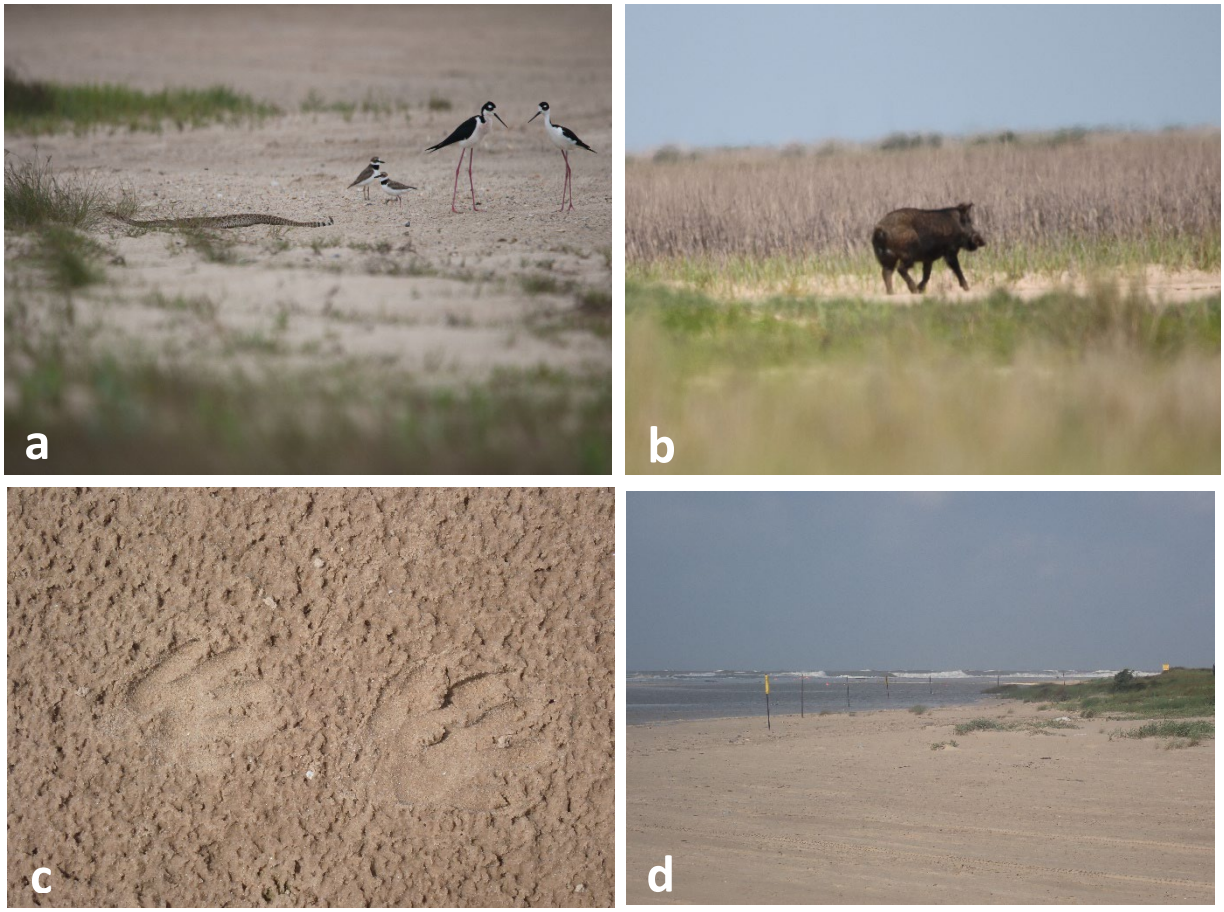


Figure 9. Natural disturbances observed at Matagorda and Sargent Beach. (a) Pair of Black-necked Stilts and two adult male Wilson's Plover defending their nesting territory against a diamondback rattlesnake at Three-mile Cut on Matagorda Beach. (b) Feral hog spotted running through Wilson's Plover and Least Tern nesting habitat at Sargent Beach. (c) Raccoon prints found near a failed Wilson's Plover nest at Sargent Beach. (d) High tide going past our signs at CRMF on Matagorda Beach. (All photos taken by Taylor Bennett)

We estimated that 23 out of 63 chicks fledged at Matagorda Beach and Sargent Beach. For Matagorda Beach, 7 out of 20 chicks fledged and only 2 were banded. We estimated that 16 out of 43 chicks fledged at Sargent Beach and only 4 were banded.

Figure 10. GCBO intern, Kenlynn Volz, Taylor Bennett, and Susan Heath taking a celebratory photo with the last Wilson's Plover adult (A8) to receive a light-level geolocator on Sargent Beach. (Photo taken on May 30, 2022 by Susan Heath)

Figure 11. The last fledged chick of Matagorda Beach. (Photo taken on July 6, 2022)

Least Tern

We estimated 202 Least Tern breeding pairs between Matagorda Beach (31 Mat Pen and 8 Dunes Dr.) and Sargent Beach (63 Sargent East and 100 Sargent West). We didn't observe any nests at Three-mile Cut this season. We observed a maximum of 326 adults (126 Sargent East and 200 Sargent West) and 66 nests (35 Sargent East and 31 Sargent West) on Sargent Beach and 79 adults (62 Ma Pen and 17 Dunes Dr.) with 16 nests (8 Mat Pen and 8 Dunes Dr.) on Matagorda Beach.

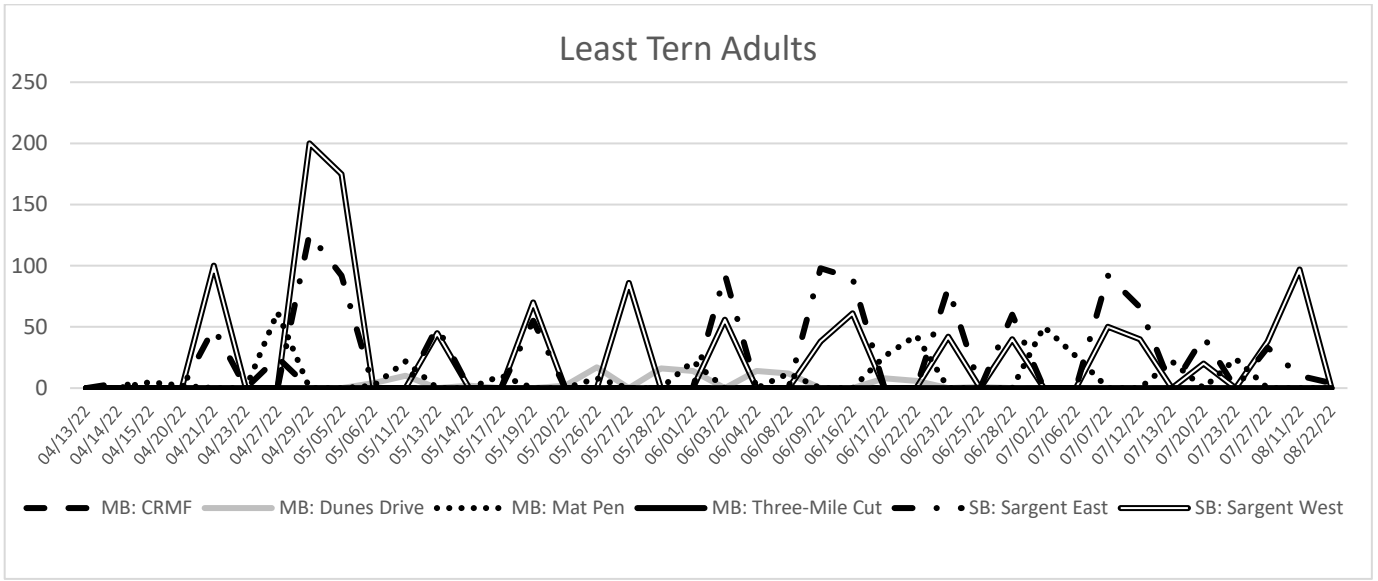


Figure 12. Survey counts of adult Least Terns at Matagorda Beach (CRMF, Dunes Dr., Mat Pen, and Three-mile Cut) and Sargent Beach (Sargent East and Sargent West) in Texas from April 13 to August 22, 2022.

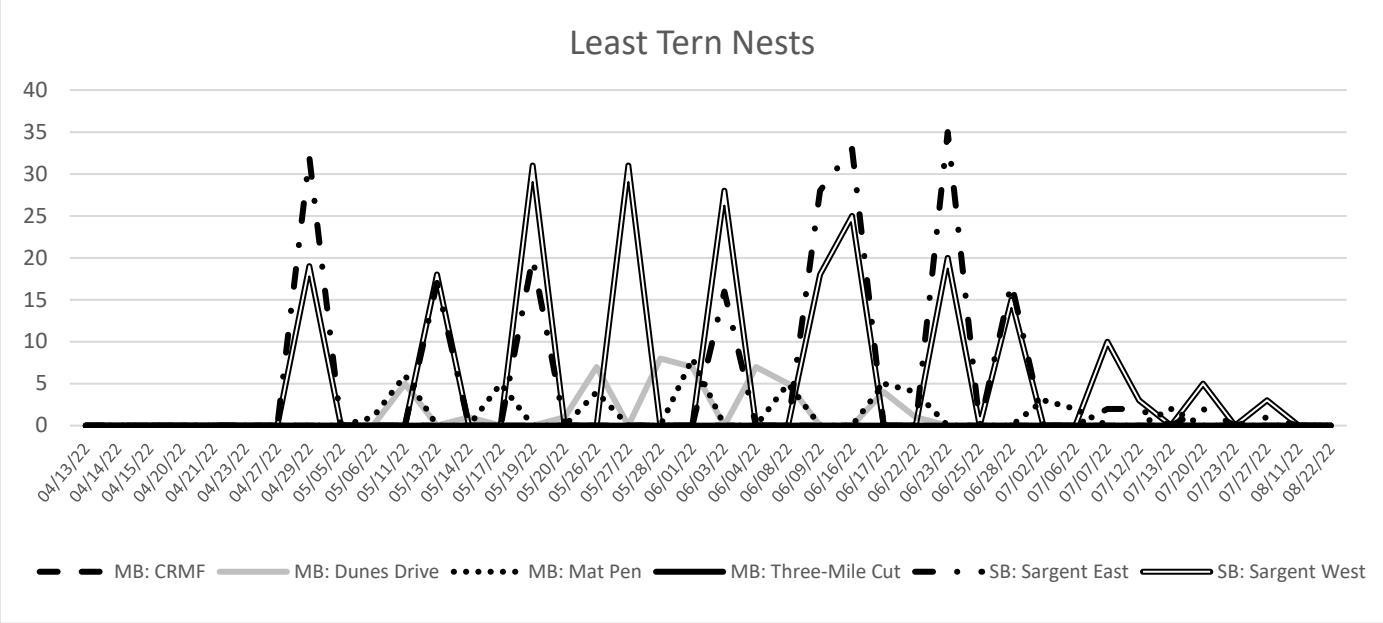


Figure 13. Survey counts of Least Tern nests at Matagorda Beach (CRMF, Dunes Dr., Mat Pen, and Three-mile Cut) and Sargent Beach (Sargent East and Sargent West) in Texas from April 13 to August 22, 2022.

The Least Terns are no longer nesting at Dow Chemical Plant A.

Black Skimmer (and other colonial nesting species)

This year we regained access to Dow Chemical Plant A Freeport, TX. The Black Skimmers arrived the first week of May with a first count of 1307 adults. The max number of adults observed was 1,822 with a max number of 415 nests (Figure 17). The end of August marked the end of the breeding season when the last few chicks fledged. There were a few issues with the electric fence, but that didn't appear to affect the colony as most of the issues occurred when the majority of chicks were already hatched or fledged. There was only one instance of flooding; luckily, it was near the end of the season when a majority of the chicks had already fledged.

The maximum number of chicks observed this breeding season was 801 (Figure 14 and 15). Feathered chicks (three to four weeks old) were used as a proxy for fledged chicks as was done in previous years and we calculated productivity as follows:

$$\frac{\text{Peak \# feathered chicks + \# of feathered chicks 14 days before and after peak}}{\text{Peak \# nests}}$$

$$\frac{\text{363 (July 8, 2022) + 0 (June 20, 2022) + 517 (July 22, 2022)}}{\text{415 (May 31, 2022)}} =$$

880 feathered chicks/415 nests = 2.12 or 212% productivity

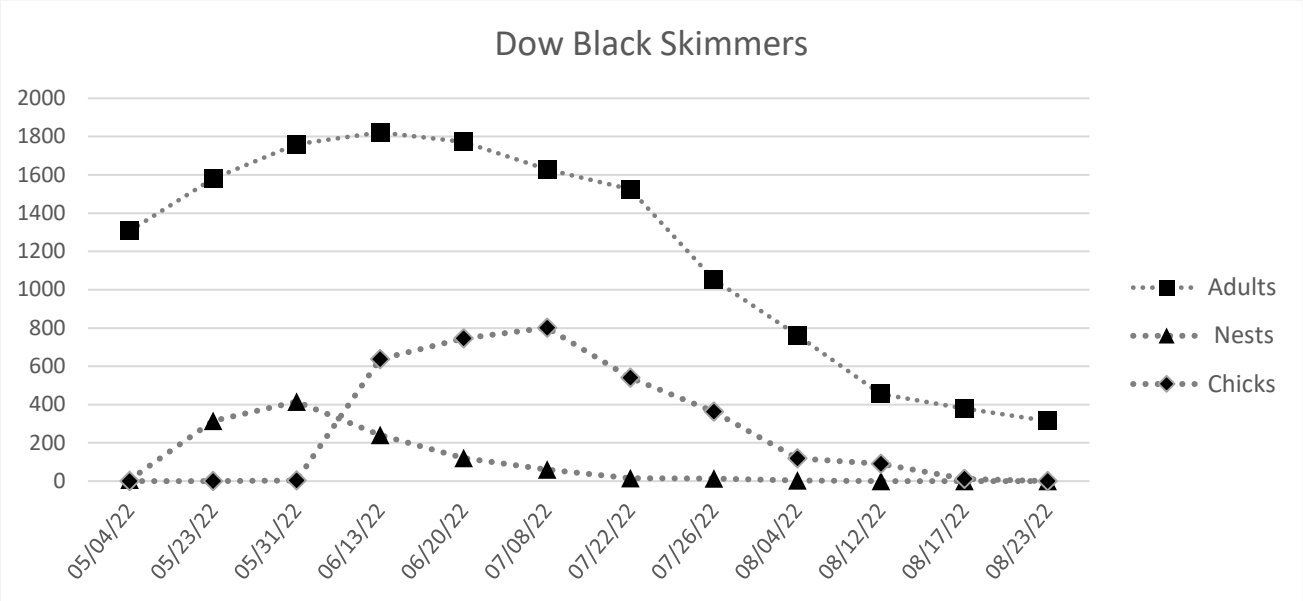


Figure 14. Black Skimmer adults at Dow Chemical Company, Plant A "Black Skimmer Colony", Freeport, Texas May 4 to August 23, 2022.

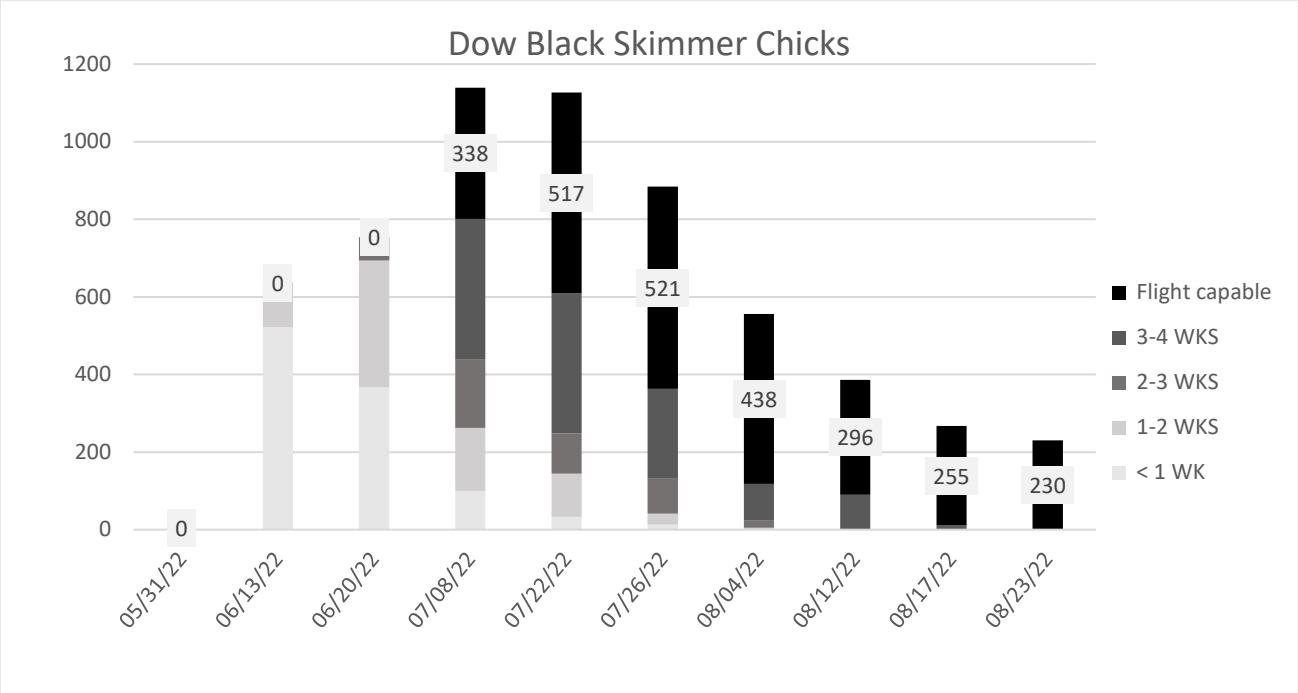


Figure 15. Number and age class distribution of Black Skimmer chicks from May 31 to August 23, 2022 at the Dow Chemical Company, Plant A in Freeport, Texas.

Figure 16. Dow Black Skimmer adults and chicks at Dow Chemical Plant A Freeport, TX. (left) Several Black Skimmer adults taking care of their broods of multiple chicks. Photo taken on June 29, 2022 by Dow escort, Michael Heather. (right) Adult Black Skimmers and fledged chicks cooling off at one of the water troughs. (Photo taken on July 22, 2022 by Taylor Bennett)

Gull-billed Terns arrived on May 4, 2022 with 370 adults within the DOW Black Skimmer Colony. There was a peak of 431 adults observed with a peak of 298 nests (Figure 17). The highest number of chicks observed was 270 on 20 June with 138 was the max number of fledged chicks. The last fledged chick was observed on August 17, 2022.

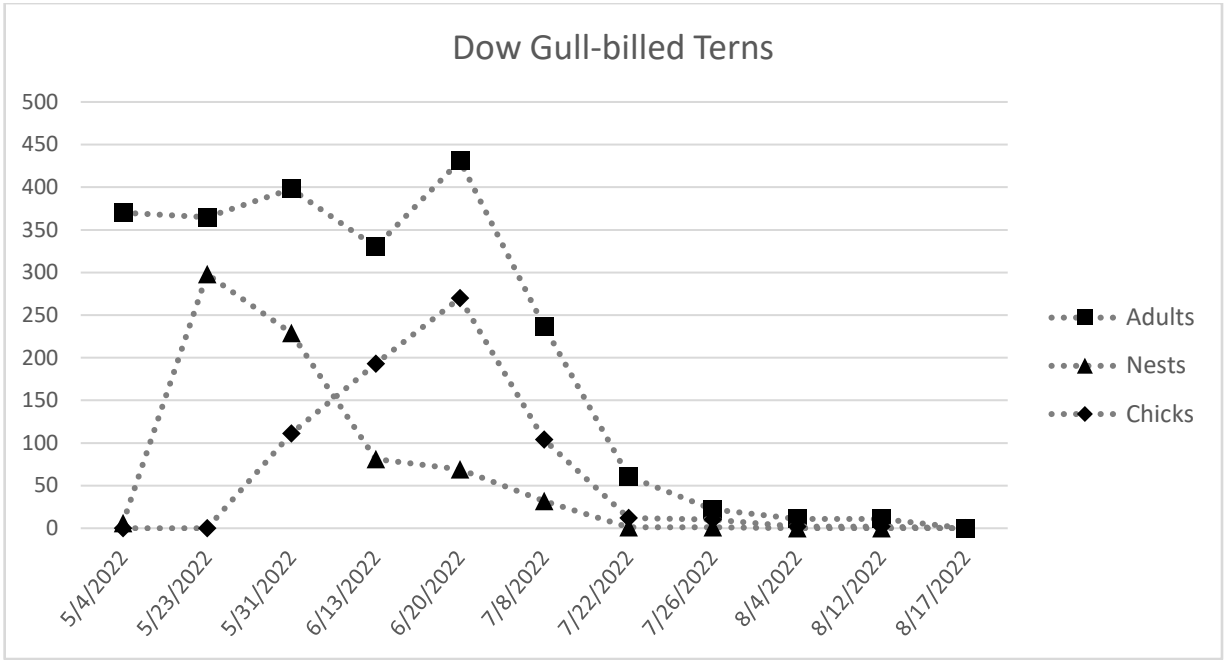


Figure 17. Number of Gull-billed Tern adults, nests, and chicks at the Dow Chemical Company, Plant A Black Skimmer Colony, Freeport, Texas from May 4 to August 17, 2022.

Figure 18. Multiple Gull-billed Tern parents taking care of their chicks within the Black Skimmer colony at Dow Chemical Plant A, Freeport, Texas. (Photo taken on May 31, 2022 by Taylor Bennett)

Non-focal solitary nesting species

We observed several non-focal species throughout this season. We observed Black-necked Stilt broods at Three-mile Cut at Matagorda Beach and Willet broods at Sargent Beach. We found one Common Nighthawk nest at Sargent Beach. We also spotted a pair of American Oystercatchers trying to nest at Sargent Beach.

Figure 19. Non-focal solitary nesting species observed at Matagorda (a) and Sargent Beach, TX 2022 (b, c, and d). (a) Black-necked Stilt adult with chick at Three-mile Cut. (b) Brood of four Willet chicks taking a stroll along Sargent Beach. (c) Common Nighthawk nest. Photo taken by Susan Heath. (d) American Oystercatcher nest. (Rest of photos taken by Taylor Bennett)

Disturbances

We recorded disturbances when something traveled close enough to the target species to disrupt ordinary behavior. Fresh predator tracks within 50 yards of known nesting habitat were considered disturbances in addition to sightings. The most common sources of disturbance in 2022 were beach-goers (3,348 sightings of individuals and 73 fresh tracks), Laughing Gull (2,921 sightings of individuals and 28 fresh tracks), grackles (769 sightings of individuals and 5 fresh tracks), anglers (545 sightings of individuals), balloons (253 sightings), unleashed dogs (109 sightings of individuals), leashed dog (76 sightings of individuals) and dog (74 fresh tracks) (Table 4). We observed several powered paragliders disturbing nesting Wilson's Plover and Least Tern colonies mainly at Sargent Beach. We also observed a western diamondback rattlesnake trying to attack a few of our nesting Wilson's Plover at Three-mile Cut. We saw an increase in the number of UTVs, golf carts, and dune buggies since they are now allowed at both Matagorda and Sargent Beach. Even though ATVs are not allowed on the beaches, we still observed several people driving them especially at Sargent Beach. Someone also placed three dog grave markers on top of the dunes at CRMF within the symbolic fencing.

Table 4. Types and number of disturbance occurrences observed within nesting habitat at Matagorda Beach (Colorado River Mouth Flats/CRMF, Matagorda Peninsula/Mat Pen, Three-mile Cut, and Dunes Dr.) and Sargent Beach (Sargent East and Sargent West). Obs.= Observed; MB=Matagorda Beach; SB= Sargent Beach.

	MB: CRMF		**MB: Mat Pen.**		**MB: Three-mile Cut**		**MB: Dunes Dr.**		**SB: Sargent East**		**SB: Sargent West**	
Predator Disturbance	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**
Black Vulture	-	-	-	-	-	-	-	-	2	1	-	-
Coyote	-	-	-	2	-	8	-	-	-	5	-	5
Crested Caracara	-	-	9	-	6	-	-	-	4	-	2	-
Feral Pig	-	2	-	1	-	11	-	-	1	14	-	6
Ghost crab	18	14	134	16	2	9	-	-	12	10	38	11
Grackle	171	1	32	1	82	-	23	-	259	2	202	1
Gull sp.	-	1	-	2	-	1	2	-	-	1	-	-
Gull-billed Tern	4	-	-	-	2	-	-	-	-	-	-	-
Herring Gull	8	-	19	-	-	-	-	-	20	-	-	-
Laughing Gull	623	7	887	5	185	4	40	-	873	7	313	5
Lesser Black-backed Gull	-	-	-	-	-	-	-	-	5	-	-	-
Opossum	-	-	-	1	-	-	-	-	-	-	-	-

	MB: CRMF		MB: Mat Pen.		MB: Three-mile Cut		MB: Dunes Dr.		SB: Sargent East		SB: Sargent West	
Predator Disturbance	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**
Raccoon	-	-	-	1	-	1	-	-	-	3	-	-
Rat	-	1	-	-	-	2	-	-	-	1	-	2
Rattlesnake	-	1	-	-	1	-	-	-	-	-	-	-
Ring-billed Gull	6	-	11	-	-	-	-	-	7	-	-	-
Turkey Vulture	3	-	5	-	29	-	12	-	24	1	10	-
Yellow-crowned Night Heron	-	-	-	-	-	-	-	-	-	-	6	2
Human Disturbance	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**	**Obs.**	**Tracks**
Angler	187	-	151	-	68	-	5	-	40	-	94	-
ATV	3	-	8	1	-	1	-	-	1	2	4	1
Balloons	1	-	161	-	1	-	-	-	79	-	11	-
Beach-goer	425	15	2601	18	16	11	11	1	90	14	205	14
Beach raker	-	-	2	3	-	-	-	-	-	-	-	-
Bicycle	-	-	-	1	-	1	-	-	-	-	-	1
Boat	-	-	-	-	-	-	-	-	-	-	2	-
Dirt Bike	-	-	1	-	-	4	-	-	2	1	3	2
Dog	-	15	-	19	-	12	-	-	-	14	-	14
Drone	-	-	2	-	-	-	-	-	-	-	-	-
Dune buggy	2	-	2	-	-	-	-	-	-	-	-	-
Golf cart	2	-	2	-	-	-	1	-	2	-	2	-
Helicopter	1	-	1	-	-	-	-	-	-	-	1	-
Horse	-	2	-	1	-	1	-	4	-	-	-	-
Kayak	-	-	1	-	-	-	-	-	-	-	-	-
Leashed dog	8	-	58	-	2	-	-	-	3	-	5	-
Motorcycle	-	-	-	-	-	-	-	-	-	-	-	1
Powered Paraglider	-	-	-	-	1	-	-	-	2	-	1	-
Tractor	-	-	-	-	-	-	1	-	-	3	-	-
Unleashed Dog	7	-	72	-	2	-	-	-	9	-	19	-
UTV	5	-	14	-	-	-	2	-	4	2	6	-
Vehicle	227	16	1004	17	57	17	83	12	137	17	179	16

Figure 20. Human disturbances observed at Matagorda and Sargent Beach. (a) and (b) photos taken at Sargent Beach. (c) and (d) photos taken at Matagorda Beach. (a) Two kids illegally driving ATVs within beach nesting bird habitat. (b) Powered paraglider after we redirected it from getting to close to a nesting Least Tern colony. (c) Vehicles and people near the beach entrance at Matagorda Beach on Memorial Day weekend. (d) Three grave markers and possible graves of dogs placed illegally on the dunes within our posted area at CRMF. (Photos by Taylor Bennett)

Banding Efforts and Resights

This season, we banded 52 Wilson's Plovers, 27 adults and 25 chicks (3 from mystery broods) (Table 5). 19 newly banded and 2 previously banded adults received light-level geolocators as well.

Table 5. Wilson's Plover adults and chicks banded at Sargent Beach and Matagorda Beach in Texas during the 2022 breeding season.

	Wilson's Plovers	
Site	Adults	Chicks
Matagorda Beach	9	11
Sargent Beach	18	14

Figure 21. The first Wilson's Plover adults and last chicks banded for the 2022 season. (a) First adult Wilson's Plover female (P6) to be banded and the first adult to receive a light-level geolocator at Sargent Beach. (Photo taken on June 16, 2022 by Taylor Bennett). (b) The last banded chick for Sargent Beach (Photo taken on July 20, 2022). (c) The first banded Wilson's Plover adult female (E7) for Matagorda Beach. (Photo taken on May 11, 2022). (d) The last banded chicks of Matagorda Beach (Photo taken on July 2, 2022). Last three photos were taken by Kenlynn Volz (GCBO Intern).

We used resight data to determine return rates of our banded plovers. Current return rates include 6 of 11 (54.5%) adult Wilson's Plovers banded in 2021, 6 of 15 (40%) adult Wilson's Plovers banded in 2020, 3 of 5 (60%) adult Wilson's Plovers banded in 2019, 2 of 17 (11.8%) banded in 2018, 0 of 12 (0%) adult Wilson's Plovers banded in 2017, and 4 of 27 (14.8%) banded in 2016. We observed several adults with chick bands, but couldn't tell which year they were banded.

Outreach

Table 6. The number of people reached directly and indirectly during the 2022 breeding season.

Event, Presentation, Meeting	Location	Activity	Date	People Reached	People Reached Indirectly
Outreach Event	Surfside Beach, TX	Wings over Surfside. Migratory Bird Day event. Education booth	4/9/2022	103	-
Community Engagement	GCBO Headquarters	Zoom presentation about BNB for Virtual Bird Bash event	4/16/2022	270	-
GCBO E-news	Online	Beach nesting birds update for GCBO members	6/3/2022	-	5233
Outreach Event	Matagorda Beach	Experience Auction Trip with Patty Brinkmeyer	6/8/2022	1	-
Community Engagement	Matagorda Nature Center	gave presentation and demonstration for Matagorda Summer Camp	6/15/2022	57	-
Stewarding	Matagorda Jetty Park	Outreach conducted outside nesting habitat (Saturday Outreach)	Throughout Season	170	-
Monitoring	Matagorda and Sargent Beach	Outreach conducted opportunistically during monitoring	Throughout Season	153	-
Article	Newspapers (7)	Wrote 2 articles that reflected beach nesting bird project and light-level geolocators	Throughout Season	-	22400 (3,200 each)

Event, Presentation, Meeting	Location	Activity	Date	People Reached	People Reached Indirectly
Facebook	Online	Posts about beach nesting birds	Throughout Season	-	4028
			TOTALS	**770**	**31,661**

Figure 22. Outreach and volunteers of 2022 season. (a) GCBO intern, Kenlynn Volz, and Taylor Bennett at Wings Over Surfside outreach event at Surfside, TX. Photo taken on April 9, 2022 by Kristen Vale of ABC. (b) Experience auction winner, Patty Brinkmeyer, holding a newly banded adult Wilson's Plover female (H8) at Three-mile Cut on Matagorda Beach on June 8, 2022. (c) Dow escort, Michael Heather, and GCBO temp employee, Rebekah Synder, assisting with surveying the Dow Black Skimmer colony in Freeport, TX on August 17, 2022. (d) GCBO education intern, Adam Trijillo, holding a brood of freshly banded Wilson's Plover for the first time at Sargent Beach on June 9, 2022. (Photos b, c, and d taken by Taylor Bennett)

Discussion

We continued to survey Sargent Beach this season and once again it proved to be productive for both nesting Least Tern and Wilson's Plover. This season we were able to post signs on the East end of Sargent Beach to help reduce the amount of disturbance, particularly vehicles. We had a total of three Least Tern colonies on Sargent Beach; one on the west end and two on the east end. All of the colonies were successful in producing fledges. We estimated 163 Least Tern breeding pairs and observed 125 chicks with 65 fledges. The colony on the west side of Sargent showed a lot of disturbance from vehicles and dogs, so next season we are hoping to post signs there as well. We had two Least Tern colonies on Matagorda Beach with an estimate of 39 pairs, 36 chicks, and 16 fledges. We observed more Wilson's Plover breeding pairs on Sargent Beach than Matagorda Beach. We estimated 23 Wilson's Plover pairs on Matagorda Beach versus 35 Wilson's Plover pairs on Sargent Beach. We located only 18 nests on Matagorda Beach versus 25 nests on Sargent Beach. We also observed more unbanded Wilson's Plover pairs than in previous years. This season we were able to band 27 new Wilson's Plover adults and 25 chicks. This season we had a grant to attach 21 light-level gelocators to Wilson's Plover adults help track them when they migrate to their wintering grounds. We attached light-level geolocators to 19 newly banded Wilson's Plover adults and two previously banded adults; one from 2021 and another from 2020.

This season there was a drought which resulted in common back beach foraging areas drying up. This made resighting Wilson's Plover broods very difficult and we had many broods disappear completely. As a result, we had to assume fledged on a few of the Wilson's Plover chicks since on the week of fledging we had difficulty locating them, but have observed them for multiple weeks. The Least Terns seemed to have benefited from the drought since we observed more fledglings this season than previous seasons. In previous years, they would often get washed away from storms.

We noticed a decrease in the number of Wilson's Plover nests and fledged chicks on Matagorda Beach compared to previous years. The majority of the nests this season were located on Sargent Beach. In 2021, we had 40 Wilson's Plover nests total (23 Matagorda Beach and 17 Sargent Beach) and 12 fledged chicks. In 2020, we had 23 Wilson's Plover nests total and 9 fledged chicks at Matagorda Beach. In 2019, we had 22 nests total (1 Bryan Beach and 21 Matagorda Beach) and 10 fledged chicks. We observed more Least Tern nests and fledglings than previous years; however, the majority of them were located on Sargent Beach. In 2021, there were 59 nests total with zero fledged chicks. In 2020, there were 37 nests total with zero fledged chicks. In 2019, there were 44 nests total with only 6 fledged chicks.

Recommendations

We are still in the process of collaborating with Matagorda Bay Foundation to install permanent bollards at CRMF. These will help permanently protect the Wilson's Plover nesting there as well as the non-breeding waterbirds that utilize this area during migration. We are hoping that it will help lessen the amount of vehicle traffic as well. Next season we are hoping to install posts and fencing on the west side of Sargent Beach in hopes of reducing the amount of vehicle and dog disturbance. We observed a lot of nest failures due to dogs, so we need signs mentioning to keep dogs on a leash since there are none at either of our sites. We didn't get a chance to take the LCRA employees out banding with us, so we will plan that for next season. We are also hoping to collaborate outreach events with LCRA to educate more people about beach nesting birds as well as nesting sea turtles.

Appendix

Article I: April Nature Notes Facts Article

2022 Beach nesting bird season has begun
Article by Taylor Bennett

The beach nesting bird season has officially begun along the upper Texas Coast, which means that shorebirds are starting to make their nests on the sands of our beaches. It also means that we at Gulf Coast Bird Observatory are once again monitoring for those nests as part of our ongoing research.

The target species we are focusing on are Wilson's Plover and Least Tern. The Wilson's Plover is a shorebird that prefers to nest in the soft sand along the dunes, mudflats, and shelly areas with vegetation. During the breeding season, they break up into pairs and create their own territories. The Least Tern is a water bird that prefers to nest in large groups mainly in flat open shelly areas. Both of these species are protected by the Migratory Bird Act and are considered species of high concern due to habitat loss and disturbance. For each species, we monitor for pairs, nests, and chicks.

We also band Wilson's Plover adults while they are incubating and their chicks when they hatch. When we band a bird, we place a lightweight band around their leg (just the right size, so it doesn't hurt) with a unique number and letter combination on it. Then we can keep track of who's who by reading the numbers off their bands, like T5 or VM. Each newly banded adult this year will also receive a geolocator which will help us track where they go during the winter. Gulf Coast Bird Observatory is monitoring two sites this year: Matagorda Beach and Sargent Beach.

For Matagorda Beach, we monitor half of Matagorda Peninsula and three areas: Colorado River Mouth Flats (CRMF), Three-mile Cut, and Dunes Drive. The Wilson's Plovers mainly nest along the beach in front of the dunes and also in the debris. We observed our first Wilson's Plover nest of the season on April 13th, 2022. So far, we have located only two Wilson's Plover nests; one on Matagorda Peninsula and one for Three-mile Cut. The Matagorda Peninsula nest belongs to female T5 (or Tina) and her mate. She was banded in 2020. The Three-mile Cut nest belongs to male VM (or Van Morrison) and his mate. He was banded in 2019. We have yet to find a Wilson's Plover nest for CRMF. We haven't observed any nesting Least Terns yet.

Sargent Beach is divided into two sections, Sargent East and Sargent West. We have observed both Least Tern and Wilson's Plover in each section. For Sargent East, we located three Wilson's Plover nests. One of the three nests belongs to female Y5 (or YaYa) and her mate. She was banded last year. The Least Terns have just started to arrive and soon should have nests. We also managed to locate a hatching American Oystercatcher nest. For Sargent West, we located three Wilson's Plover nests. They all belong to unbanded pairs. We hope to band them next week. The Least Terns are also starting to pair up and nest there as well.

April through July is the most vulnerable time for Wilson's Plover, Least Tern, and other nesting birds. Please remember to fish, swim, and play 50 yards away from nesting birds and chicks.
Drive slowly, avoid the dunes and sandy areas where plovers tend to nest, and keep dogs on a leash. On behalf of Gulf Coast Bird Observatory, thanks for reading!

Article II: June Nature Notes Facts Article
Using Light-Level Geolocators to Track Birds
Article by Taylor Bennett

At Gulf Coast Bird Observatory, we are researching beach-nesting birds and the obstacles that they face. We are excited to add a new aspect to our study this year: light-level geolocators!

The main monitoring sites we are focused on for this project are Matagorda Beach and Sargent Beach. The target species are Wilson's Plover and Least Tern. The Wilson's Plover is a shorebird that nests in the soft sand along the dunes, mudflats, and shelly areas with vegetation. The Least Tern is a water bird that nests in large groups mainly in flat open shelly areas. Both of these species are protected by the Migratory Bird Act and are considered species of high concern due to habitat loss and disturbance.

For each species, we monitor for pairs, nests, and chicks. We have banded 21 Wilson's Plover adults (13 Sargent Beach and 8 Matagorda Beach) and 12 Wilson's Plover chicks so far. Twenty- one adults received some new bling in form of a light-level geolocator to help track these birds over time.

There are many different methods biologists use to help track bird species over time. Banding birds is one of the most common ways; we attach a lightweight band to the bird's leg with a unique number combination, let the bird go, then wait for the banded bird to be re-sighted. This is a simple method, but it relies on someone spotting it and reporting it, which often doesn't happen.

Another tracking method is the use of nanotags, which send out a signal that can be picked up using a receiver. At Gulf Coast Bird Observatory, we use this method for our Loggerhead Shrike project. This method is more effective and allows a better way to track a species in real time using telemetry equipment.

For our research with the Wilson's Plover, we are using light-level geolocators. We are hoping to find out where the Wilson's Plover migrate for the winter. We already know where they breed, so figuring out where they winter will give us a better understanding of the species as a whole.
These geolocators are different from nanotags in that they don't emit a signal. Instead, they measure light levels.

The geolocator is attached on the back of the bird like a backpack using a harness that wraps around the legs and doesn't hurt or hinder the bird's movement. Each geolocator has a microchip to store data and a light sensor that sticks out. Based on the light levels over the course of the day, latitude and longitude can be determined, resulting in a rough location. Latitude is calculated from day length from sunrise to sunset. Solar noon (the point when the sun is highest in the sky) is different across the globe, and helps determine longitude.

This type of geolocator is a little less expensive than nanotags and tend to last longer since they don't need as much battery to operate. They are also incredibly lightweight. But because they don't emit a signal or have a GPS, there is no way to track the bird in real time. We simply have

to rely on the bird coming back the following breeding season, when we can catch it and remove the backpack.

The geolocator then gets transferred back to the company that made them to download the data off of them. Then the data is analyzed using a specific program. We will not know until next breeding season if any of them come back, but we are hoping for the best.

On behalf of Gulf Coast Bird Observatory, thank you for reading and please to remember to fish, swim, and play from 50 yards away from beach nesting birds and their chicks.

Texas Breeding Seabird and Shorebird Monitoring and Stewardship Project – 2022

October 2022

Prepared by:
Jess Cosentino and Brooke Hill
Coastal Bend Bays & Estuaries Program

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INTRODUCTION

The Coastal Bend Bays & Estuaries Program is working to protect beach-nesting sites for solitary and colonial nesting birds such as Snowy Plovers, Wilson's Plovers, and Least Terns, with the long-term conservation goal of maintaining or increasing their nesting success. To determine current nesting success for these species and to contribute to management practices that bolster populations, our team monitored (1) the Port Aransas Nature Preserve at Charlie's Pasture, (2) Packery Flats, (3) "The Village", and (4) the Texas A&M University – Corpus Christi University Beach in 2022. This is the 10th year that we have monitored breeding activity at these locations (2013-2022, Port Aransas and Packery Flats only). Partners with American Bird Conservancy, Houston Audubon Society, and Gulf Coast Bird Observatory have been monitoring other sites on the upper Texas coast during much of this time.

SITES

The sites surveyed included: (1) Port Aransas Nature Preserve at Charlie's Pasture (hereafter "the Preserve"), (2) Packery Flats (*both located on Mustang Island, Texas*), (3) "The Village" located behind Marker 37 in the Upper Laguna Madre, and (4) the Texas A&M University – Corpus Christi University Beach, located on Ward Island across from the university (hereafter "University Beach" (Figure 1, Table 1)

Figure 1. Areas surveyed in the central Texas coast region during the 2022 breeding season (highlighted in white): 1 = Port Aransas Nature Preserve at Charlie's Pasture; 2 = Packery Flats; 3 = The Village; 4 = TAMU-CC University Beach.

Table 1. Acreage of the four sites monitored during the 2022 breeding seasons (February-July) on the central Texas coast. Survey effort and frequency are also provided.

Site Name	Acres Monitored	Acres Protected	Habitat Description	Survey Frequency	# Full Surveys
The Preserve	303	303	Bayside algal/sand flats	Twice weekly	41
Packery Flats	311	1.6	Bayside algal/sand flats	Twice Weekly	41
The Village	73	0	Bayside algal/sand flats	Once weekly	14
University Beach	3	1.5	Sand Beach	Once weekly	14

Posting of Sites

We installed signs and symbolic fencing at both Packery Flats and University Beach in 2022 (Figures 2 and 3). Fencing was installed to reduce the number of anglers and recreationists cutting through nesting areas to reach the channel and beach. Signage was not installed at the Preserve as visitors are restricted to the adjacent walking paths and most of the boardwalks have not been replaced since Hurricane Harvey in 2017.

On March 24, we fenced an approximate area of 1.6 acre at Packery Flats where Wilson's Plovers and Least Terns have historically nested. Several paths through lower elevation tidal habitat were left open between different fenced off areas of upland habitat patches. This allowed anglers to pass without having to walk completely around the protected area while minimizing disturbance to nesting birds. This noticeably reduced the number of people walking through the protected areas, although some lines were cut during the late breeding season and a few footsteps were observed within the fenced areas where birds had been nesting. Four Wilson's Plover and at least two Least Tern nests were observed inside of the protected fenced areas at Packery Flats in 2022.

On April 25, we fenced approximately 1.6 acres of the University Beach, protecting the westernmost end. One Wilson's Plover and at least 12 Least Tern nests were found inside the fencing throughout the season (nine active Least Terns nests were found prior to April 25 and fencing was strategically placed to protect these with several subsequent renesting attempts occurring within the same area, which also included a single pair of nesting Wilson's Plovers). The Packery Flats and University Beach fencing were removed on July 22 and July 29, respectively.

Figure 2. Signage posted at Packery Flats.

Figure 3. Bilingual signage installed at University Beach to protect nesting Least Terns and Wilson's Plovers.

RESULTS

The estimated total number of pairs observed across the Preserve, Packery Flats, The Village, and University Beach was 34 Wilson's Plover (*Charadrius wilsonia*, "WIPL") and ten Snowy Plover (*Charadrius nivosus*, "SNPL"). The total number of nests located were 32 Wilson's Plover, nine Snowy Plover, and 54 Least Tern (*Sternula antillarum*, "LETE"). The total high counts of hatch-year fledglings observed were 107 Wilson's Plover, six Snowy Plover, and six Least Tern. Other breeding metrics recorded can be found in Table 2.

Table 2. Metrics monitored at the Preserve and Packery Flats during the 2022 breeding season.

		The Preserve			Packery Flats	
Metric/Description	**WIPL**	**SNPL**	**LETE**	**WIPL**	**SNPL**	**LETE**
Average # Adults	27	7	27	13	0	4
Estimated # of Breeding Pairs	14	10	54	12	0	2
Total # Nests Monitored (max observed for LETE)	16	9	54	10	0	2
# of Successful Nest Hatches	5	4	3	5	0	0
# of Failed Nests	12	5	51	5	0	2
Max # of Downy Chicks	1	3	3	3	0	0
Max # of Feathered Chicks	0	0	0	1	0	0
Max # of Flight Capable/Fledged Chicks	107	6	6	2	0	0

Wilson's Plover

We located and monitored Wilson's Plover nests at the Preserve (16), Packery Flats (10), the Village (5), and University Beach (1) throughout the period of March 5 and July 28 (Figures 4 and 5). Most of the nesting occurred from early April through late June (Figures 6 and 7).

The total of 16 nests found at The Preserve was consistent the nine-year average of 17 while the 10 nests found at Packery Flats was also consistent with the nine-year average of 11 nests. The total number of nests found at The Village (5) was generally consistent with the average; however, no long-term average for this site is available due to inconsistent interannual monitoring efforts. The single nest at University Beach was consistent with the average season total, as one pair generally occupies the entire beach as a single territory. The percentage of Wilson's Plover nests that successfully hatched in 2022 was slightly above the nine-year average at both the Preserve and Packery Flats sites (Figure 8, Table 3). We did our best to reduce unknown fates when possible, which may have led to an increase in perceived hatching success. Unknown fates only occurred when it was not known whether the nest hatched or not. Failed nests were assumed depredated if (a) predator tracks led to the nest, (b) egg fragments were found inside or adjacent to the nest cup, or (c) if eggs were absent well before the estimated hatch date. A nest was considered hatched if (a) chicks were observed in or near the nest cup, (b) were seen with one or more banded adults from known nests, or (c) pip fragments were observed inside the nest cup near the estimated hatch date.

Seventy-five percent of nests at the Preserve failed: 50% due to predation, 13% to washout, 6% to abandonment, and 6% having an unknown fate (Table 3). At most nests, the predator could not be determined because there were no tracks; however, one nest was depredated by a raccoon (*Procyon lotor*). At Packery Flats, 50% of the nests failed: 40% were lost to predation and 10% to wash out by high water levels. High-water events only seemed to occur earlier in the breeding season (April – mid May), causing the washout of a single nest found in mid-April (Figure 9). Half of the nests found (5/10) were located several hundred meters away from the algal flats at higher elevations, closer to the walking path and parking area, where water during tidal shifts did not seem to reach. A lack of heavy rainstorms and high-water events throughout late May and June resulted in heavy drying of the entire site and its adjacent algal mudflats.

At the Village, 60% of nests failed due to predation. One of these nests was confirmed as depredated by a coyote (*Canis familiaris*) while the remaining two were unknown. At University Beach, a single Wilson's Plover nest hatched, and three downy chicks were observed in the following days (Figure 10). However, a vehicle reportedly drove the full length of the beach (leaving visible tracks) and no WIPL adults of chicks were observed at the site after 14 days following hatch. It was presumed that the chicks did not reach fledgling age.

Figure 4. Locations of Wilson's Plover nests found at the Nature Preserve at Charlie's Pasture during the 2022 breeding season.

Figure 5. Locations of Wilson's Plover nests found at Packery Flats during the 2022 breeding season.

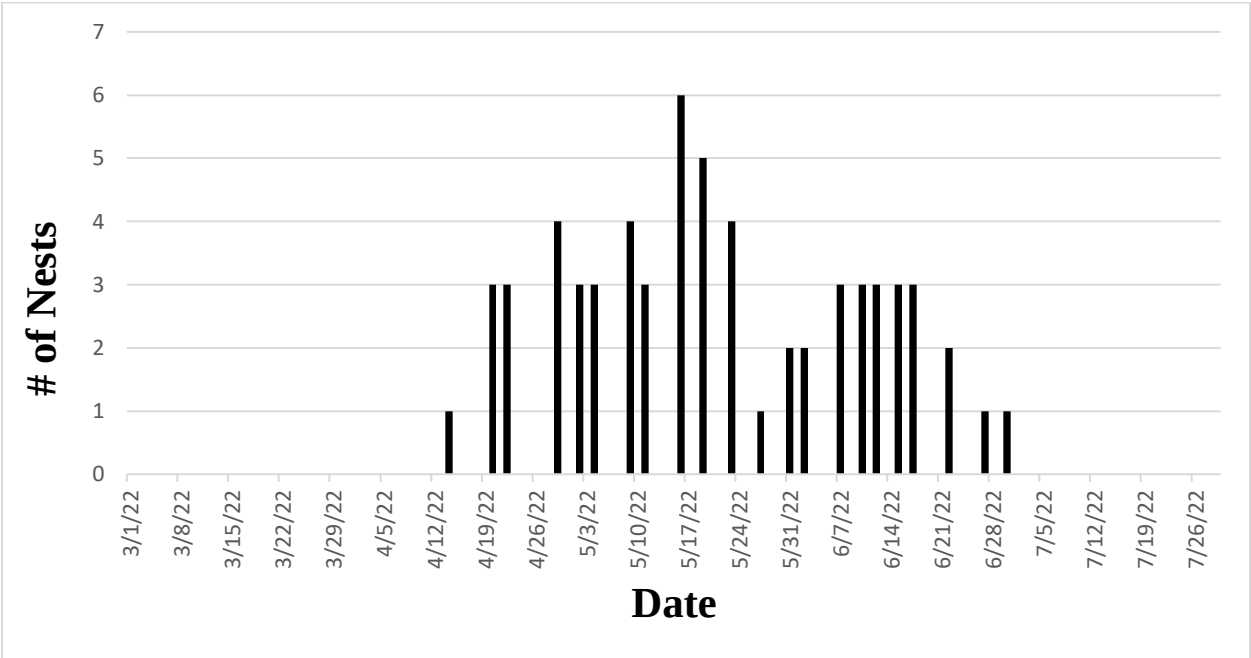

Figure 6. Number of active Wilson's Plover nests by date at the Port Aransas Nature Preserve at Charlie's Pasture during the 2022 breeding season.

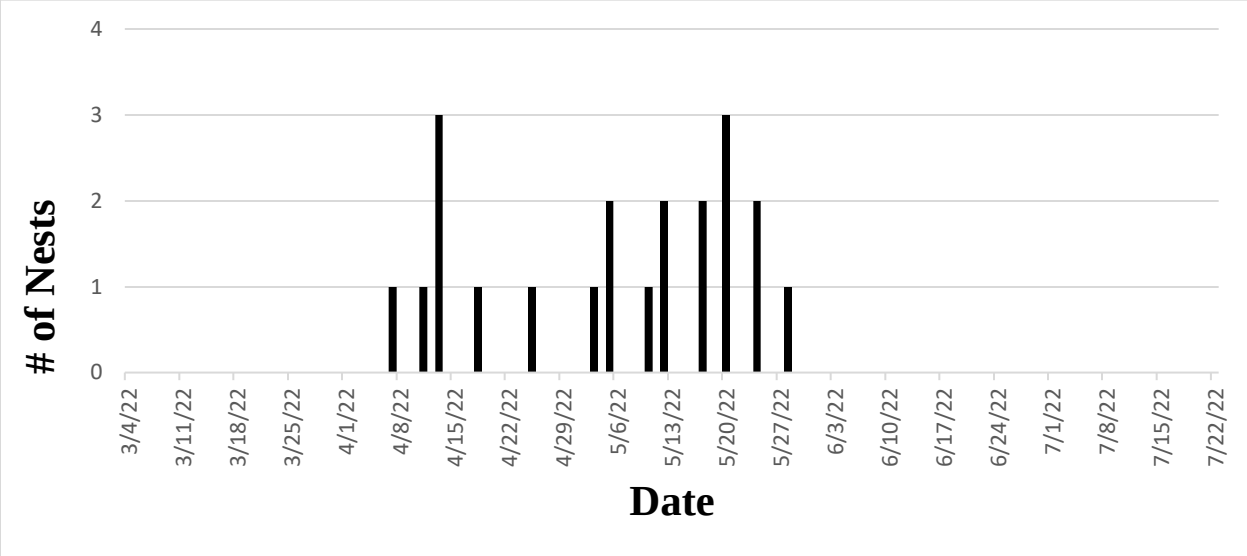

Figure 7. Number of active Wilson's Plovers nests by data at Packery Flats during the 2022 breeding season.

Figure 8. (Left) Wilson's Plover downy chick hides in vegetation
Figure 9. (Right) Wilson's Plover nest almost washed out by a recent high-water event

Table 3. A comparison of percentages of Wilson's Plover nest fates: the previous nine-year average (2013-2021) and the 2022 breeding season for the Port Aransas Nature Preserve at Charlie's Pasture and Packery Flats, Texas. The actual number of nests with each fate for 2022 are also provided.

	The Preserve				**Packery Flats**	
Nest Fate	**Nine-year Average**	**2022 %**	**2022 #**	**Nine-year Average**	**2022 %**	**2022 #**
Hatched	25.2%	31%	5	41.9%	50%	5
Unknown	20%	6%	1	15.1%	0%	0
Washout	24.4%	13%	2	17.4	10%	1
Depredated	26.7%	50%	8	20.9	40%	4
Abandoned	3%	0%	0	4.7%	0%	0
Failed to hatch	0%	0%	0	0%	0%	0
Human-caused Failure	0.7%	0%	0	0%	0%	0
Total Nests	**17**	**NA**	**16**	**11**	**NA**	**10**

Figure 10. Wilson's Plover female incubating on a University Beach nest

Snowy Plover

We located and monitored nine Snowy Plover nests at the Preserve throughout the monitoring period, March 1 through July 28 (Figure 11). There were two distinct breeding periods within the season – a dominant one spanning across April and a smaller phase during early June through mid-July (Figure 12). We estimated that a minimum of ten breeding pairs were present at the Preserve. No Snowy Plover adults were observed in nesting habitat at Packery Flats, the Village, or University Beach (Figure 13).

The nine Snowy Plover nests found at The Preserve in 2022 was lower than the nine-year average of 20 nests that site. The percentage of nests that successfully hatched in 2022 was 44.5%, which is higher than the nine-year average (Table 4). Additionally, an adult SNPL was observed with an unbanded downy chick (Figure 14) in May from an undiscovered nest, so it is possible that hatch success was slightly higher, and a minimum of 10 nesting attempts were made at The Preserve.

The remaining 55.5% of nests failed – 33.5% due to depredation, 11% to washout, and (1/9) to abandonment. Of the nine depredated nests, Crested Caracara was responsible for one and was observed actively depredating eggs after flushing an incubating parent. Crested Caracaras were consistently observed during surveys at the Preserve throughout March and June yet absent throughout July. The predator could not be identified for the remaining depredated nests; however, coyote, raccoon, and feral hog tracks were regularly documented during surveys as well as Gull-billed Terns, Laughing Gulls, and Great-tailed Grackles.

A single high-water event in May was responsible for the only washed-out nest at the Preserve. This nest was located on a completely dried algal mud flat. There was an absence of severe weather events throughout May and July, specifically thunderstorms, which have historically had negative impacts on nesting attempts at this site. Snowy Plovers generally nest at lower elevations, where ephemeral high-water levels pose a greater risk to nest wash out. The algal mudflats throughout much of the northern portion of the preserve remained dry throughout late May, June, and late July, allowing several pairs to successfully nest on the substrate.

Figure 11. Locations of Snowy Plover nests found at the Nature Preserve at Charlie's Pasture during the 2022 breeding season.

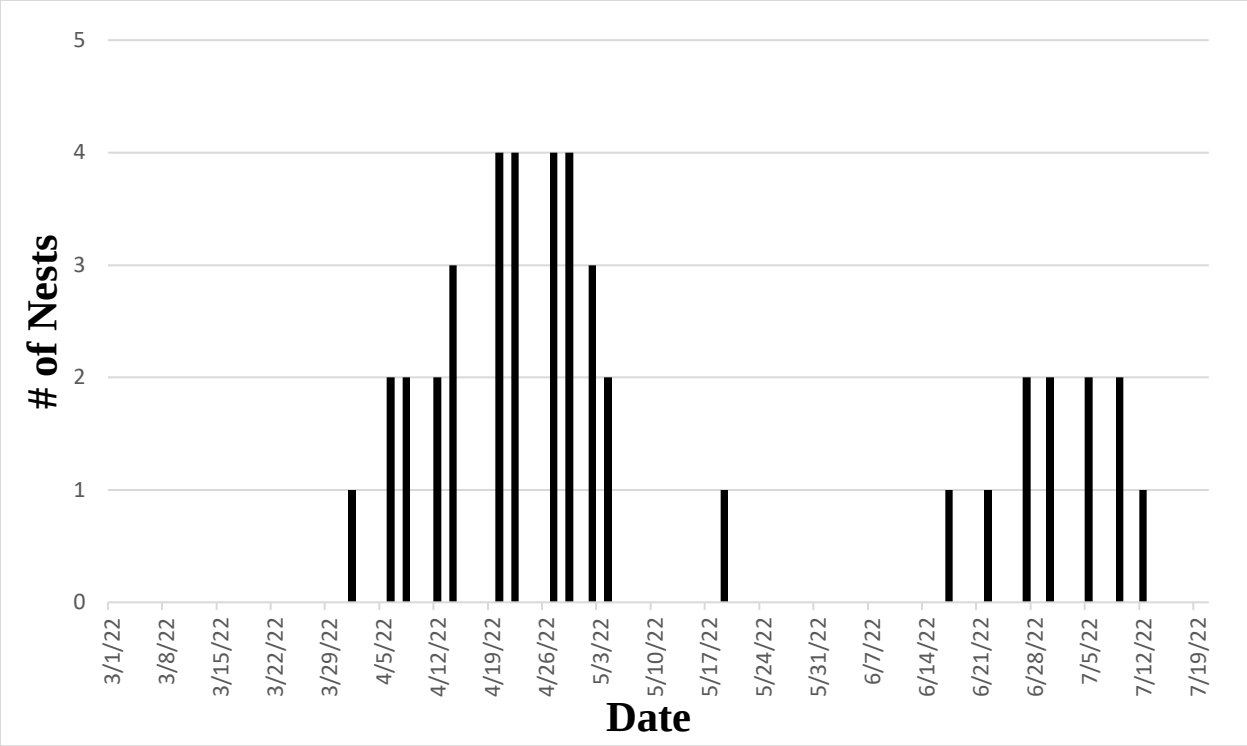

Figure 12. Number of active Snowy Plover nests by date at the Port Aransas Nature Preserve at Charlie's Pasture during the 2022 breeding season.

Figure 13. (Left) Banded Snowy Plover adult at Port Aransas
Figure 14. (Right) Snowy Plover chick on wet mudflats at Port Aransas

Table 4. A comparison of the percentages of Snowy Plover nest fates: Previous nine-year (2013-2021) and the 2022 breeding season for the Port Aransas Nature Preserve at Charlie's Pasture, Texas. The actual number of nests with each fate for 2021 are also provided.

Nest Fate	Nine-Year Average	2022 (%)	2022 (#)
Hatched	25%	44.5%	4
Unknown	0%	0%	0
Washout	18.75%	11%	1
Depredated	50%	33.5%	3
Abandoned	6.25%	11%	1
Failed to Hatch	0%	0%	0
Human-caused Failure	25%	0%	0
Total Nests	**21**	**NA**	**9**

Least Tern

Least Terns were first observed at Packery Flats in late March and the Preserve in mid-April (Figure 15). Data are presented as maximum highs for the end of each monitoring week for weeks ending 5 March through 30 July. We did not monitor Least Terns as closely as Wilson's and Snowy Plovers; however, due to their colonial nesting habits, we were able to count any adults, nests, and young present at the site from a distance as time allowed. Since they are not individually marked (e.g., color bands) and made several nesting attempts following disturbances, accurately estimating the true number of breeding pairs present on site was difficult. Alternatively, we provide date on high counts of adults for each week they were present (Figure 15). We estimated a total of 54 nests at The Preserve, two at Packery Flats, six at the Village, and nine at University Beach throughout the monitoring period (Figure 16).

The Preserve experienced a high-water event in mid-May which appeared to washout most nests; however, the colony re-established throughout June as the site consistently remained dry until July with no additional severe weather or water level changes. Only a few early season high-water events occurred at Packery Flats where two pairs of Least Terns attempted to nest along the algal flats; however, these nests failed before hatch. Three chicks from three separate nests were observed at the Preserve (Figures 17 and 18). Five fledglings were observed in mid-July but it is unclear whether they belonged to nesting adults from this site.

Least Terns were first observed at University Beach in early April at the far westernmost end of the site. A minimum of 12 nests, two chicks, and one fledgling were observed at this site between May and July. Birds were first observed at The Village in mid-April throughout the northern portion of the site, approximately 50 m from the road. As many as six nests were observed here with two downy chicks in late May; however, only a single fledged bird was seen later in the season and the colony appeared to leave the site by early June.

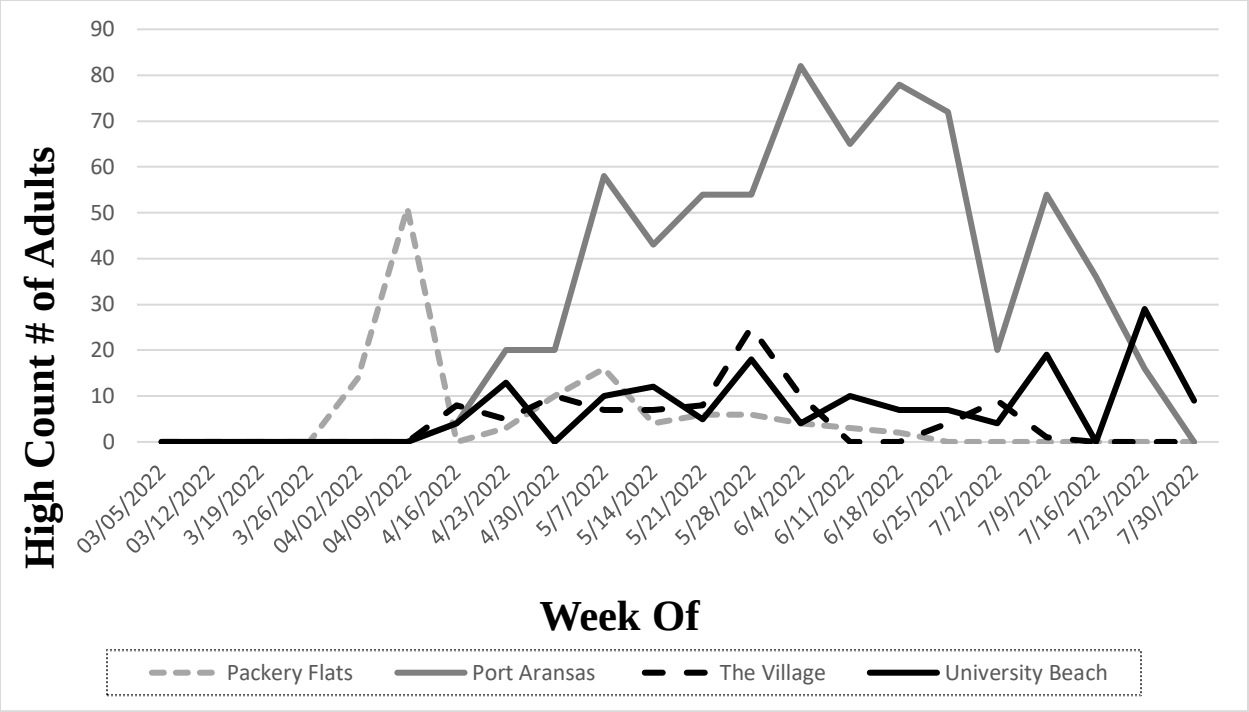

Figure 15. Weekly high counts of Least Tern adults during the 2022 breeding season at Packery Flats, the Preserve, The Village, and University Beach

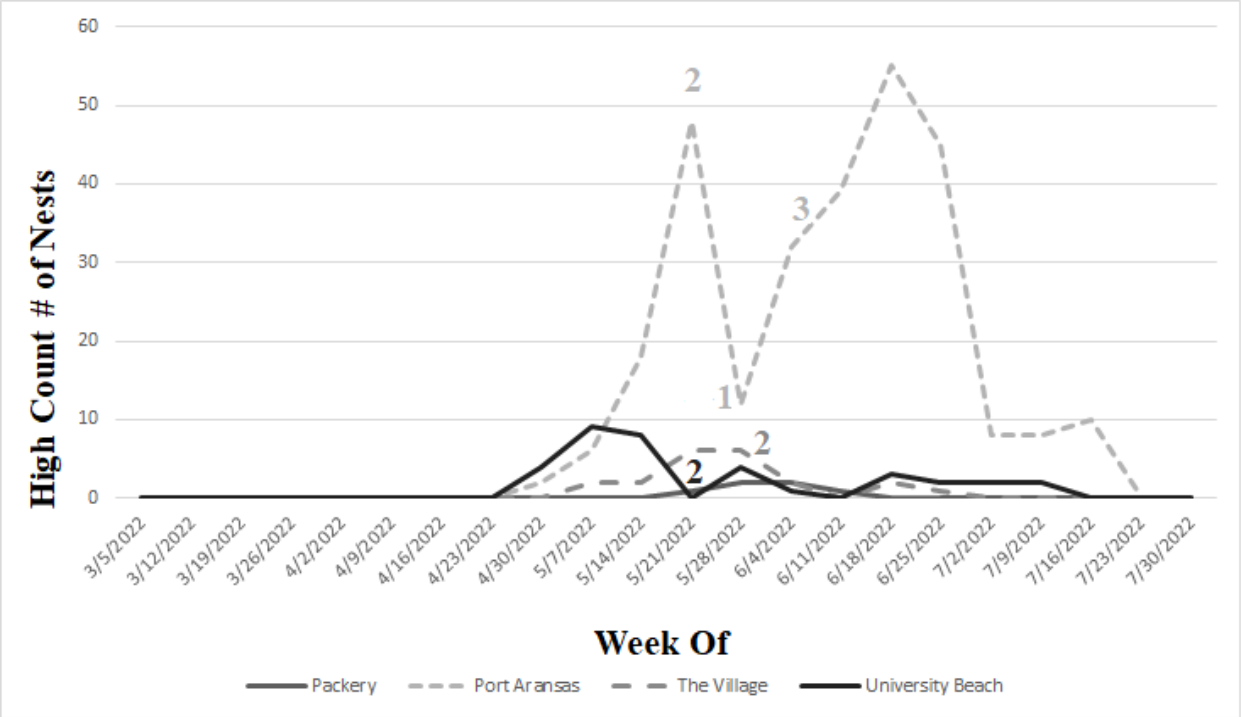

Figure 16. Weekly high counts of Least Tern nests during the 2021 breeding season at the Preserve and Packery Flats. Weekly high counts of Least Tern chicks during the same period shown in matching color.

Figure 17. (Left) Least Tern nest with chicks at Port Aransas
Figure 18. (Right) Least Tern parent feeds chick at Port Aransas

Banding and Resights

We banded a total of seven Snowy Plovers (one adult and six chicks; Figures 20 and 21) and 19 Wilson's Plovers (8 adults and 11 chicks; Figure 22)

We resighted six and 21 Snowy and Wilson's Plovers, respectively, that had been banded in a previous year. Approximately 350 Wilson's Plovers were observed at the Preserve in mid-July, appearing to be foraging and roosting in preparation for southward migration.

Figure 20. (Top left) Banding of an adult Snowy Plover at Port Aransas
Figure 21. (Top right) Recently banded Snowy Plover chicks inside of a nest scrape
Figure 22. (Bottom center) Wilson's Plover female banded on an active nest at Packery Flats

Non-Focal Species

Two and one Common Nighthawk (*Chordeiles minor*) nests were observed at Packery Flats and the Preserve, respectively. One nest was abandoned, one washed-out during a high-water event along algal mudflats, and one hatched at least one chick in mid-to-late July (Figure 23). Two and one Willet (*Tringa semipalmata)* nests were observed at Packery and the Preserve, respectively. One nest was observed to hatch with a single egg pipping while the second nest was presumed to have hatched due to defensive adult behavior. Two Black-necked Stilt (*Himantopus mexicanus*) nests were observed at the Preserve. Both nests were depredated by unknown predators.

Both sites also support populations of federally threatened Piping Plover (*Charadrius melodus*) throughout the non-breeding season. Up to 33 Piping Plovers were observed at Packery Flats (April 18) and 142 at the Preserve (February 16) when foraging conditions were favorable (generally tide-driven) for this species. This site supports a robust percentage of all Piping Plovers overwintering along Mustang Island and surrounding areas, further emphasizing its importance as both breeding and non-breeding habitat as well as during the migratory phases.

We resighted X uniquely banded Piping Plovers at the Preserve and X at Packery Flats before or after the breeding season. The algal flats at both sites offer foraging and roosting habitat for both overwintering birds and throughout the migratory phases in the spring and late summer.

Figure 23. Common Nighthawk nest at the Preserve

Disturbances

We recorded disturbances at breeding sites when something traveled close enough to the the target species too disrupt ordinary behavior. Fresh tracks from known predators withing 50 m of known nesting habits were considered disturbances as well as visual observations. Disturbances were regularly documented at Packery Flats, the Preserve, the Village, and University Beach. When looking at individual disturbance abundance, Laughing Gulls (*Leucophaeus atricilla*) and Great-tailed Grackles (*Quiscalus mexicanus*) were among the highest counted during surveys of both Packery and Port Aransas sites (Figure 24), often seen in large aggregations while roosting and foraging, as they walked on the ground through suitable plover nesting habitat. When looking at the percentage of surveys which had a certain disturbance detected, coyote tracks and Gull-billed Terns (*Gelochelidon nilotica*) were most frequently observed during surveys at Packery Flats while feral hog and coyote tracks were at Port Aransas (Figure 25). Feral hogs were actively being trapped and removed at the Port Aransas site based on communication with the Preserve manager (Figure 26). Live coyotes were also often seen at both sites as well as several pups at the Preserve in mid-June (Figure 27). While Crested Caracaras were infrequently

detected on surveys relative to other, more abundant predators, we did witness one actively predating a Snowy Plover nest with eggs after flushing the incubating parent (Figure 28).

Airplanes flying overhead were documented as disturbances at most sites, with flights from the Naval Air Station often passing over Packery Flats and University Beach while those from the Mustang Beach airport frequently passed over the Preserve. On several occasions, planes flying at lower altitudes over the Preserve were observed stirring up feeding/roosting groups of waterbirds (e.g., egrets, herons, shorebirds). This suggests that some planes, such as those flying at much lower altitudes, may cause a greater disturbance to birds on the landscape than those operating much higher above.

While both the Village and University Beach were surveyed less frequently than Packery and Port Aransas, disturbances were also consistently recorded at these sites as well. At the Village, Great-tailed Grackles, Laughing Gulls, and both coyote and domestic dog tracks accounted for the most frequently detected disturbances. At University Beach, the most frequent disturbances were beachgoers using the beach and nearby waters recreationally and Great-tailed Grackles. However, while vehicles were an infrequent disturbance at this site, one incident in late June involved a large vehicle traveling the full length of beach until reaching our fencing before turning around, which likely had an impact on both the active Least Tern colony and recently hatched Wilson's Plover chicks (which never fledged).

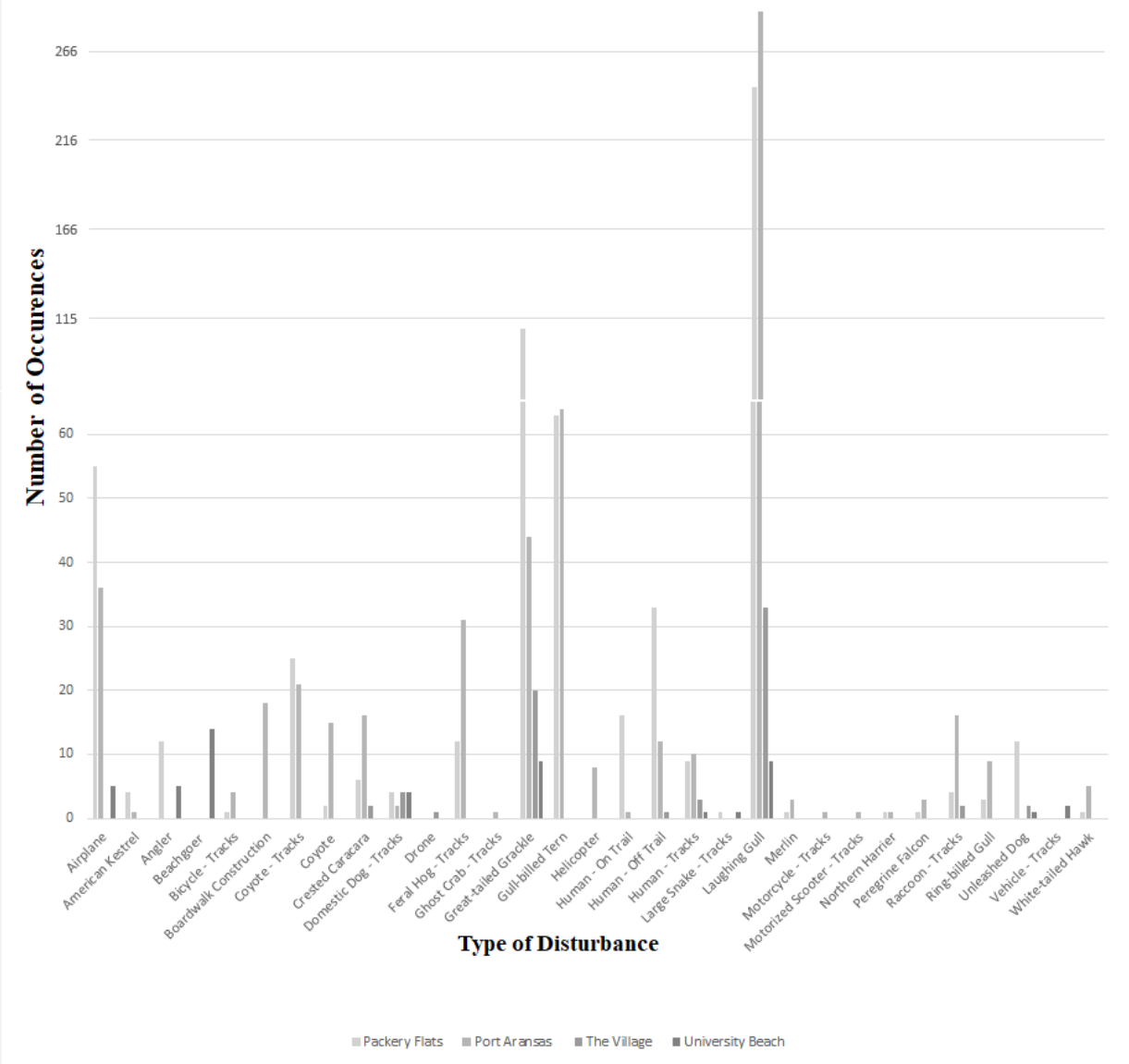

Figure 24. The number of surveys a particular disturbance was observed at Packery Flats, The Preserve, The Village, and University Beach

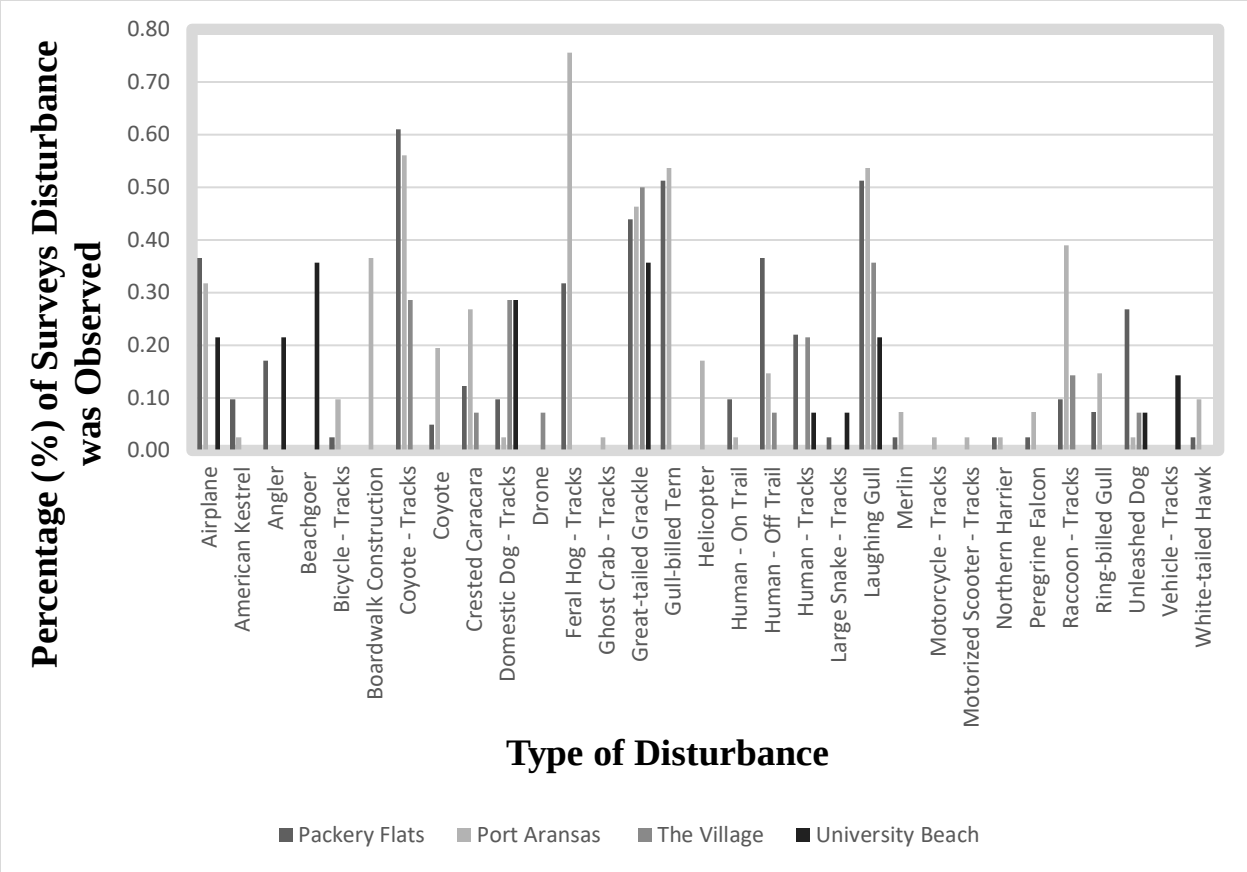

Figure 25. The percentage (%) of surveys that disturbances were detected at Packery Flats, the Preserve, the Village, and University Beach during the 2022 breeding season

Figure 26. (Top left) Feral hog tracks come close to active Snowy Plover nest
Figure 27. (Top right) Coyote walks through active plover nesting habitat at Port Aransas
Figure 28. (Bottom center) Crested Caracara being harassed by nearby Least Tern colony

Outreach

Several outreach events occurred throughout the season. These opportunities allowed for direct interaction with the public to discuss the conservation issues related to nesting waterbirds along the Texas coast and the on-going work being done through this long-term project. In February, alongside CBBEP biologist Justin LeClaire, a group of nine students from Flour Bluff ISD Intermediate were educated on shorebird nesting ecology and conservation prior to a trash clean up at the Packery Flats site (Figure 29). In April, Jess Cosentino attended the Earth Day Bay Day event at Heritage Park in downtown Corpus Christi and presented an educational table, parallel with the CBBEP Bird Program. They interacted with a continuous stream of up to 300 visitors (both adult and children), spoke about conservation issues related to colonial nesting waterbirds and both migratory and breeding shorebirds along coastal Texas, handed out educational materials, displayed a variety of waterbird skulls and bones across taxa, explained variation in morphology/feeding within bird groups, and discussed how the public could personally be conscious of sensitive nesting birds when out on beaches. Additionally, opportunistic education presented itself during monitoring efforts with anglers, dog walkers, and visitors to the Preserve and Packery Flats. These interactions often involved emphasizing proper trail use to prevent disturbing nesting birds and were generally met with positive, understanding responses.

Figure 29. CBBEP public outreach at Packery Flats in February 2022

DISCUSSION

Wilson's Plovers seemed to have had an average-to-above average breeding year compared to the long-term nine-year averages (at Port Aransas and Packery only). Hatch success was slightly higher at the Preserve and consistent with the long-term average at Packery Flats. The number of washed-out nests was lower than the average at both sites due to a lack of severe weather events, specifically thunderstorms and high-water, throughout the second half of the breeding season which allowed the sites to dry up. Nest failures were largely associated with depredation, with both the Preserve and Packery Flats sites experiencing higher than average rates due to a variety of predators. Coyote, feral hog, and raccoon tracks were documented regularly at both sites while Laughing Gulls, Great-tailed Grackles, Gull-billed Terns, and Crested Caracaras were as well.

Few downy chicks were observed post-hatch but this was likely due to well-camouflaged young birds hiding in vegetation along the mudflats until reaching fledging age. By mid-July, large groups of several hundred Wilson's Plovers were observed roosting at the Preserve with many of these being hatch-year birds, suggesting that nesting success was high at the site and across the island. Only two fledged birds were observed at Packery Flats but this may have been due to the site drying up very fast throughout June and July (Figure 30), while birds may have moved to more optimal foraging habitat on the island once able to fly. Long-term averages do not exist for the Village and University Beach sites due to inconsistent interannual monitoring efforts; however, the number of hatched nests at both was consistent with the rates observed in previous years when the sites were regularly monitored. Several hatch-year birds were observed in June at the Village, mixed in with roosting adult birds, suggesting that several nests successfully fledged at this site. The one nest at University Beach did not reach fledging age which may have been influenced by a large vehicle driving the full length of the beach just days after hatch in addition to consistent human beach activity with off-leash dogs during the same time.

Despite a lower-than-average number of nests found, Snowy Plovers appeared to experience a strong breeding year with a hatch rate that was nearly double the nine-year average. Cold temperatures coupled with consistent high winds during March seemed to postpone any nesting attempts, which has historically been a month when this species initiates early breeding at this site under favorable conditions. Very few birds were observed at the site throughout the entire month of May, only seeming to return in June, which likely contributed to lower-than-average overall nest numbers. However, following a few high-water events in mid-May, the site remained dry throughout July in an absence of any heavy rainfall/thunderstorms, which allowed birds to nest along both sand flats and dried algal mudflats. In early July, several hatch-year Snowy Plovers were observed foraging at the southern edge of the preserve, with at least one of these being a bird that was banded earlier in the season at the site (e.g., single red color band), suggesting that the species successfully fledged several nests at the site this year.

Nesting Least Terns appeared to do well at the Preserve while no colony ever established at Packery Flats, despite intermittent single digit birds being present and laying eggs early in the season. Comparatively, Packery Flats supported a large colony of upwards of 70 Least Terns in 2021; however, these birds suffered complete wipe-outs of nests during severe storms during that year. Perhaps this deterred birds from returning to the Packery Flats site in the following year. Several birds began nesting at the Village in May and downy chicks were observed on the

landscape in late May, but no fledged birds were seen on the site later into the season. At University Beach, the tern colony began nesting early in April and had several downy chicks but a single heavy rainfall event appeared to wipe them out. They returned in smaller numbers and attempted nesting later into May and June before abandoning those nests. These later season nests were very close to the beach edge which saw frequent beachgoer and angler traffic and may have contributed to abandonment due to regular disturbances.

Since high-water levels were absent at all four sites from the mid-breeding season (May) onward, nest failures were generally related to depredation and human disturbance. Human disturbance seemed greatest at Packery Flats followed by University Beach, both of which are sites where individuals are legally allowed to use the areas recreationally. At both sites, frequent off-leash dog walkers and anglers were observed, often very close to actively nesting birds, which likely had some impact. At Packery Flats, a single person was repeatedly observed from mid-April until June walking an off-leash dog through suitable Wilson's Plover nesting habitat and was spoken to in April yet returned frequently in the following weeks. This site is within the City of Corpus Christi limits which requires pets to be on leash (City ordinance 10-59), yet enforcement of this does not seem to be actively regulated. Regardless of regular human disturbance, several Wilson's Plover nests adjacent to the walking path and parking area did successfully hatch, suggesting that some nesting pairs may be resilient to the negative impacts of consistent human presence.

At the Preserve, there were multiple occasions of the same local individuals walking off-trail through active Least Tern and Wilson's Plover nesting habitat to access fishing areas, which is not open to public use. One of these occasions involved the individuals operating motorized recreational vehicles (e.g., scooters, Figure 31) to access fishing sites. They were spoken to; however, a hostile interaction ensued and was reported to the Preserve Manager (Rae Mooney). No further trespassing disruptions were documented following this occurrence. In early May, a person operating an off-road motorcycle with an off-leash dog was observed and confronted by the Preserve staff and reported to us during the following monitoring survey. This individual had driven through a large swath of suitable Wilson's and Snowy Plover nesting habitat during peak breeding period.

While human disturbance was documented at both sites, compliance with the protected fenced off areas seems to successfully continue to deter recreationists and anglers from walking through sensitive nesting habitat. Additionally, while some individuals were regularly seen with off-leashed dogs, visitors generally kept their dogs leashed and remained on designated trails. Footsteps and dog tracks were most frequently recorded at Packery Flats as people traveled from the parking area to fishing and water-access locations at both Newport Pass and Packery channel. The lack of a functional boardwalk at the Preserve likely attracted more visitors to walk out onto the algal and sand flats; however, on-going construction to restore the walkway is underway as of 2022 and should hopefully keep people off nesting habitat in subsequent years.

The monitoring of all four of these sites is planned to continue into 2023 and the beyond.


Figure 30. (Left) Dried mudflats at Packery Flats in early June 2022
Figure 31. (Right) Motorized recreational vehicle (scooter) tracks at the Preserve

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