

# Alabama Coastal Bird Stewardship Program: 2022 Report

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*Founded in 1946 as the Birmingham Audubon Society, Alabama Audubon has since grown to become the state's leading nonprofit promoting conservation and a greater knowledge of birds, their habitats, and the natural world. While we work closely with our partners at the National Audubon Society, we are an independent 501(c)(3) organization with staffed offices in Birmingham and on the Gulf Coast.*

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Alabama Audubon has been monitoring coastal bird populations and breeding success along the coast since the initiation of the Alabama Coastal Bird Stewardship Program in 2017. Our Coastal Bird Stewardship Program consists of three main components including stewardship, monitoring, and Audubon Coastal Bird Surveys.

## **Coastal Bird Stewardship**

During the 2022 breeding season symbolic fencing was used to protect ~60.00 acres of beach and island habitat at six sites, which had nesting snowy plovers, least terns, black skimmers, and gull-billed terns.

Staff and volunteers conducted outreach and stewardship activities during Memorial Day and Fourth of July weekends and 15 additional days throughout the nesting season to help minimize disturbance to nests and colonies, as well as educate beachgoers about beach nesting birds. These efforts were conducted at nine sites throughout Mobile and Baldwin Counties. 92 hours of stewardship were conducted by volunteers during April through August. This was primarily an opportunity to educate beachgoers about beach nesting birds and raise awareness of ways the public can help protect these birds and their chicks while on the beach. These efforts resulted in 878 positive educational interactions with the public. There were 10 instances where staff/volunteers had the opportunity to intervene in a situation where disturbance to a nesting area was occurring.

In 2022 we were also able to add Tern Island to our stewardship sites. This addition was prompted after human tracks were consistently found going through active nesting areas while conducting nesting surveys. Tern Island is one of Alabama's largest and most productive colonial nesting islands, and it is also a popular recreational site for boaters and fishermen. Our staff were present on the island on weekends in July and August for stewardship. We approached people as they anchored on the island to tell them about the birds and ask them to stay along the shoreline to minimize disturbance to nesting birds and their young. We talked with ~130 people. These efforts were largely successful, as many people were interested in learning about the birds and appeared to stay along the shoreline. Despite this, we observed off-leash dogs that even when running along the shore were too close for the least terns and caused the adults to continually flush, leaving eggs and young chicks exposed to heat and predators. We also observed human and dog tracks going through the colony, presumably on days we were not present. We plan to increase our stewardship efforts next season and add more signage to the island. Nonbreeding season stewardship also took place for a total of 6 hours during December. The focus of these efforts was to locate areas with large loafing and foraging flocks and educate beachgoers on the importance of not disturbing birds during this critical period.

We conducted Audubon Coastal Bird Surveys across 20 sites in Mobile and Baldwin counties, 11 of which were led by volunteers. Throughout 2022 volunteers conducted 135 ACBS surveys totaling 263 hours.

Alabama Audubon Coastal Programs tabled at 10 public events, led four birding walks, facilitated a beach clean-up on Dauphin Island, and led six programs for local schools and summer camps. During Alabama Coastal Birdfest, Audubon staff taught three workshops, led four birding field trips with volunteers, and tabled at the Bird and Conservation Expo. We also gave a presentation for three local community groups. The City of Orange Beach led programs including Hands on Habitat and Expect Excellence. This resulted in 164 outreach hours for the year. In total between stewardship, outreach, and Audubon Coastal Bird Surveys a total of 39 volunteers contributed 610 hours for 2022.



Figure 1. Student Conservation Association interns deploying fencing at a least tern colony.



**Figure 2. Volunteer stewards on the beach.**

## **Beach Nesting Bird Monitoring**

During the 2022 breeding season, Alabama Audubon coastal staff included two full-time Coastal Biologists, one full-time Coastal Outreach Manager, and two seasonal interns. Volunteer Drew Haffenden also monitored several sites on Dauphin Island consistently throughout the season. Volunteers contributed a total of 277 hours to beach nesting bird monitoring in 2022.

### **Study Area**

For site descriptions and maps of breeding season monitoring sites and Audubon Coastal Bird Survey routes, see ALCBSP Study Areas document, available at [alaudubon.org/reports](http://alaudubon.org/reports). Species monitored during the breeding season are listed in Table 1.

**Table 1. Study sites and associated nesting species during the 2022 breeding season.**

<b>Mobile County</b>	<b>Species</b>
Pelican Island, Dauphin Island	Snowy plover, least tern
Pelican Bay, Dauphin Island	n/a
Pelican Hook, Dauphin Island	n/a
Public Beach West, Dauphin Island	Snowy plover
Public Beach East, Dauphin Island	n/a
West End, Dauphin Island	n/a
Katrina Cut, Dauphin Island	Least tern
Far West End, Dauphin Island	Least tern, snowy plover, American oystercatcher
Little Dauphin Island, Dauphin Island	n/a
Cat Island, Portersville Bay	Black skimmer, American oystercatcher, gull-billed tern
Cedar Point, Dauphin Island	Least tern
Coffee Island, Portersville Bay	Least tern, black skimmer, American oystercatcher, gull-billed tern
Marsh Island, Portersville Bay	n/a
Tern Island, Portersville Bay	Least tern, black skimmer, gull-billed tern
Marsh Island, Grand Bay	American oystercatcher
Lightning Point, Coden	Wilson's plover
<b>Baldwin County</b>	<b>Species</b>
Beach Club Resort and Spa, Fort Morgan	Least tern
Gulf Highlands, Fort Morgan	Least tern
Gulf State Park, Gulf Shores	Least tern
Piggly Wiggly, Fairhope	Least tern
Bayfront Park, Daphne	Least tern
Alabama Point, Orange Beach	Least tern
Alabama Point West, Orange Beach	Least tern
No Fly Zone, Orange Beach	Least tern
Shallow Lot, Orange Beach	Least tern



Summer Salt, Orange Beach	Least tern
Walker Island, Orange Beach	n/a
Robinson Island, Orange Beach	n/a
Bird Island, Orange Beach	n/a

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## Survey Methods

Mainland and barrier island sites with no breeding activity were surveyed once per week and sites with breeding activity were surveyed twice per week. Nearshore islands were surveyed approximately once per week, as weather and boat availability allowed.

We began solitary nesting surveys (i.e., American oystercatcher, snowy plover) in early-February to search for adult birds displaying breeding behaviors. When breeding adults or active nests were found, we recorded the adults' behavior, number of eggs or chicks, number and location of roving chicks, and active disturbances and/or predator tracks within 50 ft of nests/chicks. If a nest failed, we determined the cause using evidence observed in or around the nest including predator tracks, eggshell fragments, wrack lines, or saturated substrate. If we were unable to determine the cause of failure, it was recorded as unknown. Similarly, if we were unsure if a nest hatched or failed, the nest fate was recorded as unknown. We conducted 338 Solitary surveys during February–August.

We began colonial nesting surveys (i.e., black skimmer, least tern) in late-May. Sites that had nesting activity in past years were fenced prior to birds arriving. During colony surveys we recorded the number of adult birds, pairs (i.e., birds that were displaying breeding behaviors or actively incubating a nest), nests, chicks, fledglings, and any predator tracks and/or active disturbances within 50 ft of the colony. We recorded least tern chicks by age categories; 1–5, 6–10, 11–15, and 16–20 days. The chicks of other colonial species were categorized as downy, feathered, or fledged. Internal surveys were conducted if it did not cause excess disturbance to the colony, however once chicks were present in a colony all surveys were external. We conducted 581 colonial surveys across all sites during April–August.

We calculated the overall productivity (fledglings/pair) across all sites for the solitary nesting species, and the productivity per site and overall, for the colonial nesting species. Two methods were used when calculating the overall productivity for colonial nesting species. Method 1 consisted of dividing the total fledgling estimate by the number of breeding pairs. Method 2 was dividing the maximum number of fledglings observed on a single day by the maximum number of nests observed on a single day. This method is used by other researchers along the Gulf Coast and will allow us to compare productivity estimates.

## Snowy Plover

We monitored 13 snowy plover nests during the 2022 breeding season, all of which were located on Dauphin Island (Table 2; Figures 3 and 4). Of those nests, three were on Pelican Island peninsula, one on Public Beach West, and nine on the Far West End. Two additional nests on the Far West End were not found during the incubation period, but chicks were located shortly after hatching. Of the three nests on Pelican Island, one was confirmed to have hatched three chicks, one was lost to high winds during a storm, and one was lost to fox depredation. The nest on Public Beach West was also lost to fox depredation. Of the nine tracked nests on the Far West End, two hatched a total of three chicks. We placed a predator enclosure around one nest which succeeded in protecting the eggs from depredation, however the nest was abandoned within days of the estimated hatch date. Two of the nests on the Far West End were found depredated, one by a fox and the other by an unknown predator. One nest was lost due to overwash from a storm, and the remaining three nests had unknown fates. We observed a juvenile snowy plover on the Far West End with two unbanded adults on 22 June and 27 June, however it is unknown if the natal nest was located on Dauphin Island or if it had come from a different location. We observed an additional pair on Tern Island on 10 May with a fresh scrape, but we did not find an active nest on any subsequent surveys. Productivity across all sites was estimated to be 0.08 fledglings/pair. Only pairs with nests were included in calculating this estimate.

**Table 2. Snowy plover breeding season metrics in 2022.**

Site	Pairs	Nests	Failed Nests	Chicks	Fledglings
Tern Island	1	0	0	0	0
Pelican Island	2	3	2	3	0
Public Beach West	1	1	1	0	0
Far West End	9	11*	7	7	1**

\*Includes the two nests that were found after hatching.

\*\*Natal nest is unknown but is believed to have come from the Far West End.

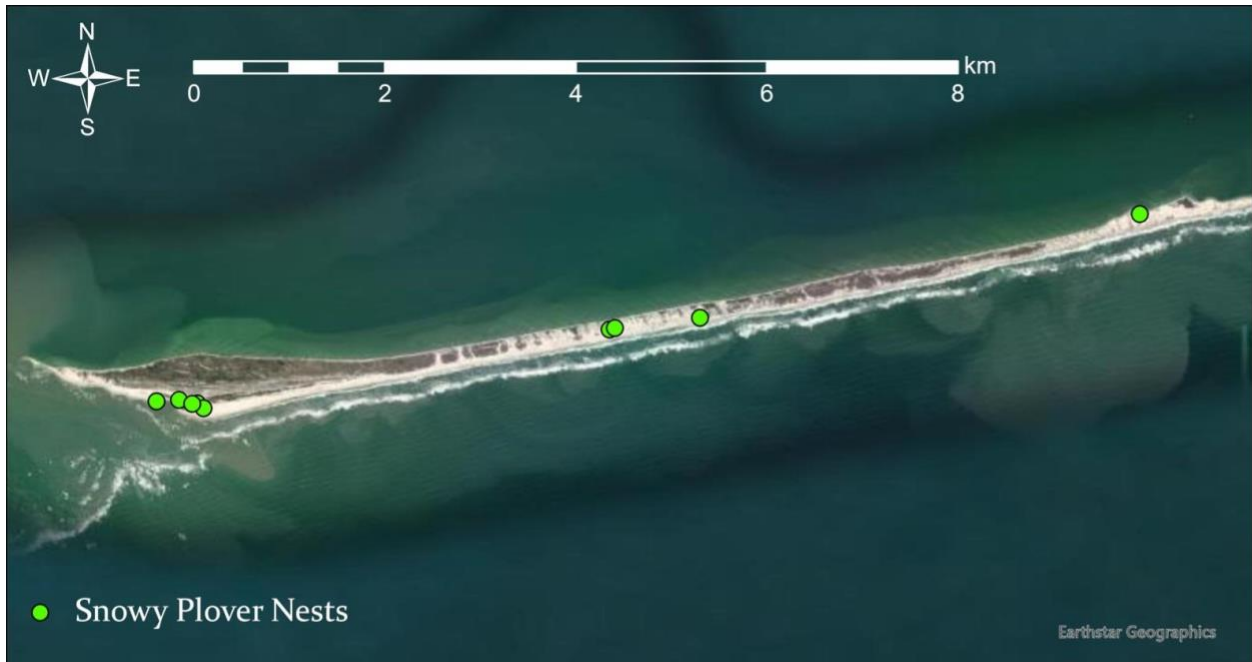


Figure 3. Locations of snowy plover nests on the west end of Dauphin Island in 2022.



Figure 4. Locations of snowy plover nests on the east end of Dauphin Island in 2022.

## American Oystercatcher

We monitored seven American oystercatcher nests; five on Coffee Island, one on Marsh Island in Grand Bay, and one on the Far West End of Dauphin Island (Table 3; Figure 5). Three additional nests were found after hatching. One chick, ~3 days old, was found on the northern section of Coffee Island on 18 May, though we don't believe the chick survived as it was not re-sighted during later surveys. On 09 August we found two chicks, ~40 days old, in the same general location as the previous one, which was likely a re-nest from the same pair. We also found two chicks, ~4 days old, on Cat Island, both of which reached fledging age. The nest on Far West End was likely lost to fox depredation as tracks were found in the location where the nest was previously seen. Four of the nests on Coffee Island were lost due to overwash and one had an unknown fate. Three of the nests on Coffee Island belonged to banded oystercatchers, two to a male banded (red CO) and one to a male banded (blue JT). Unfortunately, "JT" was found deceased on 11 April with no obvious cause of death, shortly after his nest was lost due to overwash. The nest located on Marsh Island in Grand Bay hatched and fledged three chicks. The productivity across all sites was estimated to be 0.88 fledglings/pair. Only pairs that had nests were included in calculating the productivity estimate.

**Table 3. American oystercatcher breeding season metrics in 2022.**

Site	Pairs	Nests	Failed Nests	Chicks	Fledglings
Dauphin Island	1	1	1	0	0
Cat Island	1	1	0	2	2
Coffee Island	5	7	5	3	2
Marsh Island, Grand Bay	1	1	0	3	3
Marsh Island, Portersville Bay*	1	0	0	0	0
Murder Point*	1	0	0	0	0

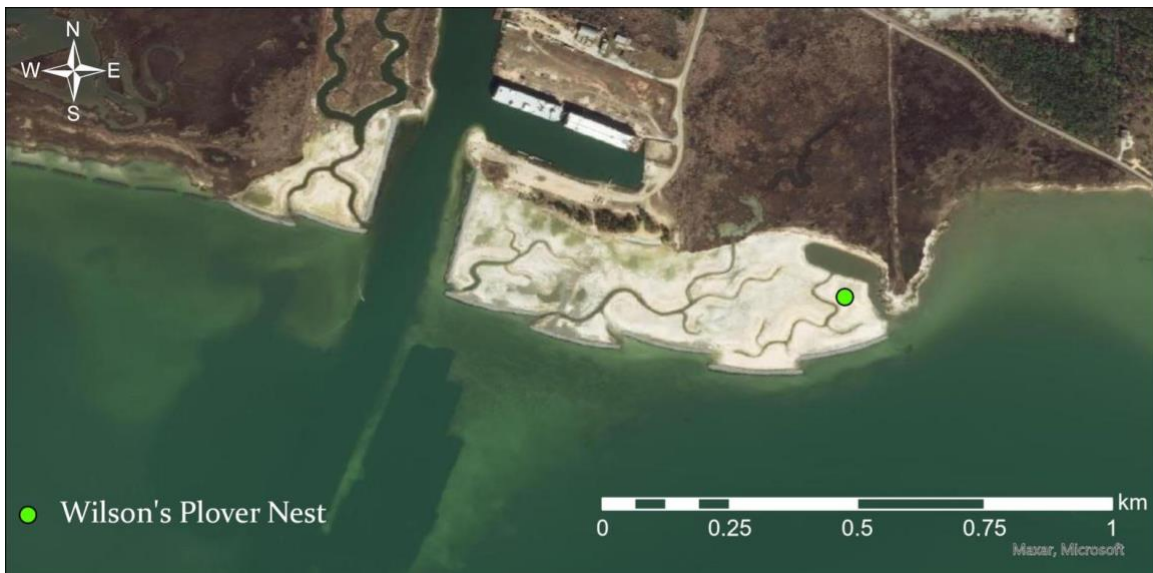
\*Pairs were observed at these sites, but we did not find nests.



**Figure 5. American oystercatcher nest locations during the 2022 breeding season.**

### Wilson's Plover

We monitored one Wilson's plover nest this year; the first confirmed nest recorded in the state since 2016. The nest was located at Lightning Point (Figure 6) and found on 24 May, with an estimated initiation date of 18 May. The nest was found inactive on 16 June, though we were not able to find chicks and the adults' behavior did not indicate that chicks were nearby. We believe that the nest hatched, and the chicks were depredated soon after, as there were no predator tracks seen in or around the empty nest scrape.



**Figure 6. Wilson's plover nest location at Lightning Point.**

## Black Skimmer

We monitored black skimmer colonies on three nearshore islands during the 2022 breeding season; Cat Island, Coffee Island, and Tern Island (Table 4; Figure 7). We used different methods to best estimate the total nest, chick, and fledgling counts for each island and calculated productivity estimates for each and across all sites. Methods used were based on the frequency of monitoring and ability to obtain accurate counts on the different islands.

For Cat Island, we estimated the total nest count as the highest one-day internal survey count (41). The chick count was estimated by using the highest one-day chick count (35) and adding two downy chicks that were observed 20 days later. The low fledgling estimate was the highest one-day fledgling count (20). The high estimate was the highest one-day count with the addition of six feathered chicks observed that day, assuming they all survived to fledging age.

Coffee Island's nest count was estimated with the highest one-day internal nest count (41) plus four new nests that we observed 47 days later. We estimated the chick count by taking the highest one-day count (44) and adding the downy chick count approximately every 10 days after, assuming that after a 10-day interval each new downy chick was uncounted on the previous survey. The low fledgling estimate was the highest one-day fledgling count (32), and the high estimate was the total chick estimate minus deceased chicks that were observed on the first internal survey conducted after breeding on the island ended.

Tern Island's nest count was the highest one-day count (66) plus 18 nests that were observed 28 days later, and another two nests observed 27 days after that. We estimated the chick count with the total number of feathered chicks observed throughout the season, except for a survey that was conducted four days after the previous one. The low fledgling estimate was the one-day fledgling count on 25 July (45), and the highest estimate was the one-day fledgling count on 07 August (66). It is possible that as the season progresses fledglings will move to different locations, therefore it is possible that some fledglings counted on Tern Island had come from colonies on different islands.

We looked at total fledgling numbers on all three islands across a two-day period (Tern Island on 07 August, Cat and Coffee Islands on 09 August) to estimate the total number of fledglings across the three sites. We counted 99 fledglings (66 on Tern, 22 on Cat, and 11 on Coffee) which is one less than the cumulative low fledgling estimates per island (100). Using method 1, overall productivity across the three sites was estimated as 0.63–0.96 fledglings/pair. With method 2 we calculated an overall productivity of 0.66–0.80 fledglings/pair.

**Table 4. Black skimmer breeding season metrics in 2022 (chicks are minimum estimate).**

Site	Pairs	Nests	Chicks	Fledglings	Productivity
Cat Island	41	41	37	20–26	0.49–0.63
Coffee Island	41	45	63	32–60	0.85–1.46
Tern Island	66–86*	86	70	45–66	0.59–0.87
Total	148–168*	172	170	97–152	0.63–0.96

\*Average number of pairs used for productivity estimate.



**Figure 7. Black skimmer colony locations during the 2022 breeding season.**

### Least Tern

We monitored least tern colonies at 15 sites throughout Mobile and Baldwin Counties, including two nearshore islands, two rooftops, four barrier islands sites, one bayshore site, and six mainland sites (Table 5; Figure 8). We calculated the productivity of each site as well as overall productivity using both methods 1 and 2.

For most of the colonies, we were able to gather direct nest and chick counts as they were relatively small. However, due to the large size of the colony on Tern Island we used different methods to estimate nest, chick, and fledgling numbers. For the nest count we used the highest one-day internal survey count, with the addition of downy chicks that were observed, as the minimum estimate. The maximum nest estimate was the highest one-day external survey count, where adult birds that appeared to be incubating were counted as a nest. We estimated the total number of chicks on the

island using the highest one-day count of all downy, feathered, and fledged chicks. For the fledgling estimate we used the highest one-day fledgling count, plus chicks within the 16 to 20-day age category observed on that day and the subsequent survey, assuming they all survived to fledgling age.

The overall productivity using method 1 was 0.13–0.19 fledglings/pair and using method 2 was 0.11–0.17 fledglings/pair. Only pairs that had nests were included in the calculations for productivity. Causes of nest and chick loss included mammalian and avian predation, human disturbance, and weather events. The colony at Beach Club Resort and Spa experienced multiple instances of chick and nest loss, likely due to coyote predation. Multiple small colonies attempted to nest on Dauphin Island sites including Katrina Cut and Pelican Island Peninsula, though these nests were lost to storms and overwash.

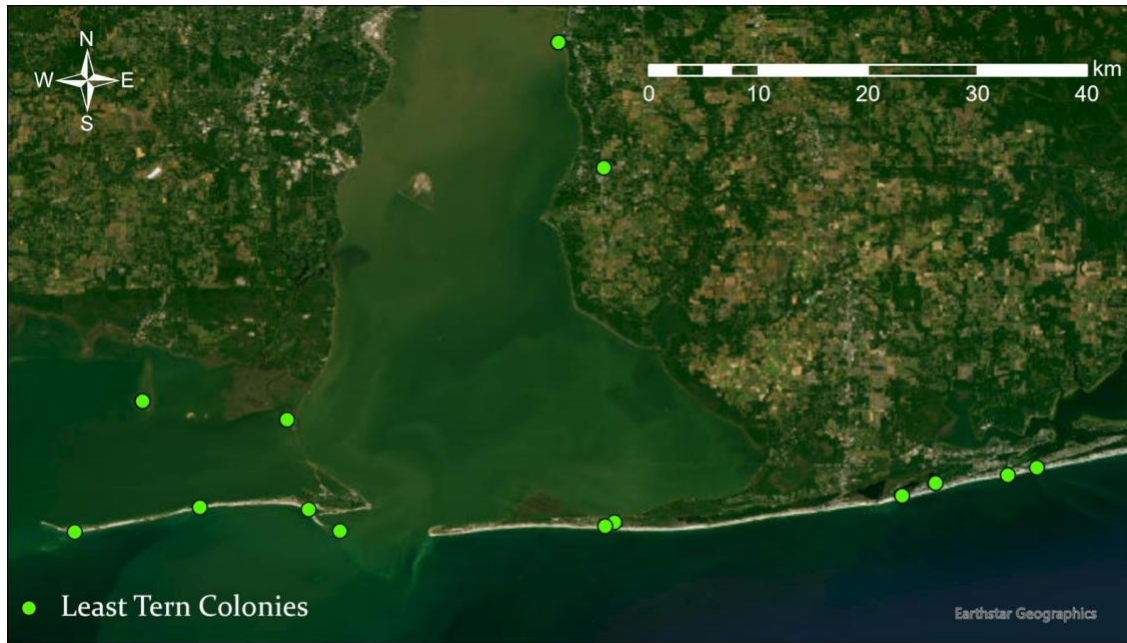
**Table 5. Least tern breeding season metrics for 2022.**

Site	Pairs	Nests	Failed Nests	Chicks	Fledglings	Productivity
Alabama Point East	<b>151</b>	182	–	41	14	0.09
Shallow Lot	<b>24</b>	31	17	14	8	0.33
Summer Salt	23	<b>22</b>	19	3	0	0.00
Beach Club Resort & Spa	33	<b>32</b>	26	10	0	0.00
Gulf Highlands	3	<b>1</b>	1	0	0	0.00
Gulf State Park	7	<b>6</b>	6	0	0	0.00
Piggly Wiggly Rooftop	20	<b>19</b>	16	5	1*	0.05
Bayfront Park	5	<b>5</b>	5	0	0	0.00
Far West End	28	<b>5</b>	4	1	0	0.00
Pelican Island	6	0	0	0	0	0.00
Katrina Cut	2	<b>1</b>	1	0	0	0.00
Cedar Point	3	<b>1</b>	1	0	0	0.00
Coffee Island	10	<b>6</b>	6	0	0	0.00
Tern Island	330	<b>128–307</b>	–	94	55	0.18–0.43
<b>Total</b>	645	439-618	–	166	77	0.13–0.19**

\*One chick survived to fledging age (21 days) but we did not observe it flying and it was not present at the next check ~1 week later.

\*\*The numbers in bold were used to estimate total productivity.





**Figure 8. Least tern colony locations during the 2022 breeding season.**

### Gull-billed Tern

We monitored gull-billed tern colonies on three nearshore islands; Cat Island, Coffee Island, and Tern Island (Table 6; Figure 9). The colonies were relatively small, with Coffee Island producing the most fledged chicks. We estimated productivity using the same methods as above for each island, as well as across all sites.

Cat Island's nest count was estimated with the highest one-day count (22) plus one nest observed 30 days prior. We used the highest one-day chick count and the highest one-day fledgling count for the chick and fledgling estimates.

Coffee Island's nest count was the highest one-day count (32) plus 16 nests observed 30 days later. The low range of the pair count is assuming that the 16 nests were renests, and the high range count is assuming they were from new breeding pairs to the island. We estimated the chick count by using the highest one-day count (7) and adding downy chicks observed every ~10 days, assuming that after every 10 days downy chicks will be new and uncounted. The low range fledgling count was the highest one-day count (8). The high range count was that highest one-day count plus three feathered chicks that we observed 24 days later, assuming they all survived to fledging age.

The Tern Island nest count was the highest one-day count. The chick count was the highest one-day count plus one downy chick observed 13 days later. The fledgling count was the highest one-day count.

Overall productivity with method 1 was 0.22–0.26 fledglings/pair. Using method 2, productivity across all sites was 0.25 fledglings/pair.

**Table 6. Gull-billed tern breeding season metrics in 2022.**

Site	Pairs	Nests	Chicks	Fledglings	Productivity
Cat Island	23	23	6	5	0.22
Coffee Island	32–48*	48	13	8–11	0.20–0.28
Tern Island	9	9	3	3	0.33
Total	64–80*	80	22	16–19	0.22–0.26

\*Average number of pairs used to estimate productivity.



**Figure 9. Gull-billed tern colony locations during the 2022 breeding season.**

### Reddish Egret

We did not find any reddish egret nests this season; however, we did consistently observe them on the Far West End, Pelican Island peninsula, and Tern Island throughout the breeding season. We recorded reddish egrets loafing on Coffee Island and Marsh Island on a few occasions as well. Those islands provide suitable nesting habitat for wading birds as we observed nesting colonies of white ibis, great egrets, snowy egrets, and tricolored herons. Much of those areas are either inaccessible or difficult to reach, so it is possible that reddish egrets nested within the colonies, and we were simply unable to see them.

### Caspian Tern, Royal Tern, Sandwich Tern

Caspian terns nested on Cat and Coffee Islands, royal terns nested on Cat, Coffee, Marsh, and Tern Islands, and sandwich terns nested on Cat, Marsh, and Tern Islands (Table 7). Estimates were made for the number of nests, chicks, and fledglings using similar methods as described above. Productivity was estimated at 0.10

fledglings/pair for sandwich terns, 0.37 for royal terns, and 0.32 for Caspian terns, with each method producing the same results.

**Table 7. Breeding season metrics for Caspian terns, royal terns, and sandwich terns in 2022.**

Site	Species	Pairs	Nests	Chicks	Fledglings	Productivity
Cat Island	Caspian Tern	175	177	82	49	0.28
Cat Island	Royal Tern	135	135	75	52	0.39
Cat Island	Sandwich Tern	66	66	19	7	0.11
Coffee Island	Caspian Tern	25	36	27	15	0.60
Coffee Island	Royal Tern	3	3	0	0	0.00
Marsh Island, Portersville Bay*	Royal Tern	150	147	N/A	50	0.34
Marsh Island, Portersville Bay*	Sandwich Tern	9	9	N/A	N/A	N/A
Tern Island	Royal Tern	36	36	30	17	0.47
Tern Island	Sandwich Tern	2	2	0	0	0.00

\*Marsh Island was surveyed from the boat due to large numbers of laughing gulls being present and causing predation risk to royal tern and sandwich tern nests. Thus, chick and fledgling counts were not obtained or likely low.

## Predation and Disturbance

Predation was a significant cause of nest failure on mainland, barrier island, and bayshore sites in Baldwin and Mobile Counties. We observed signs of fox depredation (tracks, eggshell fragments) at five solitary nests in Mobile County including three snowy plover, one American oystercatcher, and one killdeer nest. Four of those depredation events occurred on Dauphin Island sites and one occurred at Lightning Point.

In Baldwin County we observed evidence of coyote predation and disturbance at six nesting sites, including tracks among empty nest scrapes at a small least tern colony at Gulf State Park. Of the six nests observed at the site, none were active for more than ten days. Coyote tracks were also observed throughout the site at Gulf Highlands. Though there were no confirmed depredations, we believe disturbance from coyotes could have caused abandonment of a least tern and killdeer nest. Tracks were observed within 15 m of a least tern nest on five out of six nest checks, and no adult birds were seen incubating the nest after the first observation. Tracks were also observed at a one-egg killdeer nest, though no adult birds were nearby the nest on any subsequent surveys. At Orange Beach sites, causes of nest loss including depredation by coyotes and foxes. At the Beach Club Resort & Spa, multiple instances of least tern nest and chick loss were attributed to coyote predation. A game camera that we deployed at the site failed to capture evidence of predation or

disturbance. We believe this was due to a malfunction of the camera rather than lack of disturbance, as new signage was installed at the site in range of the camera though the camera was not triggered. However, eggshell fragments were observed in an empty least tern nest scrape and coyote tracks were observed within 0.5 m of a recently hatched killdeer nest on an adjacent lot. A small least tern colony was also observed for the first time at Bayfront Park, a bayshore site located in Daphne. We recorded five nests at the site, none of which hatched. While there was no direct evidence of predation, tracks observed near the nests included Canada goose, raccoon, and dog. Active disturbance of the colony from avian predators was also recorded including common grackles, fish crows, laughing gulls, and a raptor species.

## Predator Surveys

Standardized predator surveys were conducted at various sites throughout Mobile and Baldwin Counties to understand predation pressure to breeding shorebirds. We randomly selected locations along a breeding bird survey route to conduct the predator track surveys. We recorded all predator and human tracks within a 10m diameter of the point. Ghost crab tracks and holes are denoted as GHCR-T, GHCR-H, respectively. Other data points that were recorded included: substrate type (packed sand, loose sand, soft mud, hard mud, shell hash), ground saturation (dry, moist, saturated, puddled), beach zone (forebeach, backbeach, foredunes, interdunes, backdunes, tidal flat/salt flat), and ground cover. We also noted any recent wind and rain within 24 hours.

### *Mobile County Sites*

We conducted predator track surveys along seven routes on Dauphin Island; Public Beach East, Pelican Bay, Pelican Island, Public Beach West, Dauphin Island West End, Katrina Cut, and Far West End. One survey was conducted during each site visit except for Far West End where three surveys were conducted per visit.

We conducted 128 predator surveys across all Dauphin Island sites including 11 on Public Beach East (Figure 10), one on Pelican Bay, 19 on Pelican Island (Figure 11), 14 on Public Beach West (Figure 12), seven on Dauphin Island West End (Figure 13), seven on Katrina Cut (Figure 14), and 69 on Far West End (Figure 15). Fox tracks were recorded on all sites except for Public Beach West. They were most prevalent on the back beach and back dunes, occurring in 64% and 100% of surveys completed in those beach zones, respectively. Evidence of ghost crabs, including tracks and/or holes, were recorded on all sites. They occurred in over half of surveys conducted on each beach zone but were most prevalent on the back beach (79%) and back dunes (100%). Human footprints were also recorded on each site, predominantly on the forebeach (57%) and back dunes (75%). Gull tracks were recorded on Pelican Island and Far West End but were only present on the forebeach and back beach zones. Other tracks included nutria, heron, and owl.

We conducted two predator surveys on Pelican Island that were within 100 m of an active snowy plover nest, one of which contained human prints and ghost crab tracks. On Far West End, we conducted five predator surveys within 100 m of active snowy plover nests, with one survey per

nest. Ghost crab holes were recorded in four of those surveys, fox tracks in three, and human footprints in one.

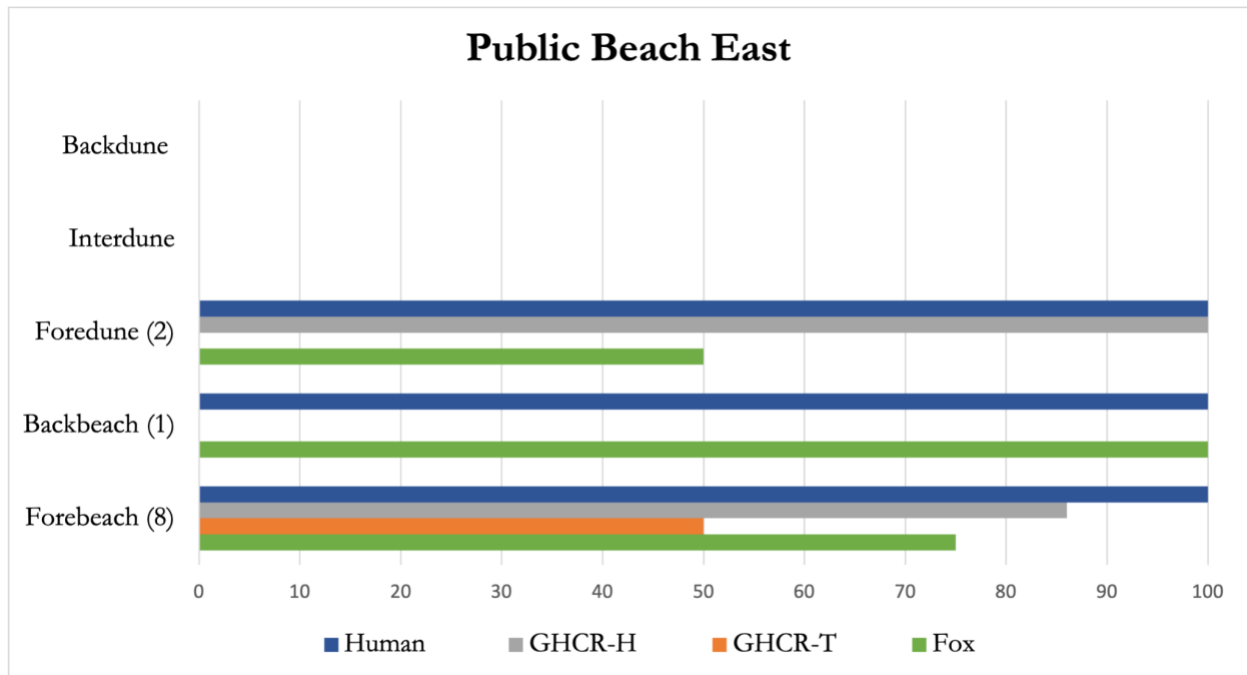


Figure 10. Percentages of high priority predator presence documented on Public Beach East. Numbers next to the beach zone are the total number of circle surveys conducted at the site.

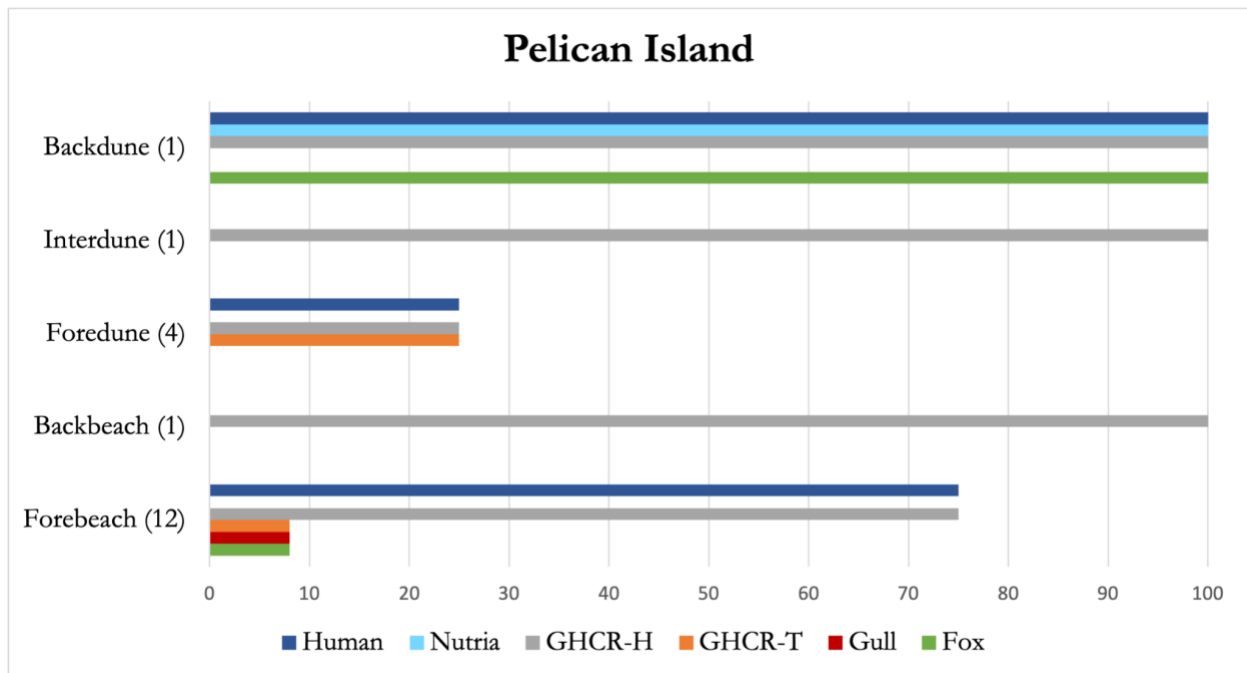
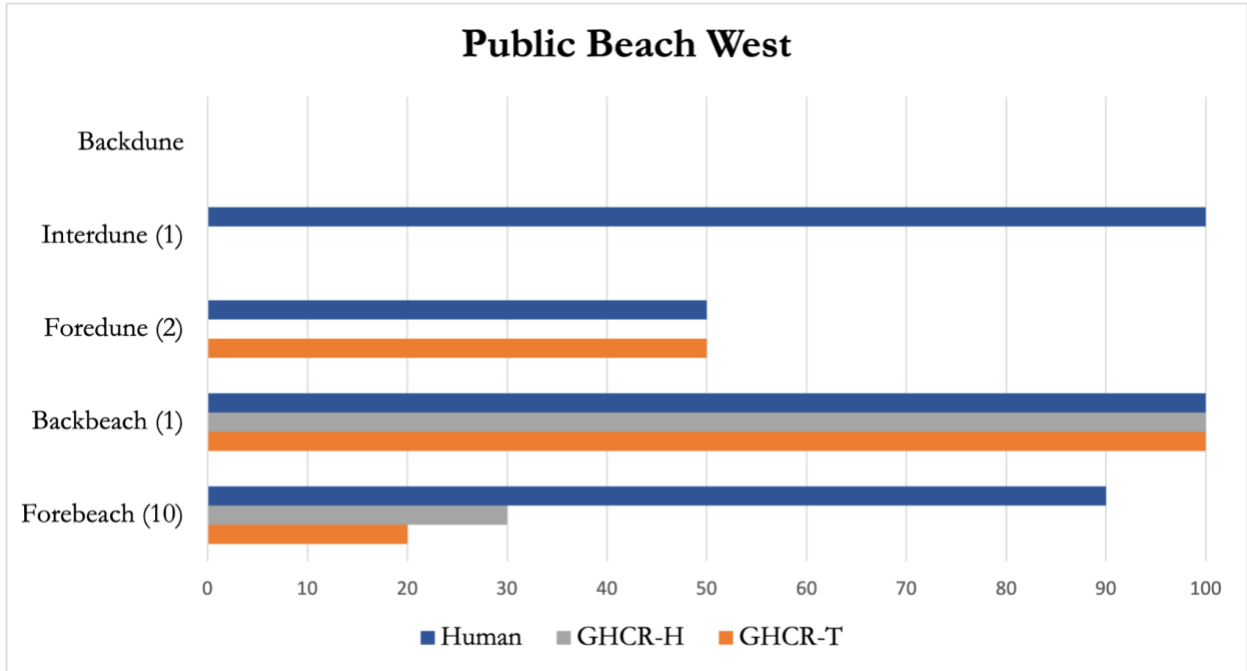
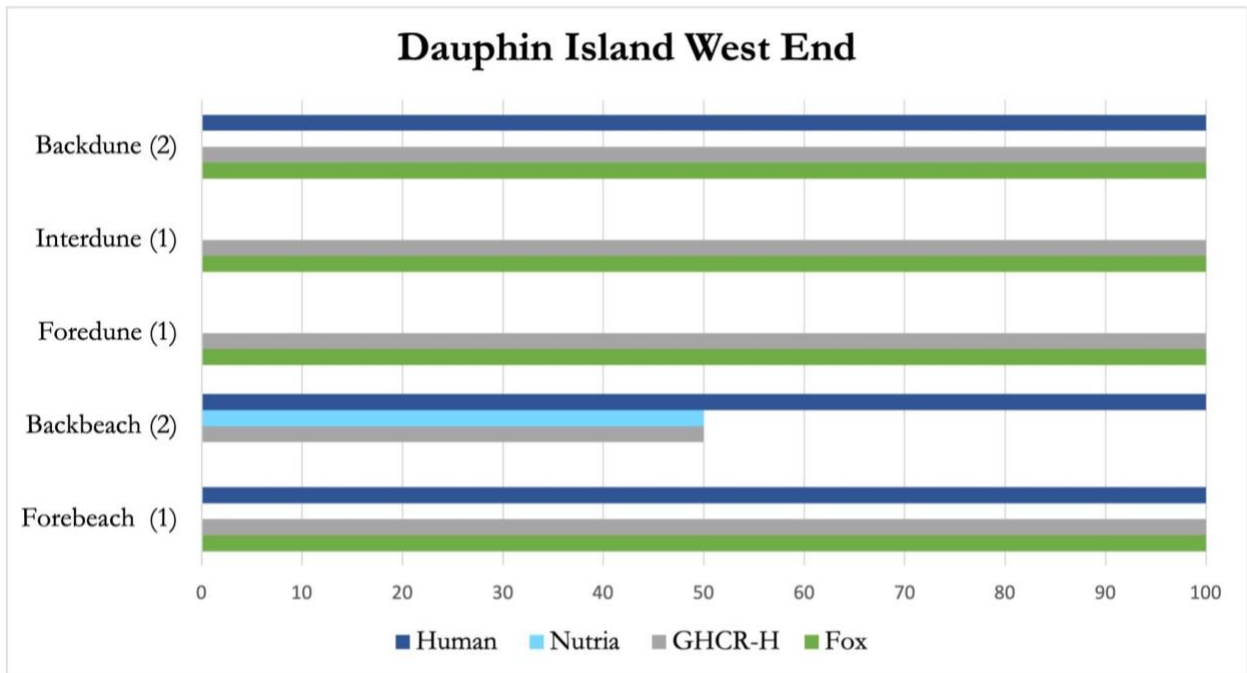


Figure 11. Percentages of high priority predator presence documented on Pelican Island. Numbers next to the beach zone are the total number of circle surveys conducted at the site.



**Figure 12. Percentages of high priority predator presence documented on Public Beach West. Numbers next to the beach zone are the total number of circle surveys conducted at the site.**



**Figure 13. Percentages of high priority predator presence documented on Dauphin Island West End. Numbers next to the beach zone are the total number of circle surveys conducted at the site.**

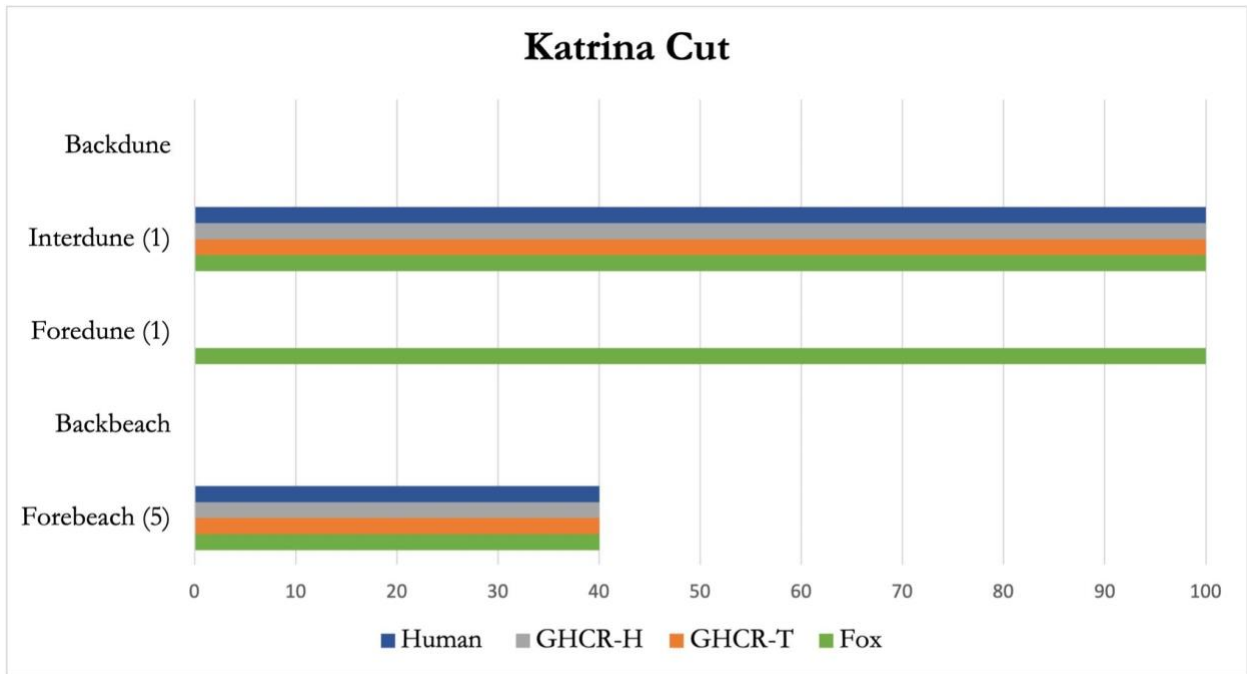


Figure 14. Percentages of high priority predator presence documented on Katrina Cut. Numbers next to the beach zone are the total number of circle surveys conducted at the site.

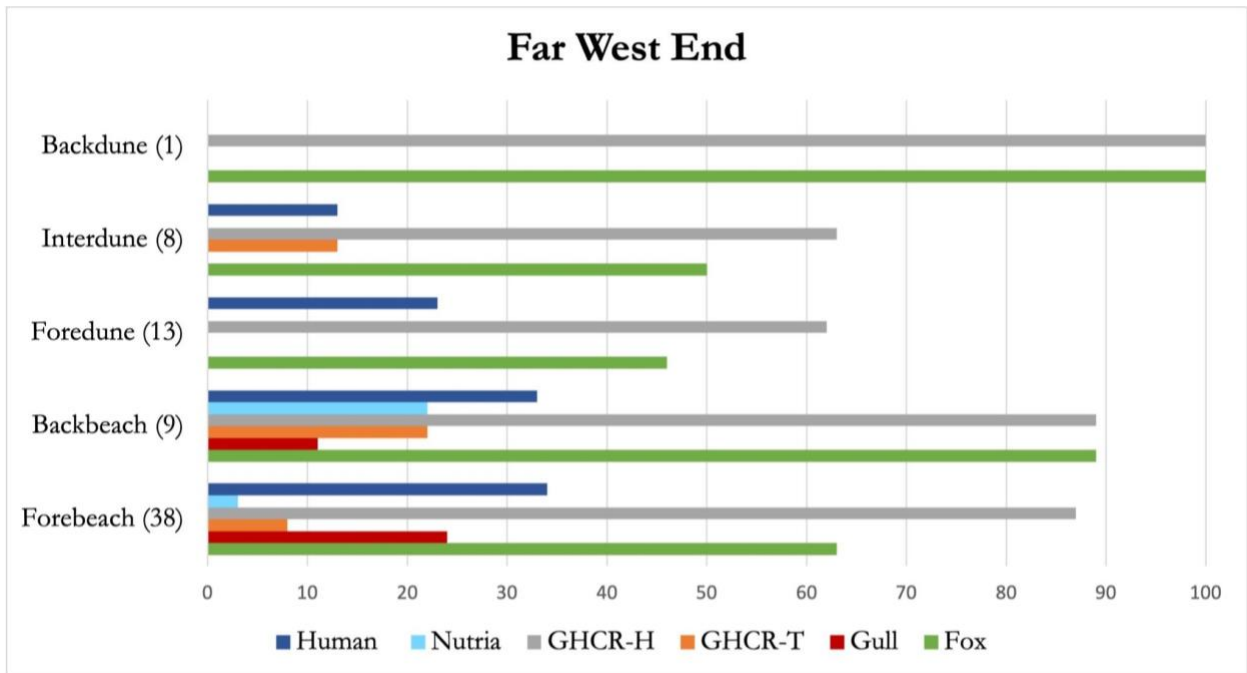


Figure 15. Percentages of high priority predator presence documented on Far West End. Numbers next to the beach zone are the total number of circle surveys conducted at the site.

### *Baldwin County Sites*

We conducted predator surveys on 11 sites in Baldwin County including Gulf State Park East (Figure 16), Gulf State Park West (Figure 17), Gulf Highlands (Figure 18), Alabama Point East (Figure 19), Alabama Point West (Figure 20), Bird Island, Robinson Island, Walker Island, No Fly Zone (Figure 21), Shallow Low (Figure 22), and Summer Salt. The beaches at Gulf State Park and Orange Beach sites are subject to beach raking during the summer months. This could lead to underrepresented predator activity on the forebeach and back beach zones where raking occurs.

We conducted 245 predator surveys including 100 at Gulf State Park East, 32 at Gulf State Park West, and 44 at Gulf Highlands, 25 at Alabama Point East, 11 at Alabama Point West, five at Bird Island, five at Robinson Island, two at Walker Island, 11 at No Fly Zone, nine at Shallow Lot, and one at Summer Salt. The following results are from mainland beach sites. Coyote tracks were recorded at each site and were most prevalent on the foredunes occurring in 48% of surveys conducted in that beach zone. They were also recorded in over one quarter of surveys completed on the back beach (27%), interdune (25%), and backdune (27%). Fox tracks were recorded on Gulf State Park East, Alabama Point East, No Fly Zone, and Shallow Lot with relatively low frequency. Evidence of ghost crabs were recorded at all sites and occurred in over half of surveys conducted in each beach zone. They were most prevalent in the interdunes and backdunes with tracks and/or holes being recorded in 85% of surveys for both zones. The forebeach and foredunes also had a high frequency with evidence in 83% and 81% of surveys, respectively. We recorded human footprints in all beach zones with the most prevalence in the forebeach (96%) and back beach (84%). The foredunes, interdunes, and backdunes had a low frequency of human prints recorded with 24%, 15%, and 06%, respectively. Gull tracks were recorded at all sites except Gulf Highlands and were primarily located on the forebeach and back beach zones. Other tracks observed include heron, owl, eagle, opossum, bobcat, and snake.



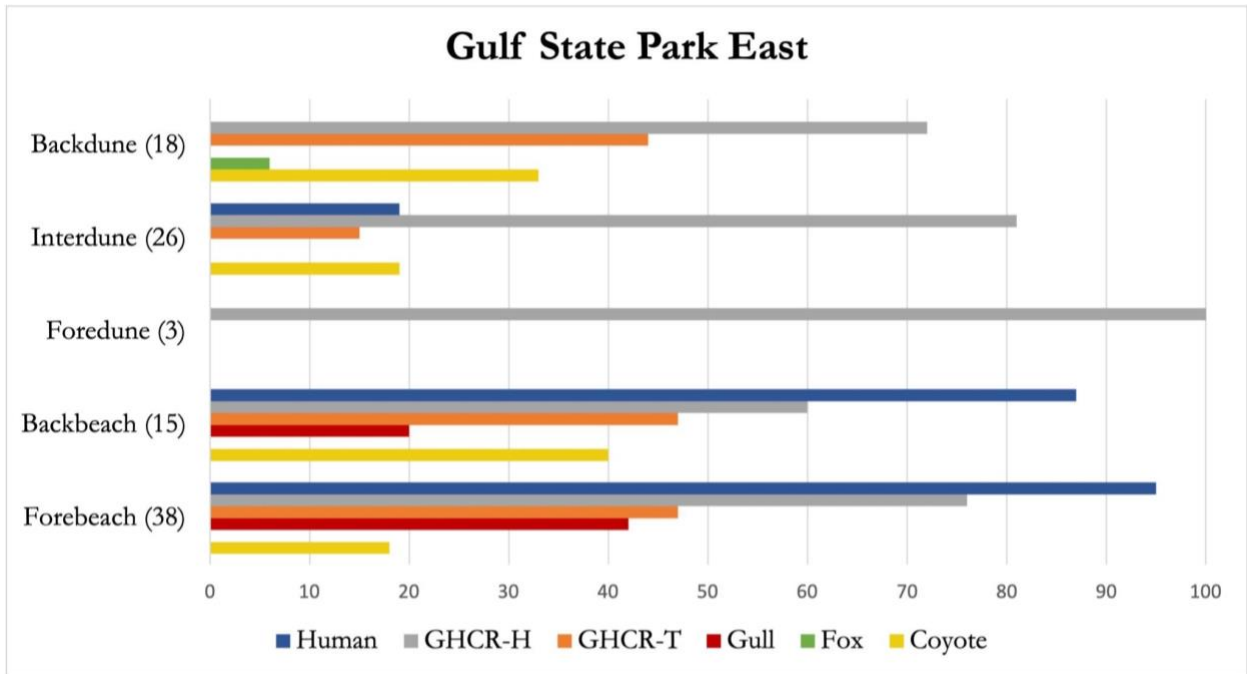


Figure 16. Percentages of high priority predator presence documented on Gulf State Park East. Numbers next to the beach zone are the total number of circle surveys conducted at the site.

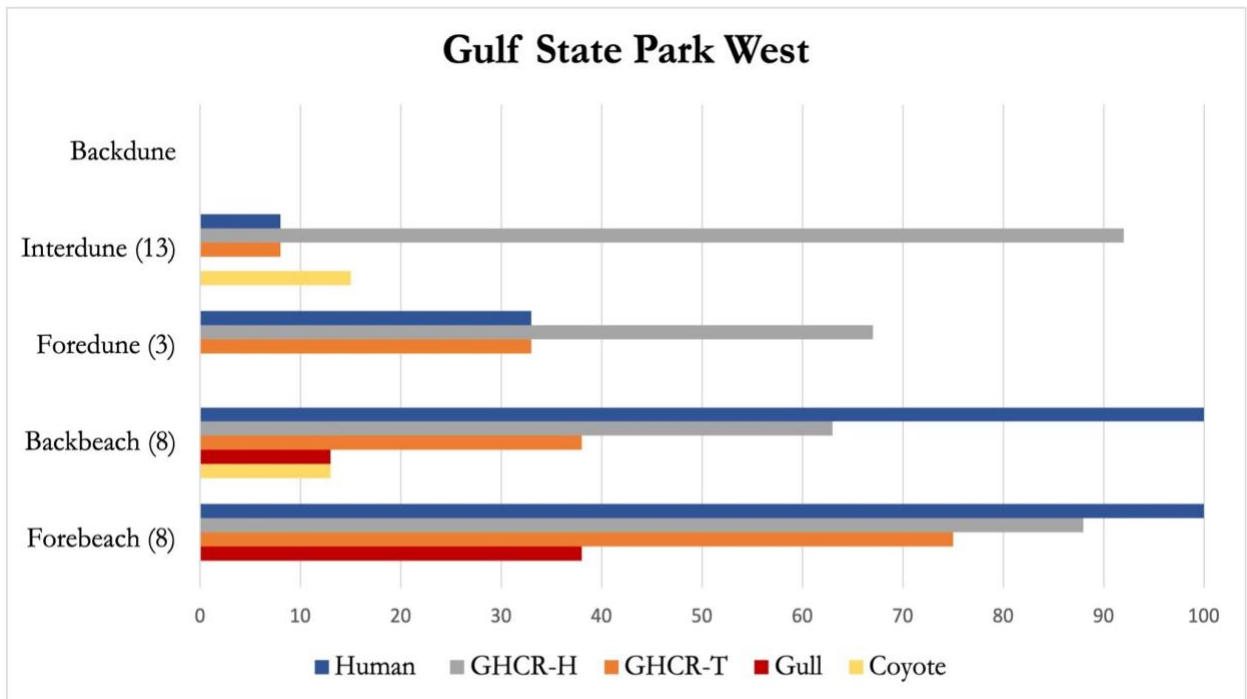


Figure 17. Percentages of high priority predator presence documented on Gulf State Park West. Numbers next to the beach zone are the total number of circle surveys conducted at the site.

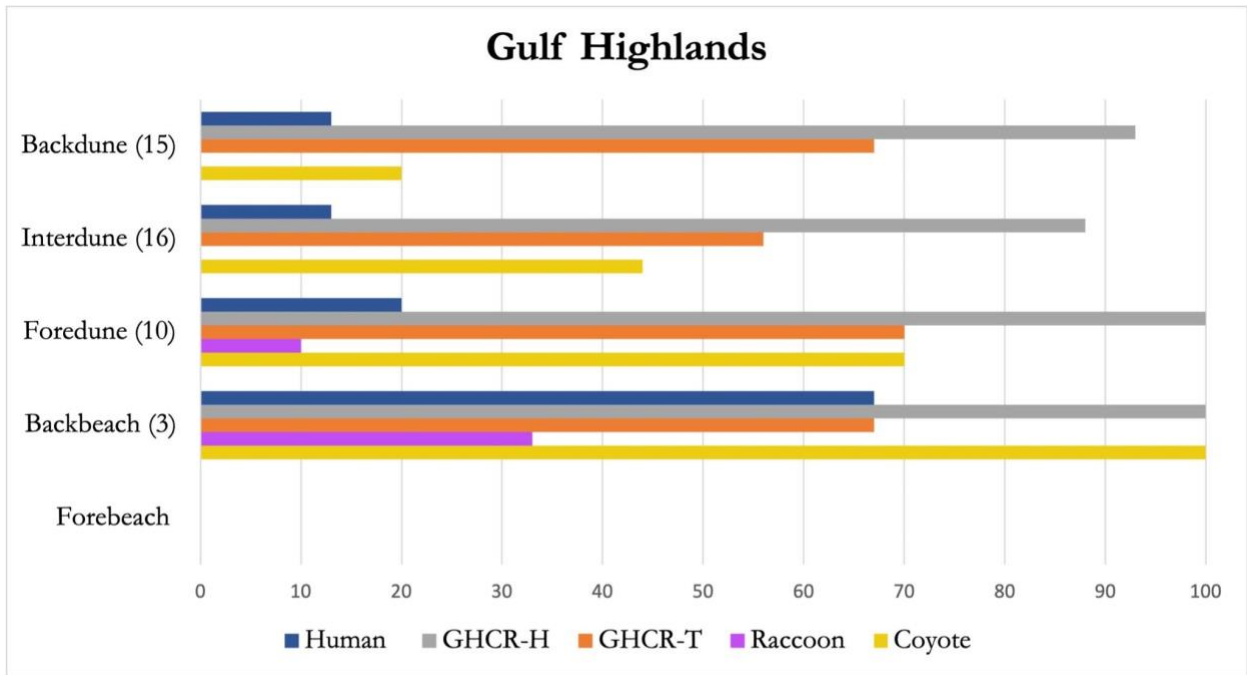


Figure 18. Percentages of high priority predator presence documented on Gulf Highlands. Numbers next to the beach zone are the total number of circle surveys conducted at the site.

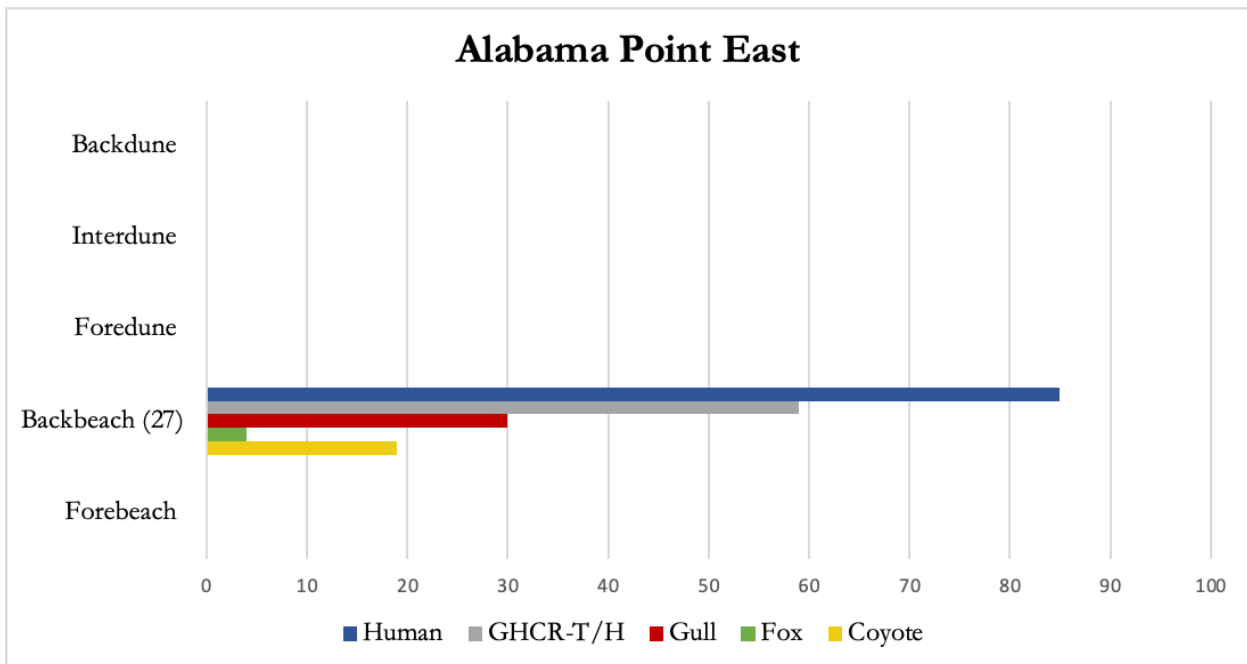


Figure 19. Percentages of high priority predator presence documented on Alabama Point East. Numbers next to the beach zone are the total number of circle surveys conducted at the site.

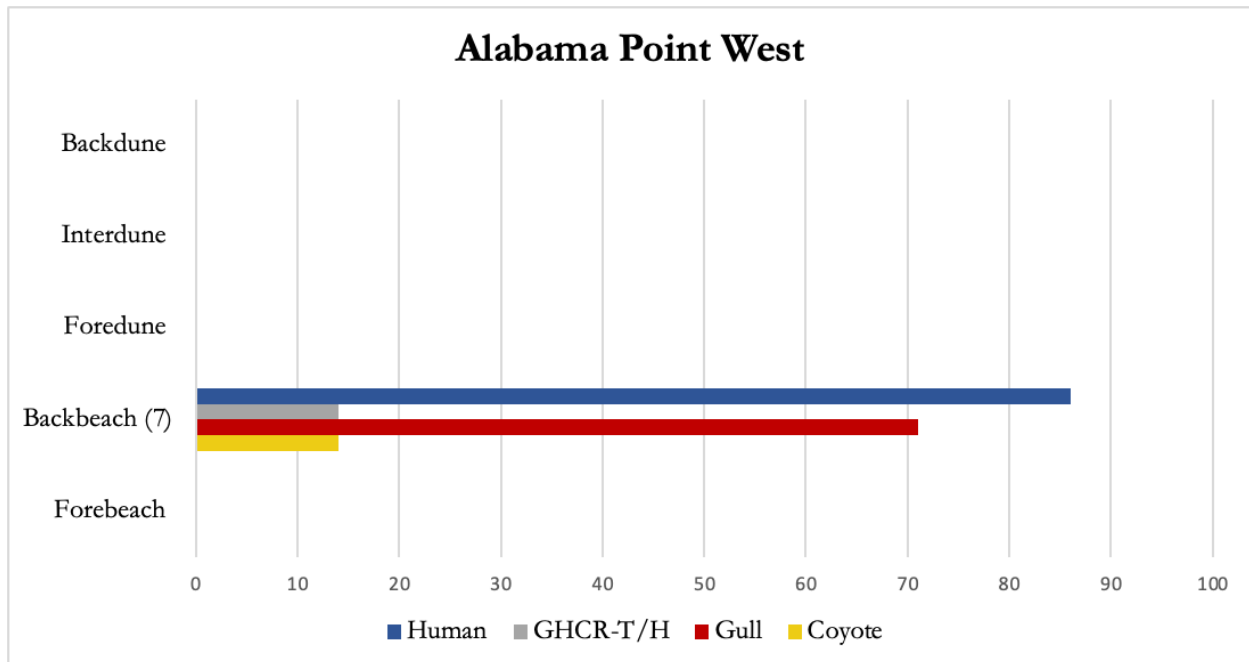


Figure 20. Percentages of high priority predator presence documented on Alabama Point West. Numbers next to the beach zone are the total number of circle surveys conducted at the site.

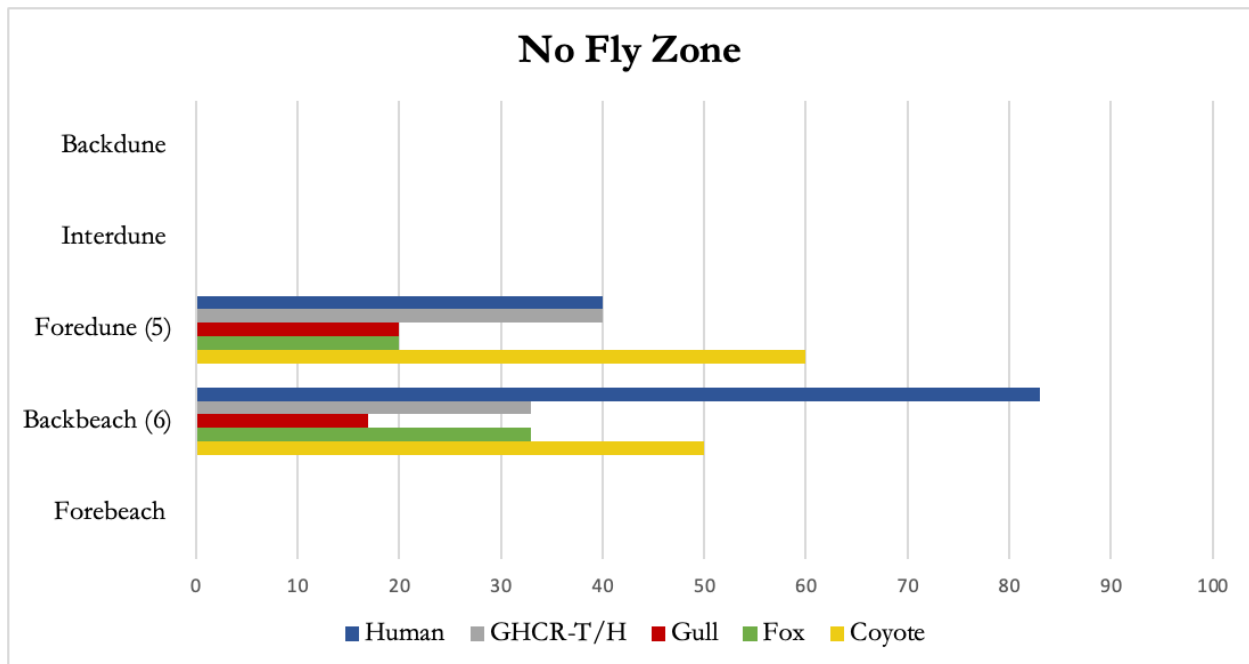
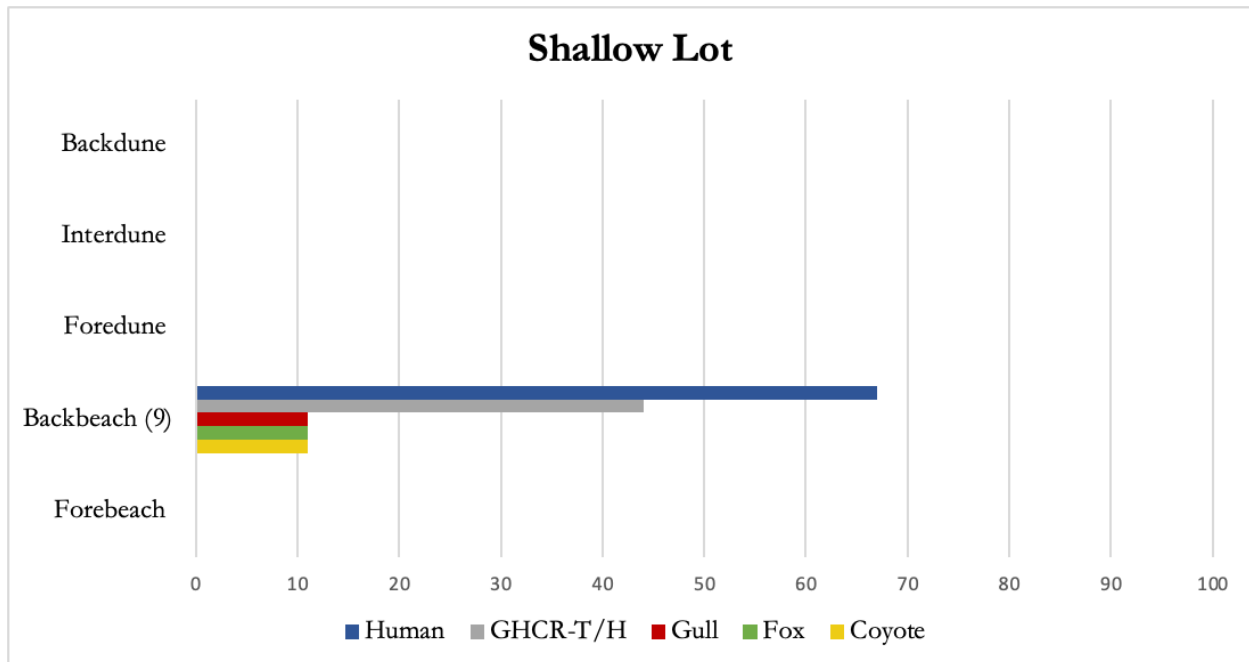


Figure 21. Percentages of high priority predator presence documented on No Fly Zone. Numbers next to the beach zone are the total number of circle surveys conducted at the site.



**Figure 22. Percentages of high priority predator presence documented on Shallow lot. Numbers next to the beach zone are the total number of circle surveys conducted at the site.**

### Human Disturbance

We monitored two least tern colonies specifically to document the types and number of disturbances. Alabama Point East was monitored throughout the breeding season, and Bayfront Park in Daphne was monitored in June and July while terns were attempting to nest there. We monitored the Alabama Point colony for 4-hour increments, weather permitting, and the Bayfront Park for 2-hour increments. Both sites were monitored between the hours of 09:00 to 17:00.

When a disturbance occurred, we recorded what the disturbance was, the distance between the disturbance and the nearest nest, the reaction of the nesting and loafing birds, and the percentage of the colony that displayed a specific reaction. Disturbance categories were determined as they were observed. We categorized bird reactions into four behaviors: defensive (dive-bombing or chasing the source), flushing (leaving the nest), alert (shifting into the upright and aware position) or no reaction at all (remaining in the same position prior to the disturbance).

We documented a total of 188 disturbances at Alabama Point over 14 days and 53 hours of observations. Two major categories of disturbances were seen: bird disturbances and human disturbances, with human being more prevalent (62.8%). We documented seven kinds of disturbances including people walking too close to the birds/colony (WALK), use of beach toys (e.g., drones, kites, balls, etc.) (TOY), vehicles (e.g., law enforcement trucks, lifeguard ATV/UTVs) (VEH), aircrafts (e.g., low-flying advertisement planes, helicopters) (AIRCRAFT), trash (e.g., trash rolling through the colony) (TRASH), and harassment to birds (e.g., throwing things, swatting) (HARASS), and other birds (GULL, OSPR, GBHE, etc.). People walking near the colony caused 83.1% of the

human disturbances, followed by recreational toy use (11%), and aircrafts (3.4%). Vehicles, trash, and harassment each attributed 0.8% to colony disturbances. Laughing gulls caused 80% of the bird disturbances, followed by ospreys and great blue herons (7.1%). Black skimmers, ruddy turnstones, royal terns, and sanderlings each attributed 1.4% to colony disturbances.

Of the 98 walking disturbances recorded, a portion of the colony became defensive during 91% and flushed during 31% of those times. There were 13 toy disturbances where least terns were defensive 92% and flushed 15% of those times. Least terns were not seen to be defensive towards aircrafts, vehicles, or trash but a portion of the colony flushed every time those disturbances occurred. Of the 56 gull disturbances recorded, the terns became defensive 98% and flushed 16% of those times. Ospreys and great blue herons caused the terns to be defensive 80% of the time, and flush 60% and 80% of the time, respectively. Black skimmers, ruddy turnstones, royal terns, and sanderlings did not cause flushing but caused defensive behaviors each time they were a disturbance to the colonies.

The number of disturbances varied throughout the season, as did the number of people on the beach. The greatest amount of disturbance was seen on Memorial Day, 28 May, also the most populated day on the beach. The number of disturbances peaked mid-breeding season and remained low at the beginning and end of the season, even with human presence remaining high. Least terns were the most defensive mid-breeding season and less defensive at the beginning and end of the season.

## **Audubon Coastal Bird Surveys**

Audubon Coastal Bird surveys are standardized abundance surveys that are conducted every fall, winter, and spring along set routes. Surveys include walking the high tide line of each route and counting all birds that are seen and heard within a 0.25 miles radius. Metadata including trash, human activity, wrack lines, and weather conditions were also recorded for each survey. The fall and spring pulses consist of six surveys per site, taking place August-October and March-May, respectively. The winter pulse includes three surveys from January to February. Surveys were conducted in 10 to 14-day intervals.

A total of 19 routes were included in the Audubon Coastal Bird Surveys during the Winter and Spring 2022 pulses, and 20 during the Fall pulse. Three island sites located in Orange Beach were added in the Winter 2022 season: Bird Island, Robinson Island, and Walker Island. One island site, Tern Island, located just south of the Pelican Island peninsula, was added in the Fall 2022 season.

We documented 104 different species during the winter 2022 ACBS surveys including 48 landbird species, 15 shorebird species, 15 species of waterfowl and allies, eight gull/tern species, seven wading bird species, nine raptor species, one pelagic species, and two marsh bird species. Bayfront Park had the highest average species richness ( $47.33 \pm 5.31$ ) for the Baldwin County sites, while Pelican Bay had the highest ( $22.33 \pm 1.89$ ) for Mobile County sites (Table 8)

146 species were documented during the Spring 2022 season including 67 landbird species, 24 shorebird species, 14 species of waterfowl and allies, 13 gull/tern species, 12 wading bird species, seven raptor species, two pelagic species, and seven marsh bird species. Bayfront Park had the highest average number of species recorded ( $38.33 \pm 6.55$ ) for Baldwin County sites and Pelican Bay had the highest ( $27.67 \pm 3.68$ ) for Mobile County sites (Table 8).

135 total species were documented during the Fall 2022 season including 61 landbird species, 24 shorebird species, seven species of waterfowl and allies, 13 gull/tern species, 13 wading bird species, seven raptor species, one pelagic species, and nine marsh bird species. Bayfront Park had the highest average number of species recorded ( $44.50 \pm 6.24$ ) for Baldwin County sites and Pelican Island had the highest ( $23.00 \pm 6.98$ ) for Mobile County sites (Table 8).

**Table 8. Species richness values from 2022 ACBS surveys for routes surveyed in Mobile and Baldwin Counties.**

<b>Mobile County</b>	<b>Winter 2022</b>	<b>Spring 2022</b>	<b>Fall 2022</b>
Cat Island	11.50 ± 1.50	16.00 ± 1.63	13.00 ± 1.29
Coffee Island	9.50 ± 1.50	20.33 ± 1.70	20.33 ± 2.75
Tern Island	-	-	22.33 ± 5.91
Dauphin Island West End	10.00 ± 5.10	12.83 ± 1.95	10.50 ± 1.26
Far West End	14.33 ± 4.19	21.5 ± 1.71	21.67 ± 2.87
Pelican Bay	22.33 ± 1.89	27.67 ± 3.68	22.17 ± 2.61
Pelican Island	18.00 ± 0.82	22.17 ± 3.24	23.00 ± 6.98
Public Beach East	13.33 ± 4.50	14.50 ± 1.50	12.17 ± 1.77
Public Beach West	8.33 ± 1.89	14.17 ± 2.61	15.67 ± 3.25
<b>Baldwin County</b>	<b>Winter 2022</b>	<b>Spring 2022</b>	<b>Fall 2022</b>
Alabama Point	6.33 ± 1.70	9.5 ± 1.98	9.17 ± 1.67
Bayfront Park	47.33 ± 5.31	38.33 ± 6.55	44.50 ± 6.24
Bird Island	4.33 ± 3.61	10.50 ± 2.22	6.20 ± 1.60
Bon Secour NWR- Ft. Morgan	25.00 ± 2.94	20.67 ± 2.75	16.83 ± 4.60
Bon Secour NWR- Perdue Unit	14.00 ± 8.04	12.67 ± 3.20	12.20 ± 1.94
Fairhope Public Beach	29.67 ± 0.47	26.17 ± 3.13	22.33 ± 5.19
Gulf State Park	11.33 ± 0.47	16.50 ± 1.71	11.83 ± 1.77
May Day Park	23.33 ± 4.11	33.00 ± 2.65	29.83 ± 5.08
Orange Beach	12.00 ± 1.63	12.00 ± 2.38	5.33 ± 1.60
Robinson Island	5.67 ± 1.25	9.67 ± 2.69	5.00 ± 1.10
Walker Island	14.33 ± 2.05	15.33 ± 3.90	5.00 ± 3.52

## Coastal Waterbird Species Richness

While species richness was highest at Bayfront Park and Pelican Bay, most of the species seen were landbirds, raptors or waterfowl that are not dependent on the coast. To better understand the use of ACBS sites by coastal waterbirds, all species determined not to be coastal waterbirds were excluded from the following species richness calculations. For this report, coastal waterbirds are defined as species that rely on either the dunes, beaches, or shorelines adjacent to coastal waters for a major migratory stop-over, the nonbreeding season, and/or breeding season. Species that can utilize other bodies of water or similar beach/shoreline habitats not related to the coast (i.e., belted kingfisher, cattle egret, American white pelican) were not included. Pelagic species that spend most of their life at sea were also excluded from the calculations. In total, 61 of the 185 species seen during the 2022 surveys were included.

We documented 31 different coastal waterbird species during the 2022 winter ACBS including 15 shorebird species, one species of waterfowl and allies, eight gull/tern species, six wading bird species, and one marsh bird species. Bayfront Park had the highest average species richness ( $12.33 \pm 1.25$ ) for the Baldwin County sites, while Pelican Island Peninsula had the highest ( $15.33 \pm 1.25$ ) for Mobile County sites (Table 9).

Fifty-two coast-dependent species were documented during the 2022 spring season including 24 shorebird species, one species of waterfowl and allies, 13 gull/tern species, 10 wading bird species, and four marsh bird species. Bon Secour NWR- Fort Morgan had the highest average number of species recorded ( $12.33 \pm 1.89$ ) for Baldwin County sites and Coffee Island had the highest ( $19.33 \pm 1.70$ ) for Mobile County sites (Table 9).

Fifty-five coast-dependent species were documented during the 2022 fall season including 24 shorebird species, one species of waterfowl and allies, 13 gull/tern species, 11 wading bird species, and six marsh bird species. Bayfront Park had the highest average number of species recorded ( $15.67 \pm 1.70$ ) for Baldwin County sites and Pelican Island Peninsula had the highest ( $22.5 \pm 5.47$ ) for Mobile County sites (Table 9).



**Table 9. Species richness values for coast-dependent species in 2022.**

<b>Mobile County</b>	<b>Winter 2022</b>	<b>Spring 2022</b>	<b>Fall 2021</b>
Cat Island	10.5 ± 1.50	14.33 ± 2.05	11.83 ± 1.34
Coffee Island	7.00 ± 2.00	19.33 ± 1.70	18.33 ± 3.25
Tern Island	-	-	20.33 ± 6.65
Dauphin Island West End	8.00 ± 3.56	9.67 ± 2.05	9.00 ± 1.29
Far West End	13.00 ± 2.16	18.17 ± 2.54	18.17 ± 3.02
Pelican Bay	13.33 ± 0.47	17.33 ± 1.97	15.17 ± 2.34
Pelican Island	15.33 ± 1.25	18.17 ± 1.95	22.50 ± 5.47
Public Beach East	9.33 ± 1.70	8.00 ± 1.53	8.50 ± 1.50
Public Beach West	7.33 ± 1.25	10.83 ± 1.34	14.33 ± 3.40
<b>Baldwin County</b>	<b>Winter 2022</b>	<b>Spring 2022</b>	<b>Fall 2021</b>
Alabama Point	5.33 ± 2.36	8.5 ± 1.95	9.00 ± 1.63
Bayfront Park	12.33 ± 1.25	9.67 ± 1.25	15.67 ± 1.70
Bird Island	3.33 ± 2.87	7.83 ± 2.67	5.40 ± 1.85
Bon Secour NWR- Ft. Morgan	10.00 ± 0.82	12.33 ± 1.89	10.33 ± 2.49
Bon Secour NWR- Perdue Unit	6.67 ± 1.25	9.33 ± 1.37	10.20 ± 1.60
Fairhope Public Beach	6.67 ± 0.47	5.83 ± 1.21	5.83 ± 1.34
Gulf State Park	6.67 ± 0.47	10.17 ± 1.95	9.33 ± 0.94
May Day Park	4.33 ± 1.70	7.00 ± 2.52	10.16 ± 1.46
Orange Beach	8.67 ± 1.25	9.17 ± 2.48	5.50 ± 1.26
Robinson Island	4.00 ± 0.82	5.50 ± 1.26	3.20 ± 0.75
Walker Island	10 ± 0.82	11.33 ± 3.25	3.6 ± 3.07

## Priority Birds

Through Audubon Coastal Bird Surveys and beach-nesting bird monitoring, Alabama Audubon staff and volunteers are present on the coast year-round. This allows for valuable data to be collected showing how priority species utilize coastal habitats throughout the year. Our focal species included American oystercatcher, black skimmer, gull-billed tern, piping plover, reddish egret, red knot, short-billed dowitcher, snowy plover, and Wilson's plover. The GPS location, time, and behavior (i.e., loafing, foraging, flying) were recorded for each observation of an individual or group except for breeding birds during summer. From 01 January to 31 December, staff and volunteers recorded 802 observations of priority species (Table 10).

## Priority Bird Habitat Use

We categorized observations of our nine priority species, as well as sanderling, brown pelican, and least tern, across habitat types using data collected from Audubon Coastal Bird Surveys (Table 11). Habitat types included mainland beaches, barrier island beaches, nearshore islands, and bayfront. In 2022, ACBS routes covered ~6.5 linear miles of mainland beaches, 9.4 miles of barrier island beaches, and 2.5 miles along Mobile Bay. We surveyed ~1.52 linear miles of nearshore islands in the winter and spring, and 1.92 miles in the fall with the addition of Tern Island.

American Oystercatchers were primarily observed on barrier island beaches and nearshore islands, with one observation on the mainland. In the spring, 69% of oystercatcher observations were on the nearshore islands, which were their primary nesting locations this year. This shifted during the fall surveys where 74% of our observations were on barrier island beaches. We observed a similar trend with black skimmers. Most observations were on the barrier island beaches and nearshore islands. 91% of our skimmer observations in the spring were on the nearshore islands where large colonies later nested. This shifted to 81% on barrier island beaches in the fall after the breeding season. We did not record any black skimmers during the winter surveys. We recorded 54 observations of piping plovers, with all occurring on barrier island beaches except for one seen on a nearshore island. Snowy plovers were primarily recorded on mainland and barrier island beaches, with a few observations on nearshore islands. We record more snowy plovers on barrier island beaches in winter and fall with 74% and 70% of the observations, respectively. This shifted in the spring when 73% of observations were on mainland beaches. We had only two observations of Wilson's plovers both occurring in the spring; one on a barrier island beach and one on a nearshore island. Reddish egrets were primarily observed on barrier island beaches in all seasons, with a few recordings on the nearshore islands in the spring and fall.

**Table 10. Observations of Tier 1 priority species recorded during 01 January – 31 December 2022.**

Species	Observations	Count	Max individuals/observation
American oystercatcher	133	321	11
Black skimmer	70	1,580	239
Piping plover	155	245	11
Reddish egret	84	96	2
Red knot	37	101	8
Short-billed dowitcher	111	778	45
Snowy plover	202	477	14
Wilson's plover	7	7	1
Gull-billed tern	3	3	1

**Table 11. Observations of priority species by habitat type in 2022 during ACBS.**

	Winter 2022				Spring 2022				Fall 2022			
	Mainland	Barrier Island	Nearshore Island	Bayfront	Mainland	Barrier Island	Nearshore Island	Bayfront	Mainland	Barrier Island	Nearshore Island	Bayfront
AMOY	0	8	0	0	1	7	18	0	0	32	11	0
BLSK	0	0	0	0	2	30	330	0	2	795	173	2
BRPE	344	558	427	23	814	673	168	80	1273	1605	4406	1073
GBTE	0	0	0	0	2	7	24	0	0	1	3	1
LETE	0	0	0	0	328	118	151	5	1	7	1	0
PIPL	0	11	0	0	0	16	0	0	0	26	1	0
REEG	0	3	0	0	0	10	2	0	0	17	4	0
REKN	0	13	0	0	1	26	0	0	0	2	0	0
SAND	235	390	355	0	597	1348	333	0	448	889	633	0
SBDO	0	17	0	0	2	99	26	0	2	48	171	0
SNPL	10	28	0	0	46	17	0	0	23	71	7	0
WIPL	0	0	0	0	0	1	1	0	0	0	0	0

## Banded Birds

We banded 14 snowy plovers (one shown in Figure 19) and one American oystercatcher this year. One adult male snowy plover was banded on the Far West End on 06 April. Six more adults were banded on 07 April, including four males on the Bon Secour NWR Fort Morgan Unit and two females on the Perdue Unit. On 16 May, three chicks and an adult female were banded on Pelican Island Peninsula, however the chicks did not survive to fledging age. We banded two more males on 01 and 03 July on Public Beach West and Dauphin Island West End, respectively, and one on the Far West End on 17 August, though the sex of the bird was unknown. The American oystercatcher was banded on 16 May on the Far West End. From 01 January to 31 December, staff and volunteers recorded 407 band resights of 54 individuals (Table 12).

## Noteworthy Resights

We banded an American oystercatcher when it was a flightless chick in 2019 (band code JB). It was resighted in Florida several months later after fledging. This year, we saw it back in Alabama in May with another bird making nest scrapes, although we never found a nest. It was resighted back in Florida in September. This is the first record of an oystercatcher that hatched from a nest in Alabama returning to its natal area for breeding.

We resighted a black skimmer on Tern Island on 01 September (Figure 20). This skimmer was banded by Audubon Delta staff at a winter roost in Biloxi, MS, in November 2020.

In August, we resighted a piping plover (combination UL: orange flag LL: green-orange-green, yellow UR: federal LR: yellow) that was banded as a chick in Michigan in 2018 (Figure 21). Every fall for the past five years we have observed this bird on Dauphin Island where it overwinters before heading north to its breeding grounds in the spring. Resights like this provide information on migration patterns, site fidelity, and life span.

**Table 12. Banded bird resights during 01 January – 31 December.**

Species	Resights	Individuals
Snowy plover	290	40
Piping plover	46	5
American oystercatcher	68	6
Least tern	1	1
Black Skimmer	1	1
Caspian Tern	1	1



Figure 19. Banded snowy plover on Dauphin Island.



Figure 20. Banded black skimmer observed on Tern Island during ACBS.



Figure 21. Banded piping plover observed on Pelican Island.

Common and scientific names of species mentioned in this document.

American Oystercatcher	<i>Haematopus palliatus</i>
American White Pelican	<i>Pelecanus erythrorhynchos</i>
Belted Kingfisher	<i>Megasceryle alcyon</i>
Black Skimmer	<i>Rynchops niger</i>
Brown Pelican	<i>Pelecanus occidentalis</i>
Canada Goose	<i>Branta canadensis</i>
Cattle Egret	<i>Bubulcus ibis</i>
Common Grackle	<i>Quiscalus quiscula</i>
Common Nighthawk	<i>Chordeiles minor</i>
Egret sp.	<i>Ardea/Egretta/Bubulcus sp.</i>
Fish Crow	<i>Corvus ossifragus</i>
Gull-billed Tern	<i>Gelochelidon nilotica</i>
Great Blue Heron	<i>Ardea herodias</i>
Great Egret	<i>Ardea alba</i>
Gull sp.	<i>Larinae/Laridae sp.</i>
Heron sp.	<i>Ardeidae sp.</i>
Killdeer	<i>Charadrius vociferus</i>
Laughing Gull	<i>Leucophaeus atricilla</i>
Least Tern	<i>Sternula antillarum</i>
Osprey	<i>Pandion haliaetus</i>
Piping Plover	<i>Charadrius melodus</i>
Raptor sp.	<i>Accipitriformes/Falconiformes sp.</i>
Reddish Egret	<i>Egretta rufescens</i>
Red Knot	<i>Calidris canutus</i>
Ruddy Turnstone	<i>Arenaria interpres</i>
Sanderling	<i>Calidris alba</i>
Short-billed Dowitcher	<i>Limnodromus griseus</i>
Snowy Egret	<i>Egretta thula</i>
Snowy Plover	<i>Charadrius nivosus</i>
Tricolored Heron	<i>Egretta tricolor</i>
White Ibis	<i>Eudocimus albus</i>
Wilson's Plover	<i>Charadrius wilsonia</i>
Domestic Cat	<i>Felis catus</i>
Coyote	<i>Canis latrans</i>
Nutria	<i>Myocastor coypus</i>
Red Fox	<i>Vulpes vulpes</i>
Raccoon	<i>Procyon lotor</i>
Atlantic Ghost Crab	<i>Ocypode quadrata</i>