

# Analysis of Audubon Coastal Bird Survey Data in Alabama

2017-2020

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Report leads:

Sabrina Cobb  
Olivia Morpeth

Contact:

Alabama Audubon  
3720 Fourth Avenue South, Second Floor  
Birmingham, Alabama 35222  
T: (205) 719-3678  
E: [info@alaudubon.org](mailto:info@alaudubon.org)  
W: [www.alaudubon.org](http://www.alaudubon.org)



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## Introduction

On 20 April 2010, the Gulf of Mexico experienced an unprecedented environmental catastrophe as the BP Deepwater Horizon oil platform exploded off the coast of Louisiana. Approximately 200 million gallons of crude oil was discharged into the Gulf over an 87-day period resulting in an unmeasurable loss economically and environmentally. Eleven crew members' lives were lost as well as several avian species, marine mammals, and other fragile marine life. Avian mortality data were collected and analyzed to show just how much of an ecological impact this event had (Haney et al. 2014). From this study, researchers estimated mortality at 700,000 birds for the northern Gulf of Mexico (Haney et al. 2014). Due to the lack of baseline data for coastal Alabama's bird populations prior to the event, quantifying and understanding how much was lost could not be determined.

Alabama Audubon began conducting Audubon Coastal Bird Surveys (ACBS) in 2017 as a component of the Alabama Coastal Bird Stewardship Program (ALCBSP). The ACBS protocol was modified from the Oiled Bird Monitoring Program developed in Louisiana by Jared Wolfe and Erik Johnson at Louisiana State University and the Baton Rouge Audubon Society (Johnson 2011). These surveys were designed to monitor coastal bird species during migration and winter periods in order to better understand how they use coastal habitats locally and across the northern Gulf of Mexico. Prior to the establishment of ACBS, available data on coastal populations in Alabama was limited to surveys conducted during the last four decades (Cooley 1987, Dindo et al. 1987, Robinson and Dindo 2008, Zdravkovic 2008). Although these data provided valuable information on coastal bird populations, there was not a consistent approach to monitoring species throughout the entire year.

These surveys, along with our breeding season monitoring efforts, allowed for year-round data collection. Baseline data on coastal bird populations can be used as a bioindicator for years to come. ALCBSP focuses on eleven coastal birds identified as priority species (Table 1). Six species (American oystercatcher (*Haematopus palliatus*), black skimmer (*Rhynchops niger*), brown pelican (*Pelecanus occidentalis*), least tern (*Sternula antillarum*), reddish egret (*Egretta rufescens*), and snowy plover (*Charadrius nivosus*)) nest along the Alabama coast, and the other five species (piping plover (*C. melodus*), red knot (*Calidris canutus*), sanderling (*C. alba*), short-billed dowitcher (*Limnodromus griseus*), and Wilson's plover (*C. wilsonia*)) utilize the coast during migration or as wintering grounds. These priority species are a representation of how coastal habitat in Alabama is used throughout the year to meet resource needs of migratory and year-round inhabitants.

## Methods

### Survey Routes

When Alabama Audubon first began ACBS in fall 2017, it consisted of 12 survey routes across Baldwin and Mobile Counties. In fall 2018, Bayfront Park was added as an official site, as volunteer surveys documented many of the priority species in the area. In winter 2019 we added four more routes: Cat, Coffee, Marsh, and Little Dauphin Islands. The far west end of Dauphin Island was added in spring 2020 (Figure 1). A majority of the survey routes consist of sandy beach habitat, and are located along Dauphin Island, Orange Beach and Gulf Shores. Three routes along Mobile Bay consist of a mix of habitats including upland forest, high marsh, and sandy beaches. Orange Beach survey sites have the

most developed land surrounding the routes, with condos and beach homes occupying much of the dunes. The island and Bon Secour National Wildlife Refuge sites consist of the most naturally occurring habitat, with very little to no development.

#### Alabama Point

A 1.6 km (1 mile) route consisting primarily of open beach habitat located in Orange Beach (Figure 2). Just north of the route is a stretch of dune habitat before reaching Perdido Beach Boulevard, a busy four-lane road. The area north of the road consists mainly of condos and developed land. The site has a high human presence, especially during the summer months.

#### Bayfront Park

Just over one km (1 mile) in length located on the eastern shore of Mobile Bay (Figure 3). The beach is fine open sand next to the open water of the bay on one side and upland forest and high marsh on the other.

#### Bon Secour National Wildlife Refuge, Fort Morgan Unit

A 1.6 km (1 mile) route located at the western end of the Fort Morgan Peninsula (Figure 4). It consists of open sand beach and dune habitat with no development along the shoreline. It has a fairly low human presence, consisting mainly of fisherman or walkers.

#### Bon Secour National Wildlife Refuge, Perdue Unit

At almost three km (1.8 mile), this route is located on the eastern side of the Fort Morgan Peninsula near Gulf Shores (Figure 5). It consists of open sand beach and dune habitat, with light residential development on the western end. The eastern end begins a heavily developed neighborhood on the waterfront with high human presence; however, the route itself has fairly low human presence, mainly fisherman.

#### Cat Island

A very small island with a perimeter of approximately 1.13 km (0.7 mile) located in Portersville Bay (Figure 6). It consists primarily of open sand beach and oyster shell ridges, with a small amount of shrub habitat in the island's center. This site has very little to no human presence and is only accessible via boat.

#### Coffee Island

A 0.7 km (0.45 mile) route on the western side of Coffee Island, located in Portersville Bay (Figure 7). The shoreline of the route consists mainly of oyster shell hash. A small center section of the route to the east, is lined by shrub habitat; however, the rest of the site is almost entirely made up of marsh. This site has very little to no human presence and is only accessible via boat.

#### Dauphin Island West End

A 2.09 km (1.3 mile) route that begins on the northern shore of Dauphin Island along the Mississippi sound going west, then wraps around to the southern shore along the gulf (Figure 8). The northern section contains a thin sandy shoreline with salt marsh to one side and open bay on the other. The route

then crosses the salt marsh to the southern shoreline, which is made up of open sand beaches by the water and increases in vegetation moving north. This route has moderate human presence on the easternmost shoreline along the gulf that dissipates as the route moves westward.

#### Fairhope Public Beach

A 2.09 km (1.3 mile) shoreline route along Mobile Bay in Baldwin County (Figure 9). It has open sand beaches with maritime forests along its eastern side. This location has a public park and pier that is used frequently for recreational fishing and other activities.

#### Far West End

A 6.44 km (4 mile) long route located on the western end of Dauphin Island (Figure 10). The site is surveyed via UTV due to its length and distance from the nearest road. It consists mostly of open beach and dune habitat, with small areas of marsh and tidal pools at the west end of the route. There is no development along the route, and it has little to no human presence.

#### Gulf State Park

A 2.2 km (1.4 mile) route located on the beach of Gulf Shores in Baldwin County (Figure 11). This route consists primarily of open sand beach and dune habitat. The dunes of the westernmost section have been developed into a large condo leading to fairly heavy human presence in the area, especially throughout the summer months.

#### Little Dauphin Island

A 4.83 km (3 mile) route located just northeast of Dauphin Island (Figure 12). The site is accessed on the southernmost point via boat. It consists of sand beaches with marshes and small sections of maritime forests on the southwest side of the route, and open water of Mobile Bay on the north east side. The site has no development and has little to no human presence.

#### Marsh Island

A small island with a perimeter of approximately 1.8 km (~1.15 miles) and only accessed via boat (Figure 13). It consists primarily of marshes and mudflats with some areas of sparsely vegetated sand. The island is split into three sections for surveying. The two sections on the north side of the island are surveyed by foot and a scope is utilized to observe activity within the walking route. The southern section is surveyed by boat as the marshes make it impossible to walk that area. There is no development on this island and there is little to no human presence year-round.

#### Mayday Park

At just over 1.6 km (1 mile) in length, this route is located at Mayday Park in Daphne, and is approximately three miles from Bayfront Park (Figure 14). The route runs along the sandy shore of Mobile Bay and is bordered by an upland forest. The surrounding area is very similar to the habitat found at Bayfront Park.

### Orange Beach

A 2 km (1.3 mile) route just west of the Perdido Pass (Figure 15). This site primarily contains open sand beaches and is largely developed with condos occupying much of the dunes. Human presence is high at this location, especially throughout the summer months.

### Pelican Bay

A 1.77 km (1.1 mile) route that wraps around the eastern side of Pelican Bay, located on the southern side of Dauphin Island (Figure 16). The site is primarily open sand beach and dune habitat with small marshes at the north west end of the route. There is no development along the route and there is little human presence.

### Pelican Island

A 1.6 km (1 mile) route along a small peninsula on the southern side of Dauphin Island (Figure 17). It consists primarily of open sand beach and dune habitat with a small area of marsh to the northeast. The southern portion of the peninsula is prone to flooding during high tides and often contains tide pools. This site has moderate to low human presence, with more activity during the summer months.

### Public Beach East

A 1.6 km (1 mile) route located on the eastern section of Dauphin Island along the gulf (Figure 18). This site primarily consists of open sand beach and dunes and is backed by a maritime forest to the north. There is a small amount of residential development beginning at the western edge of the route, however this location tends to have low human presence.

### Public Beach West

A 1.6 km (1 mile) route located on the southern beaches of Dauphin Island (Figure 19). It consists of open sand beaches and dune habitat, with some development lining the route to the north. It has moderate to high human presence, especially during the summer months.

## Survey Protocol

The National Audubon Society developed standardized protocols for these surveys in 2010 ([www.audubon.org/content/audubon-coastal-bird-survey](http://www.audubon.org/content/audubon-coastal-bird-survey)). Each year, three survey pulses are conducted. The fall and spring surveys consist of six rounds in August–October and March–May, respectively. The winter surveys consist of three rounds during January–February. Each round is set at 10 to 14-day intervals and surveys are conducted in the early morning. During the surveys, every bird that is observed and heard within 0.40 km (0.25 miles) on each side of the survey route is identified and counted. Survey start and end time, wind speed and direction, temperature, tide, and precipitation are recorded. Surveyors also collect data on the amount of wrack trash, and human disturbance, as well as numbers of dead and banded birds.

## Results

Over the last three years, Alabama Audubon staff and volunteers documented at least two of the 11 priority species at each of the established routes (Figures 20-31). Barrier island sites that had the most



reported species of priority birds throughout 2017–2018 included Pelican Island (Figure 28), Dauphin Island West End (Figure 27), and Bon Secour NWR-Fort Morgan Unit (NWR-FM; Figure 21). We observed all 11 focal species at Pelican Island throughout the year, and 10 of the 11 species at Dauphin Island West End, which shares the same ecological niche (Table 2). Bon Secour NWR-FM had eight of the 11 species (Table 3).

Sites with the lowest recorded number of priority species during 2017–2018 were Fairhope Public Beach (Figure 23) and May Day Park (Figure 25), both of which are routes along Mobile Bay (Table 3). In 2018–2019, we only documented one of the 11 species at Fairhope Public Beach and two species at May Day Park (Table 4). Pelican Island and Dauphin Island West End continued to have the highest number of priority bird observations for 2018-2019 and 2019-2020 (Tables 5 and 6). Results from ACBS data collected at Bon Secour NWR-FM for 2018-2019 and 2019-2020, were comparable with seven of the priority bird species observed at the location for both years (Tables 4 and 7). Although little data has been collected thus far priority birds on nearshore islands along the Alabama coast, Little Dauphin Island had the highest number of priority bird observations in the winter 2020 during ACBS (Table 8).

In 2017–2018, we documented 186 different species (including birds identified only to group) among all sites including: 26 shorebird species, seven gull species, seven tern species, 17 species of wading birds, 10 raptor species, three pelagic species, 20 waterfowl species, and 83 songbird species (Table 9). We documented 180 species among all sites in 2018–2019 including: 27 shorebird species, six gull species, eight tern species, 16 species of wading birds, 11 raptor species, two pelagic species, 16 waterfowl species, and 80 songbird species (Table 10). In 2019–2020, we documented 182 species among all sites: 26 shorebird species, five gull species, eight tern species, 18 species of wading birds, ten raptor species, one pelagic species, 15 waterfowl species, and 79 songbird species (Table 11).

### **2017–2018**

We surveyed 12 sites during the fall 2017, winter 2018, and spring 2018 periods, five in Mobile County and seven in Baldwin County. We completed 174 surveys: 66 in fall, 36 in winter, and 72 in spring. The average number of participants per survey was two, with a total of 195 hours dedicated to ACBS surveys for the year.

With all sites combined, spring had the greatest species richness ( $23.88 \pm 8.57$ ), followed by winter ( $18.50 \pm 6.46$ ) and fall ( $17.78 \pm 5.96$ ). However, the average number of species recorded at May Day Park was highest in the winter ( $32.33 \pm 2.62$ ), followed by fall ( $27.66 \pm 1.24$ ) and spring ( $22.66 \pm 6.99$ ; Table 12). Public Beach West ( $25.33 \pm 8.74$ ) had the highest species richness during spring across all sites. The Orange Beach site had the lowest year averages for the fall ( $12.16 \pm 1.21$ ) and winter ( $13.00 \pm 0.81$ ; Table 12).

### **2018–2019**

We surveyed 13 sites during fall 2018, winter 2019 and spring 2019; five in Mobile County and eight in Baldwin County. We completed a total of 195 surveys throughout the year with 78 in fall, 39 in winter,

and 78 in spring. The average number of participants per survey was two, with a total of 174 hours dedicated to ACBS surveys for the year.

Species richness among the pulses showed spring with the highest average of species detected ( $21.12 \pm 9.30$ ) followed by winter ( $18.69 \pm 8.16$ ), and fall ( $16.85 \pm 7.58$ ). Bayfront Park had the highest average number of species for the year in the fall ( $30.16 \pm 6.84$ ), winter ( $32.66 \pm 6.64$ ), and spring ( $39.33 \pm 4.10$ ; Table 13). The second-most specious location was May Day Park, with a fall average of  $25.5 \pm 4.57$ , winter average of  $30.66 \pm 4.78$ , and spring average of  $30.33 \pm 10.27$ . Regarding beach and barrier island survey routes, Pelican Island was the most specious throughout the year, with averages of  $25.16 \pm 2.19$  in fall,  $26 \pm 0.81$  in winter, and  $27.00 \pm 1.82$  in spring (Table 13). Public Beach East and Orange Beach survey routes had the lowest averages; Public Beach East had a slightly higher average in fall ( $9.16 \pm 1.67$ ) and spring ( $10.83 \pm 3.89$ ), whereas Orange Beach had a higher winter average ( $12.66 \pm 0.47$ ).

## **2019–2020**

We surveyed 13 sites during fall 2019, 17 sites during winter 2020 and 18 sites during spring 2020. We completed a total of 153 surveys: 78 in fall, 47 in winter, and 28 in spring. The average number of participants per survey was two, with a total of 158 hours dedicated to ACBS surveys for the year.

Winter had the highest species average ( $19.12 \pm 8.64$ ), followed by spring ( $18.67 \pm 8.85$ ), and fall ( $17.80 \pm 8.40$ ). Bayfront Park had the greatest species richness among all sites in fall ( $37.16 \pm 4.29$ ), winter ( $34.66 \pm 4.64$ ), and spring ( $38.50 \pm 5.50$ ; Table 14). Public Beach West had the lowest species average in fall ( $8.60 \pm 2.80$ ) and winter ( $10.00 \pm 3.55$ ), while Alabama Point had the lowest in the spring ( $6.00 \pm 1.00$ ; Table 14).

## **2017–2020 Priority Bird Summary**

These surveys allowed the organization to focus on sensitive species over the last three years. Using abundance and spatial data collected during surveys, we examined species-specific habitat use during fall, winter, and spring seasons (Tables 15-17). We collected additional information on eight of the 11 priority species (American oystercatcher, black skimmer, least tern, reddish egret, snowy plover, piping plover, red knot, Wilson's plover), including GPS coordinates, time sighted, band combinations if any, and behavior.

### ***American oystercatcher***

The American oystercatcher is present year-round on the Alabama coast, primarily breeding on nearshore islands. Oystercatchers are also observed foraging along shorelines during the non-breeding season.

In 2017–2018, we documented 14 American oystercatcher observations during ACBS surveys across Mobile and Baldwin Counties. Many of the observations were reported during the fall pulses at sites located on Dauphin Island, with Dauphin Island West End accounting for six of the 14 records (Table 15).

In 2018–2019, we recorded a total of 17 observations, eight at Dauphin Island West End and seven on Pelican Island (Table 16).

In 2019–2020, we recorded 30 observations, all at sites in Mobile County. The species continued to be predominantly seen in the fall season. Pelican Island had the highest number of observations recorded (n=13) throughout the year, followed by Public Beach West (n=5) and Far West End (n=7). The addition of nearshore island sites in the winter of 2020 expanded our knowledge on the location of these birds. We did not observe American oystercatchers on Cat Island or Marsh Island that year; however, we recorded two observations on Coffee Island (Table 17).

### *Black skimmer*

Black skimmers are a year-round resident of coastal Alabama. During the summer these birds are found in breeding colonies on nearshore islands, often among other large colonial-breeding birds.

In 2017–2018, we recorded 151 black skimmer observations, with 68.2% of the observations in Mobile County. We observed skimmers in each survey month aside from February and March. Pelican Island had the highest number of observations throughout the year (n=41; Table 15). We did not observe black skimmers on the Fairhope Public Beach or Mayday Park routes, both of which are bayfront sites.

In 2018–2019, we had a total of 692 observations, with 84.2% in Mobile County. Pelican Island had black skimmer observations throughout all survey months, as well as the highest number of observations (n=561; Table 16). Observations ranged from one individual to a group of 247 birds.

In 2019–2020, we had a total of 626 observations, with 97% in Mobile County. Pelican Bay had the highest number of observations (n=413), followed by Pelican Island (n=175; Table 17). Fairhope Public Beach, Mayday Park, and Bayfront Park routes did not have any skimmer observations throughout the year.

### *Least tern*

Least terns are a colonial-nesting species found in Alabama only during their breeding season, which occurs from late-spring to early-fall.

In 2017–2018, we recorded a total of 572 observations, with 81.5% at sites in Baldwin County. Most of the observations occurred during the spring (n=560), and Alabama Point had the greatest number of observations (n=365; Table 15).

In 2018–2019, we had 773 observations, with 58% at sites in Baldwin County. Sightings also continued to be the highest in the spring (n=714). Alabama Point had the highest number of observations for the year (n=326), followed by Pelican Island (n=166; Table 16).

Due to COVID-19-related beach closures during the spring of 2020, reported least tern observations were significantly lower than the previous two years, with a total of 205. Under standardized protocols

ACBS spring surveys usually consist of six pulses; however, only two pulses were conducted for each site. 77% of the reported observations occurred in Baldwin County. No least tern observations were reported in the winter and only nine were seen across both counties during the fall. Alabama Point had the highest number of observations (n=70), followed by Gulf State Park (n=47; Table 17).

### *Reddish egret*

The reddish egret is an uncommon wading bird known to nest during late-spring through early-fall, and can be found along the coast throughout the year. Over the last decade, research and continued monitoring of reddish egrets along the Alabama coast have shown a decline in the number of breeding pairs but a relatively stable presence overall.

In 2017–2018, we recorded 31 observations, with 97% at sites in Mobile County. We had 20 observations in the fall, six in the spring, and five in winter. Most of the observations occurred at Pelican Island (n=14), followed by Dauphin Island West End (n= 10; Table 15).

In 2018–2019, we had 36 observations, with 97% occurring in Mobile County. Seasonal presence was comparable to the 2017–2018 year, with 22 observations in the fall, 11 in the spring, and three in the winter. Pelican Island had the greatest number of observations (n=20), followed by Dauphin Island West End (n=10; Table 16).

The number of observations during 2019–2020 was slightly lower than previous years (n=27), with 89% in Mobile County. Numbers reported across both counties for the fall remained consistent, with 20 total observations. The total number of observations for winter pulses increased slightly, yielding a total of seven records. This increase is likely attributed to the addition of nearshore island survey sites in the winter of 2020. Spring had no reported observations for the year, likely due to COVID-19 restrictions. The site with the highest number of reddish egret observations for the year was Pelican Island (n=12), followed by Pelican Bay (n=6; Table 17). Coffee Island and Little Dauphin Island, two of the nearshore island sites, each had one reddish egret observation in January.

### *Snowy plover*

Snowy plovers are year-round residents in coastal Alabama. They are a solitary-nesting species with their breeding season beginning in early-spring and ending late-summer.

In 2017–2018, we documented 182 snowy plover observations, with 57.7% in Baldwin County. Spring had the highest number of snowy plover observations (n=92), followed by fall (n=62), and winter (n=28). Bon Secour NWR Perdue Unit had the most observations (n=56), followed by Public Beach West (n=41; Table 15).

In 2018–2019, observations increased to 214, with 57.9% in Baldwin County. Most observations were in spring (n=95), followed by fall (n=82), and winter (n=37). Bon Secour NWR Perdue Unit had the most observations (n=68), followed by Pelican Island (n=53; Table 16).

In 2019–2020, we had 149 observations, with 65.8% in Baldwin County. Fall had the highest number of observations (n=91), followed by winter (n=42), and spring (n=16). Bon Secour NWR Perdue Unit had the highest number of observations (n=55), followed by Bon Secour NWR-FM and Pelican Island (n=32; Table 17).

### *Piping plover*

Piping plovers are commonly found foraging along the Alabama coast during their non-breeding season in the fall, winter, and spring.

In 2017–2018, we had a total of 24 observations, with 83% in Mobile County. Spring had the highest number of observations (n=15), followed by fall (n=7), and winter (n=2). Pelican Island had the greatest number of observations (n=14), followed by Bon Secour NWR Perdue Unit and Pelican Bay, with four each (Table 15).

Piping plover observations increased in 2018–2019 to 62 observations, all in Mobile County. Most observations occurred in spring, (n=37), followed by fall (n=13), and winter (n=12). Pelican Island had the greatest number of observations (n=49), followed by Dauphin Island West End (n=6; Table 16).

In 2019–2020, we documented 44 observations, with 98% in Mobile County. Most of the observations were during the winter pulses (n=31), followed by fall (n=12), and spring (n=1; Table 17). It is possible low spring values are a result of decreased survey effort due to pandemic-related restrictions.

### *Red knot*

The red knot is an infrequent visitor to the Alabama coast, a stopover site during their fall and spring migration.

In 2017–2018, we documented six red knot observations, with most in Mobile County. Seasonally, the species was reported more often in the spring (n=3), followed by fall (n=2), and winter (n=1). Nearly all observations were on Pelican Island (n=5; Table 15).

In 2018–2019, we had 15 observations, with 67% in Baldwin County. Most observations occurred in spring (n=10), followed by fall (n=5). Red knots were most abundant at Bon Secour NWR-FM (n=10), followed by Pelican Island (n=4; Table 16).

In 2019–2020, we had two observations during fall at Gulf State Park (Table 17).

### *Wilson's plover*

Over the last three years, we infrequently detected Wilson's plover along the Alabama coast.

In 2017–2018, we documented five observations, with 80% in Mobile County. Three observations occurred during spring, one at Bon Secour NWR-FM and two at Dauphin Island West End (Table 15).

We also documented Wilson's plovers in fall at Pelican Island and Dauphin Island West End, with one observation each. We did not observe Wilson's plovers during winter.

In 2018–2019, we had two observations at Dauphin Island West End, one in the fall and one in spring (Table 16).

In 2019–2020, we had four observations, with 75% in Mobile County. Fall surveys had the highest number of observations, two at Dauphin Island West End and one at Bon Secour NWR Perdue Unit (Table 17). There was one observation in the spring at Dauphin Island West End and no observations during the winter.

### *Brown pelican*

Brown pelicans are one of the most frequently observed birds along the beaches of Alabama. They are year-round residents to the coast, breeding on Gaillard Island in Mobile Bay, their only known nesting location in Alabama (Robinson & Dindo 2008).

In 2017–2018, we documented 9,478 brown pelican observations, with 57.2% in Baldwin County (Table 15). Most observations occurred in fall (n=6,214), followed by spring (n=1,830), and winter (n=1,434).

In 2018–2019, we had 7,988 observations, with 73.9% in Baldwin County (Table 16). Fall had the most observations (n=4,895), followed by spring (n=2,102), and winter (n=991).

In 2019–2020, we had 5,431 observations, with 70.4% in Baldwin County (Table 17). Most observations occurred in fall (n=3,850), followed by spring (n=826), and winter (n=755).

### *Sanderling*

Sanderlings are seasonal visitors to coastal Alabama, commonly seen throughout the fall, winter, and spring months.

In 2017–2018, we documented 3,164 sanderling observations, with 63.5% in Baldwin County (Table 15). Fall had the most observations (n=1,434), followed by spring (n=1,389), and winter (n=341).

In 2018–2019, we had 2,934 observations, with 51.8% in Mobile County (Table 16). Spring had the most observations (n=1,373), followed by fall (n=1,098), and winter (n=463).

In 2019–2020, we had 2,525 observations, with 54.4% in Baldwin County had 54.4% (Table 17). Most observations were in winter (n=960), followed by fall (n=884), and spring (n=681).

### *Short-billed dowitcher*

Short-billed dowitchers are another seasonal visitor to Alabama, and are observed in the spring, fall, and winter months.

In 2017–2018, we documented 314 observations, with 100% in Mobile County (Table 15). Most observations occurred in spring (n=190), followed by winter (n=79), and fall (n=45).

In 2018–2019, we had 397 observations, with most (n=369) occurring on Pelican Island (Table 16). The majority of observations occurred in the spring (n=271), followed by fall (n=104), and winter (n=22).

In 2019–2020, we had 163 observations, all in Mobile County (Table 17). Most observations occurred in winter (n=126), followed by fall (n=22), and spring (n=15).

**Note:** Due to COVID-19, numbers for the spring 2020 season may be low. Beach closures and restrictions made it possible to only complete two of the six pulses for each site. Nearshore islands, which are accessed via boat, were not surveyed.

## Discussion

Prior to the implementation of ACBS, there was a paucity of information on avifaunal biodiversity and habitat use in Alabama. The data collected from these surveys has generated a baseline of species abundance and spatial distributions which can be used to direct conservation and management efforts. The 11 focal species were most abundant at sites located on barrier and nearshore islands, indicating those areas are critical habitat for these species.

Eight of the 11 species of priority birds are shorebird species and are more likely to be observed on routes that follow a sandy shoreline with sparse vegetation like those located on barrier islands. Although these locations had more observations of priority birds, their species richness values were often lower than some of the mainland routes. This is likely attributed to how some of the mainland sites encompass several different ecosystems rather than being limited to just beachfront. Mainland sites that experienced overall higher species richness values included Fairhope Public Beach, Bayfront Park, and Mayday Park. These sites share similar habitat characteristics and include several different habitat types, allowing for more species diversity. Routes at these designated sites are along the Mobile Bay but border upland forested areas and include sparse patches of high marsh. Due to the proximity of these habitats, many songbird, raptor, wading, and waterfowl species are observed, in addition to shorebirds seen along the beach.

Location of routes in respect to urban development also seemed to contribute to lower species richness values. Sites that are in highly developed areas with low habitat diversity, such as Orange Beach and Alabama Point, are examples of routes that experienced lower species abundance and diversity.

Due to the late addition of nearshore island surveys in the winter 2020 and COVID-19 restrictions, we have limited data on species richness and priority bird presence at these locations. Little Dauphin Island had a higher species richness value in winter 2020 compared to Coffee, Cat, and Marsh Islands. Little Dauphin Island was once a part of Dauphin Island and over the years has been subjected to severe erosion causing separation from the main barrier island. The route runs along the shoreline but encompasses marsh and some remaining sections of maritime forest. One species that was observed frequenting Little Dauphin Island during the winter season was the piping plover. In addition, wintering

species such as the double-crested cormorant and the white pelican were observed in high numbers on Cat Island during the 2020 winter season indicating the site may be of importance for loafing birds. Continued monitoring and surveying will be vital to understanding how specific species are utilizing these nearshore islands.

#### Limitations

The results of the ACBS surveys are not a complete assessment of avian species that utilize Alabama's coast. Pelagic species, such as shearwaters, are occasionally reported on or near the coast; however, they were not recorded during surveys throughout the three years. Similarly, marsh birds, such as clapper rails, are also occasionally recorded during surveys, but the protocol does not allow for accurate assessment of these species. The timings of surveys are also variable as the volunteer leads plan surveys according to their availability. The surveys are typically completed in the morning; however, they may not occur during times when avian activity is at its peak. Additionally, we are only able to conduct surveys at nearshore island sites during favorable weather conditions (e.g. low tide, low/no south wind, calm water) as they are only accessible via boat. Because of this, island surveys may fall outside of the 10 to 14-day interval or pulses may have to be skipped completely.

#### Implications for Conservation

Habitat requirements for shorebird species along the Gulf Coast were virtually disregarded until the piping plover was federally listed as an endangered species in 1985 (Withers 2002). Even after, there was no established methodology for monitoring sensitive species along the Gulf Coast until after the Deepwater Horizon explosion in April 2010. Due to the lack of baseline population data it was impossible to quantify the exact impact of the disaster on many coastal species. Not only do disastrous phenomena threaten these coastal communities, coastal development is significantly impacting population decline. Many species of shorebirds are declining as a result of continued habitat loss in breeding, wintering, and migratory staging areas (Withers 2002). ACBS provides a standardized, repeatable process to capture how coastal species are using different habitat, as well as how they will respond to changes along the Alabama coast. Data collected from these surveys over the last three years has started to shed light on how many different species are using the Alabama coast; however, there is still lack of information supporting whether their habitat and resource requirements are being met. Continued research is vital in developing and maintaining conservation and management strategies, and providing time sensitive information to coastal developers.

#### Future Focus

Alabama Audubon plans to continue conducting and supporting ACBS in future years. We also intend on finding additional areas of interest to create new routes. We will continue to collect a range of metadata, such as amount of human disturbance, trash, and wrack, and weather conditions to allow for more in-depth analyses of these variables and how they affect species abundance and diversity at different sites. As we continue to look at each site independently, we will be able to gather a better understanding of which habitats are currently meeting the requirements for coastal avian species and which require improvement. We will be able to use ACBS data to further drive resource management



plans with natural resource managers and educate the public through stewardship and volunteer opportunities.

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**Figure 1. Locations of 18 Audubon Coastal Bird Survey routes in Alabama.**



Figure 2. Alabama Point ACBS route in Orange Beach, AL.

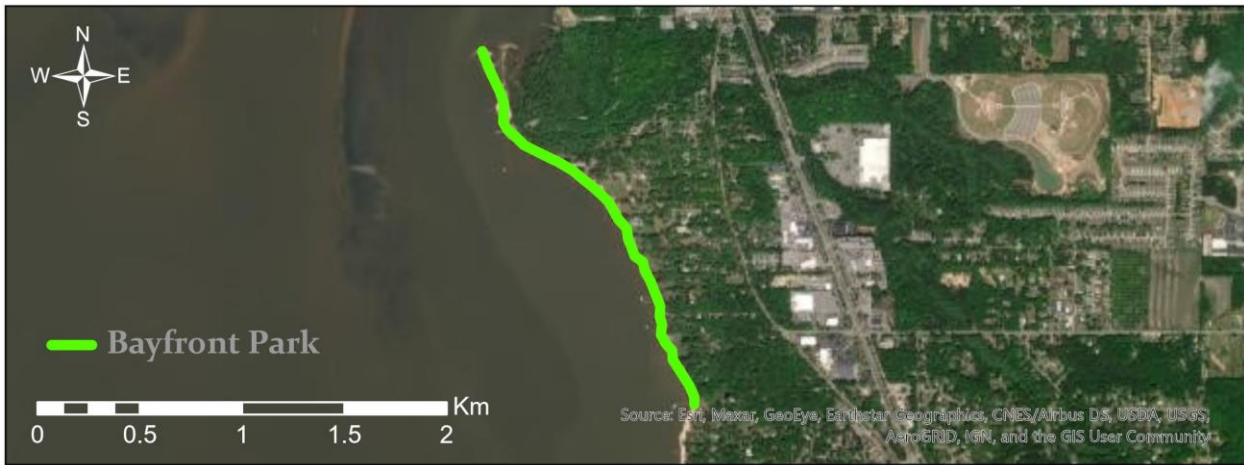


Figure 3. Bayfront Park ACBS route in Daphne, AL.



Figure 4. Bon Secour NWR Ft. Morgan ACBS route on the Ft. Morgan Peninsula, AL.





Figure 5. Bon Secour NWR Perdue ACBS route on the Ft. Morgan Peninsula, AL.



Figure 6. Cat Island ACBS route in Portersville Bay, AL.



Figure 7. Coffee Island ACBS route in Portersville Bay, AL.



Figure 8. Dauphin Island West End ACBS route at the western edge of residential development on Dauphin Island, AL.



Figure 9. Fairhope Public Beach ACBS route in Fairhope, AL, along the eastern side of Mobile Bay.

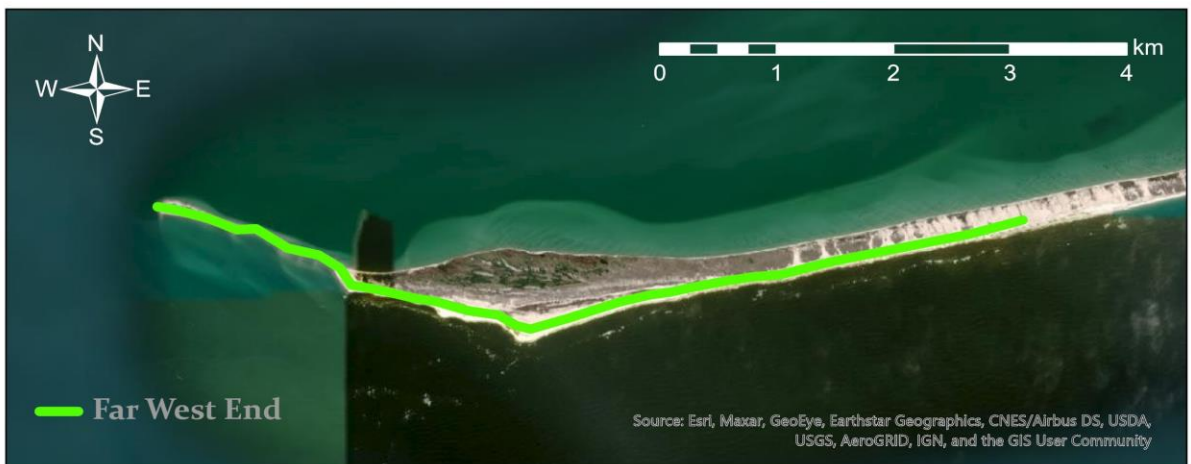


Figure 10. Far West End ACBS route at the far western tip of Dauphin Island, AL.





Figure 11. Gulf State Park ACBS route in Gulf Shores, AL.



Figure 12. ACBS route on Little Dauphin Island near Dauphin Island, AL.



Figure 13. Marsh Island ACBS route in Portersville Bay, AL.



Figure 14. Mayday Park ACBS route in Daphne, AL.

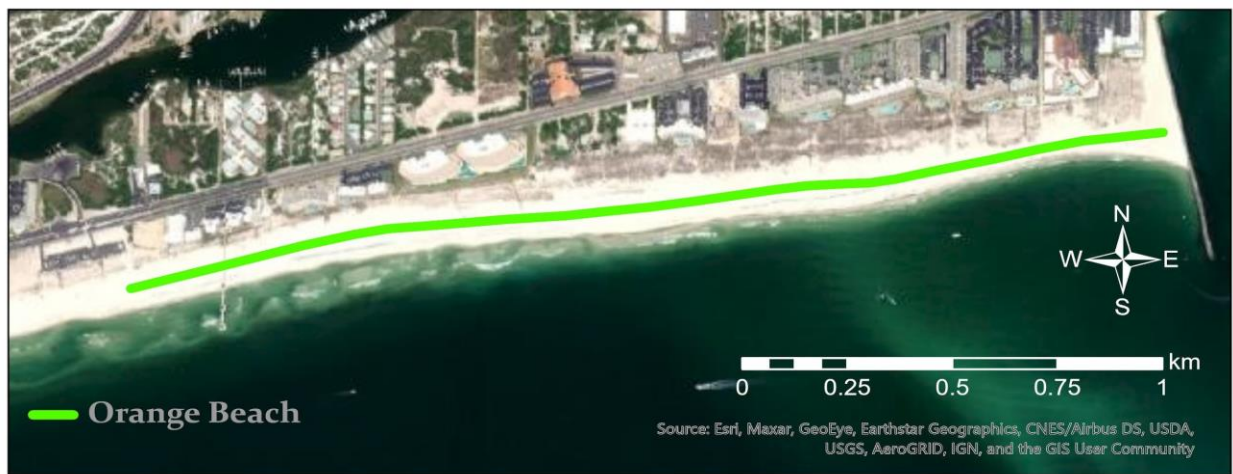


Figure 15. Orange Beach ACBS route in Gulf Shores, AL.



Figure 16. Pelican Bay ACBS route on the southern side of Dauphin Island, AL.





Figure 17. Pelican Island ACBS route on the southern side of Dauphin Island, AL.



Figure 18. Public Beach East ACBS route on Dauphin Island, AL.

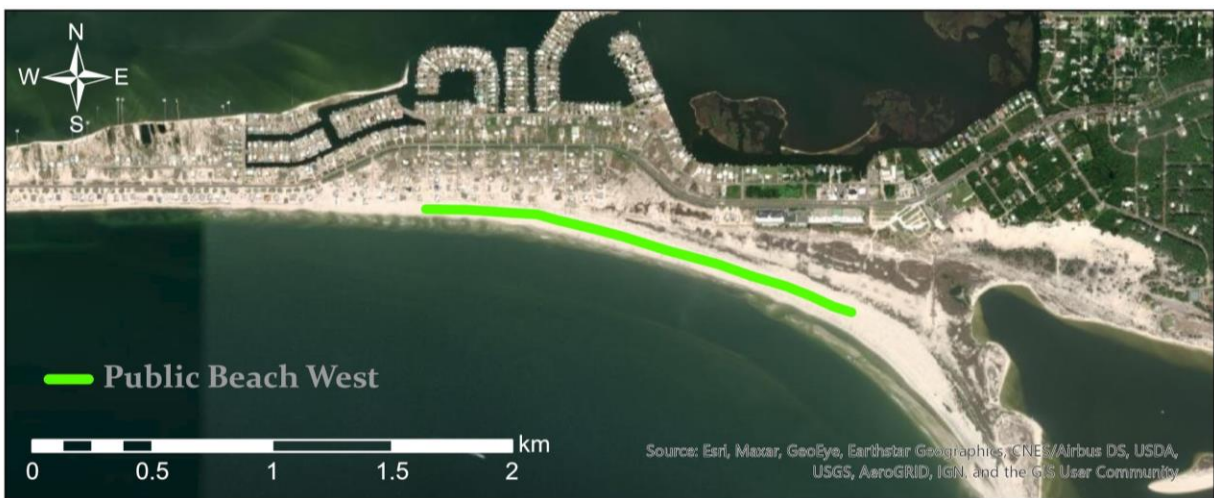


Figure 19. Public Beach West ACBS route on Dauphin Island, AL.

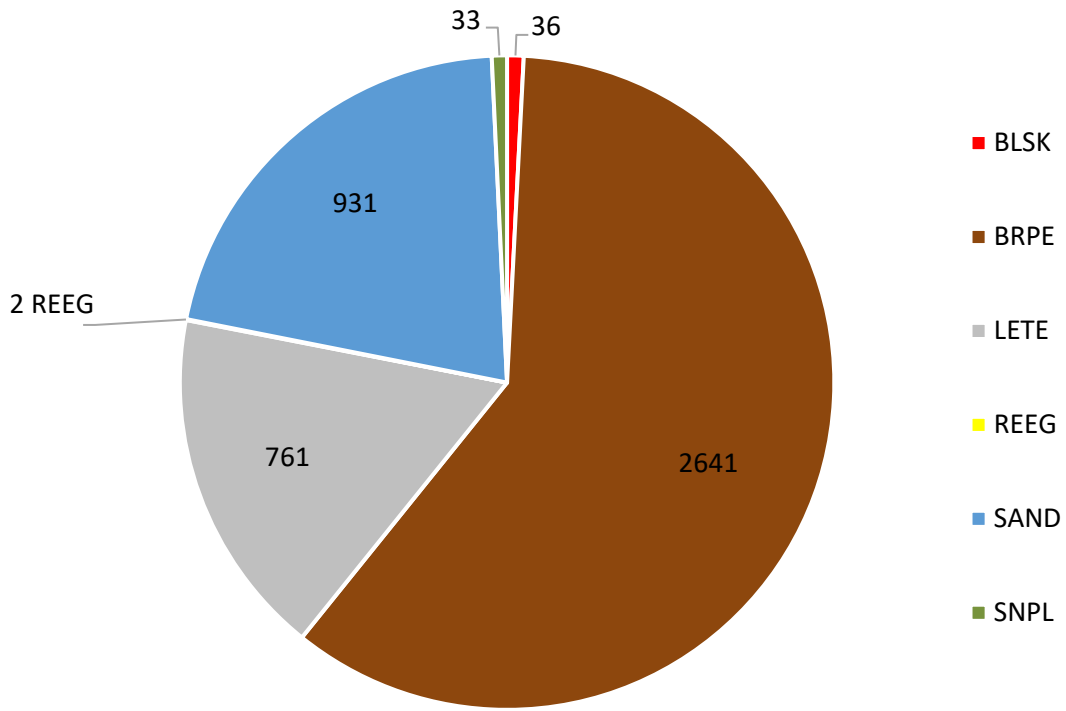


Figure 20. Priority bird observations recorded at Alabama Point during ACBS 2017-2020.

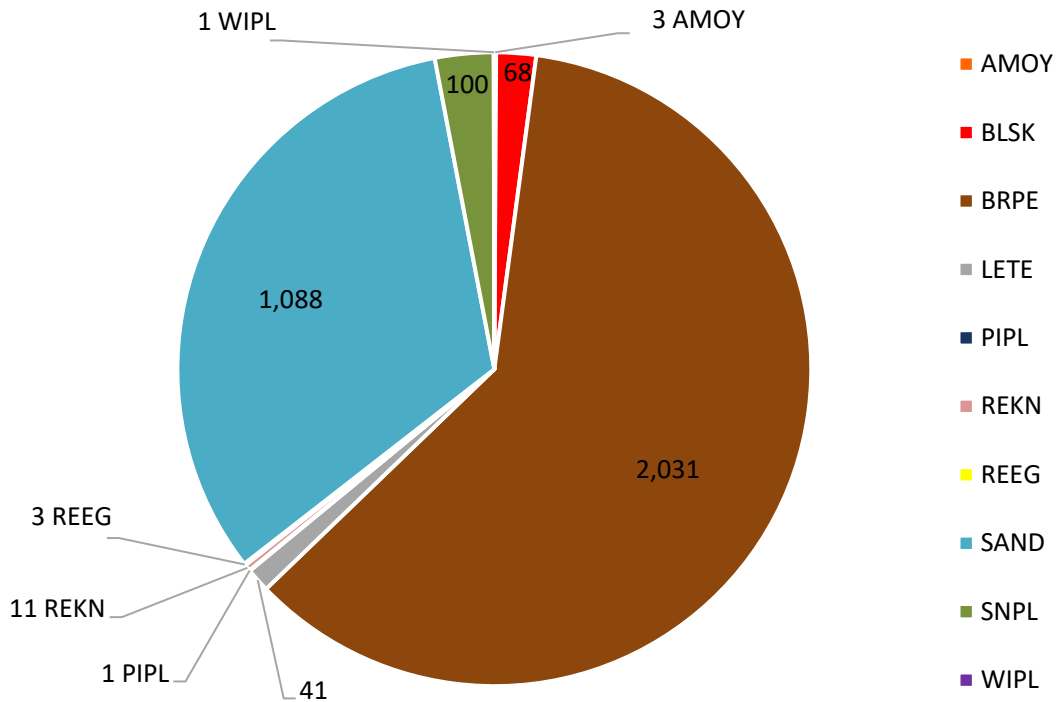


Figure 21. Priority bird observations recorded at Bon Secour NWR Fort Morgan during ACBS 2017-2020.



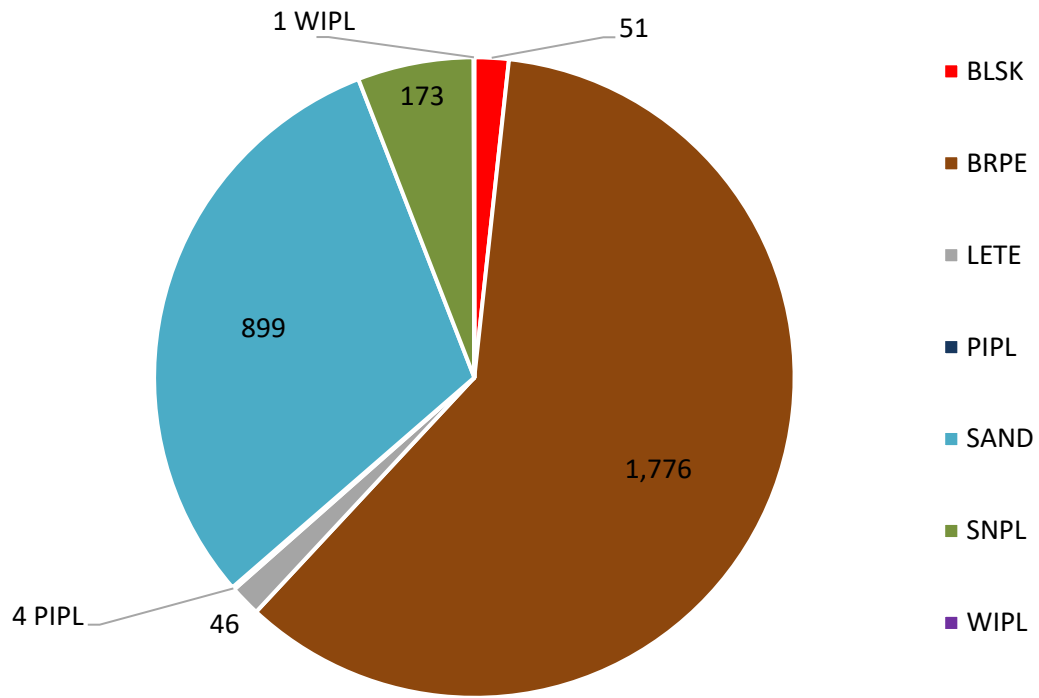


Figure 22. Priority bird observations recorded at Bon Secour NWR Perdue Unit during ACBS 2017-2020.

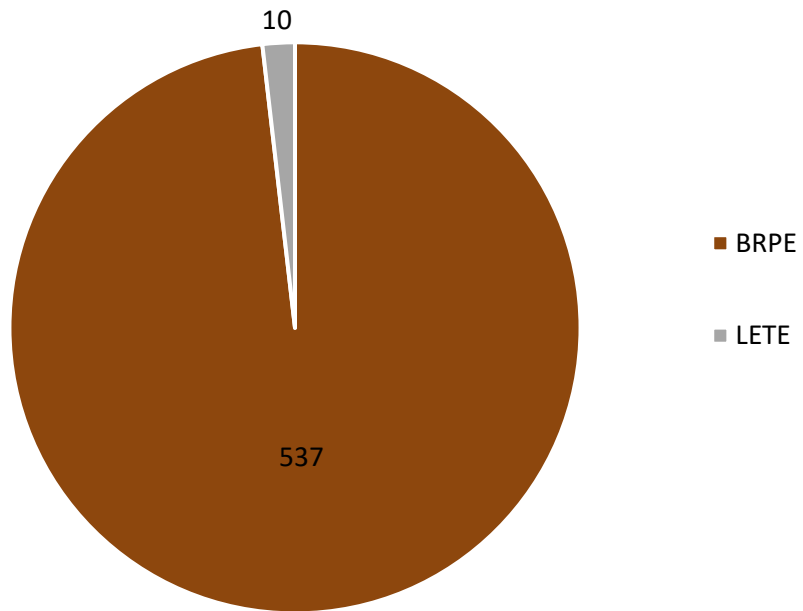


Figure 23. Priority bird observations recorded at Fairhope Public Beach during ACBS 2017-2020.

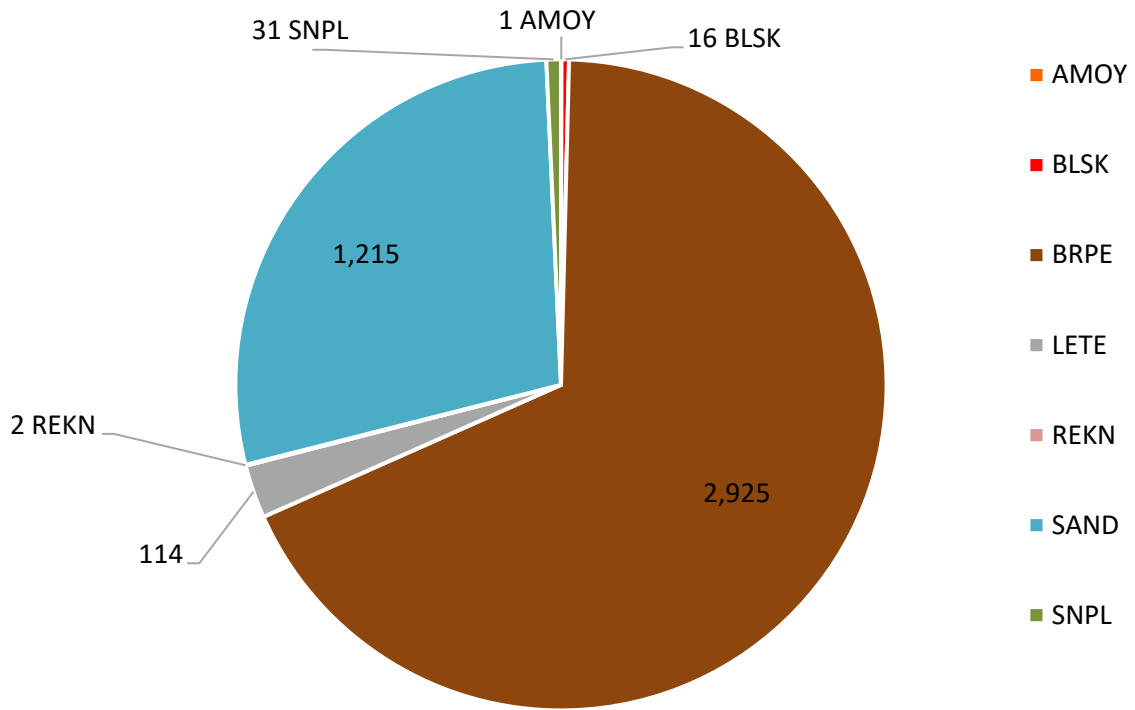


Figure 24. Priority bird observations recorded at Gulf State Park during ACBS 2017-2020.

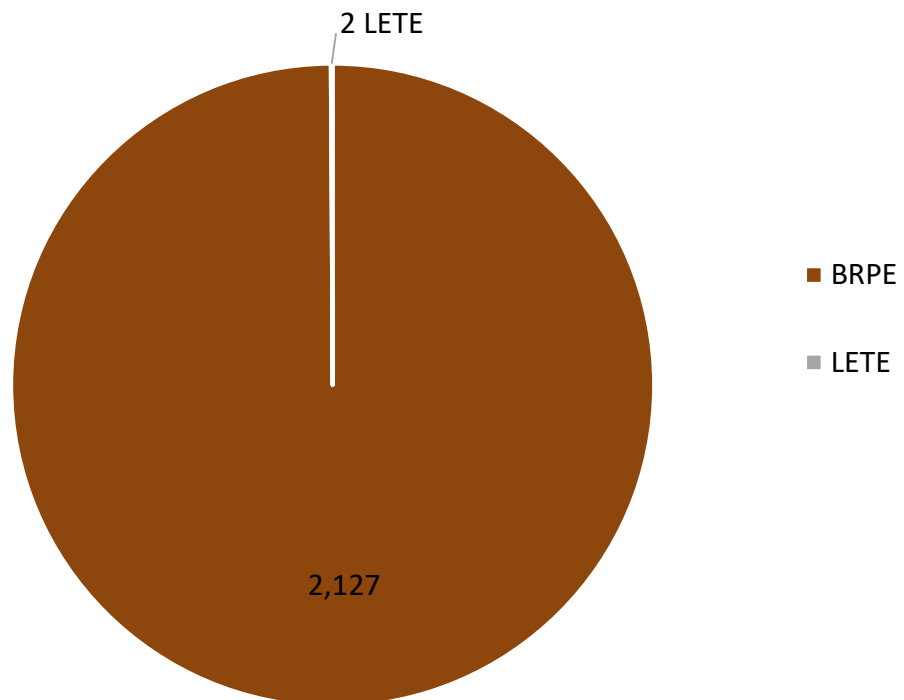


Figure 25. Priority bird observations recorded at Mayday Park during ACBS 2017-2020.

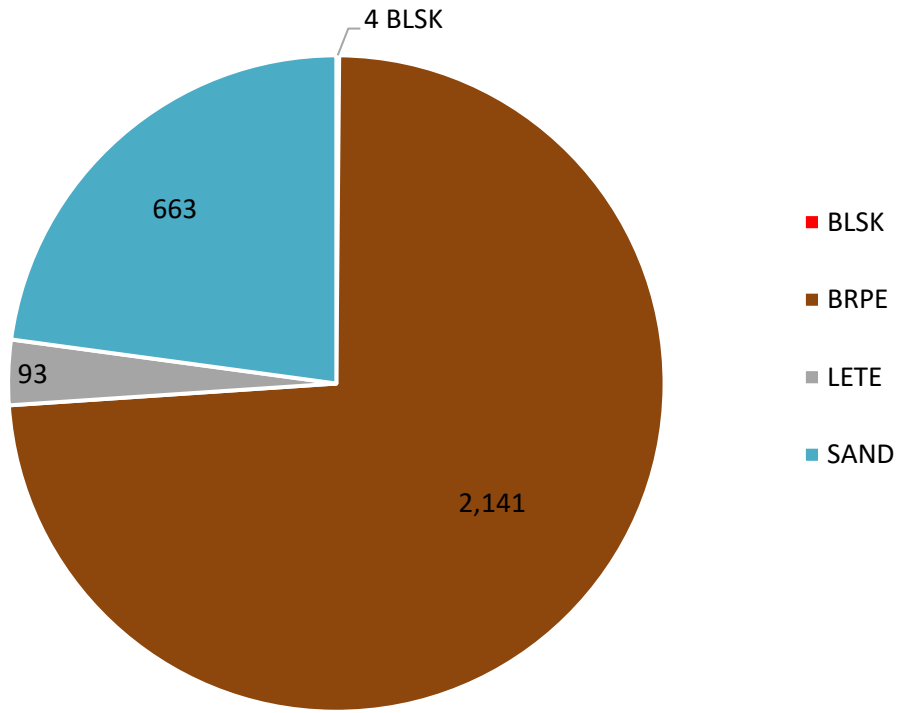


Figure 26. Priority bird observations recorded at Orange Beach during ACBS 2017-2020.

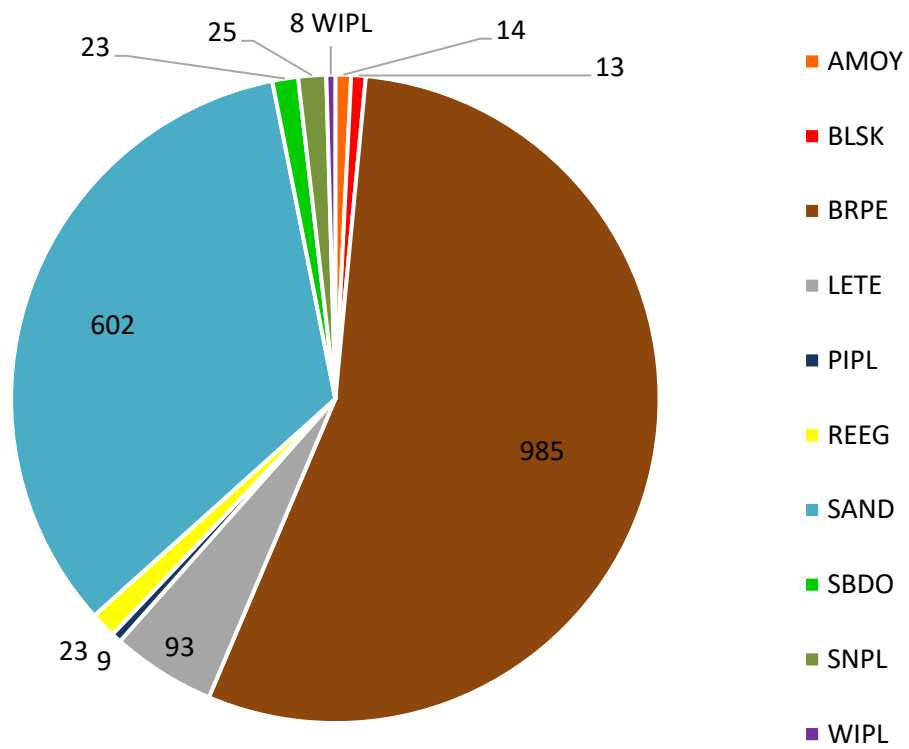


Figure 27. Priority bird observations recorded at Dauphin Island West End during ACBS 2017-2020.

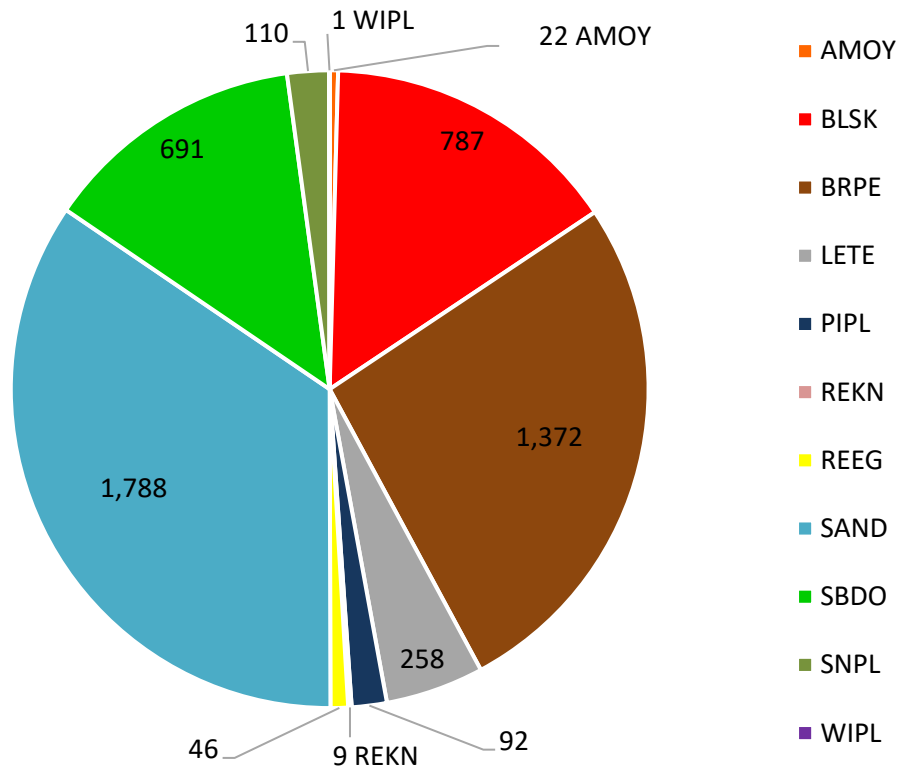


Figure 28. Priority bird observations recorded at Pelican Island during ACBS 2017-2020.

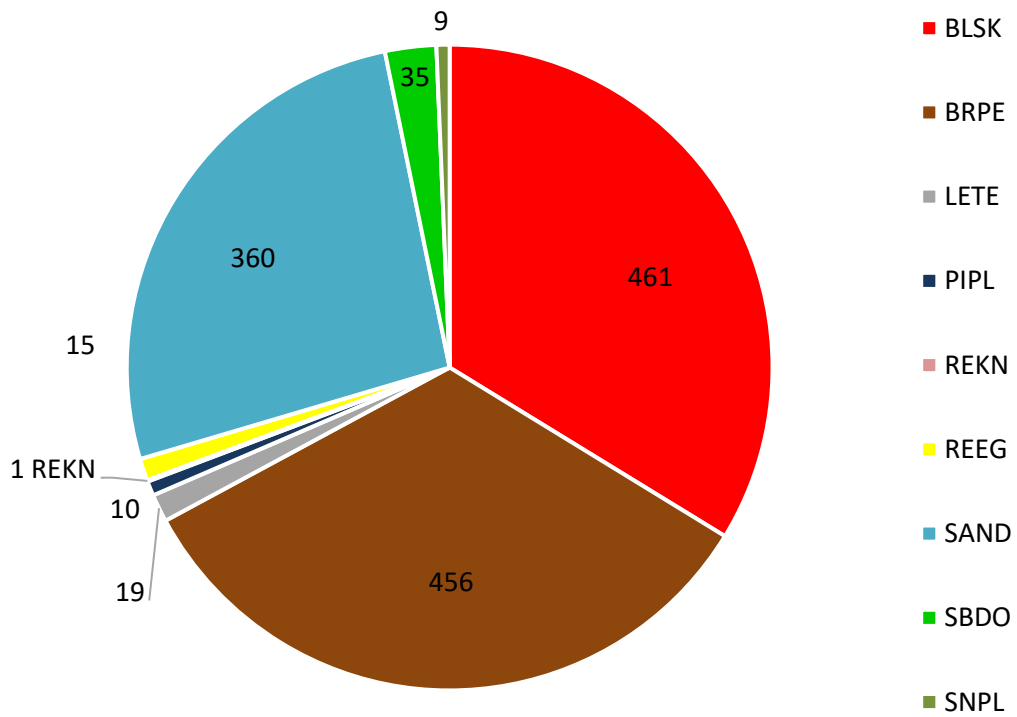


Figure 29. Priority bird observations recorded at Pelican Bay during ACBS 2017-2020.

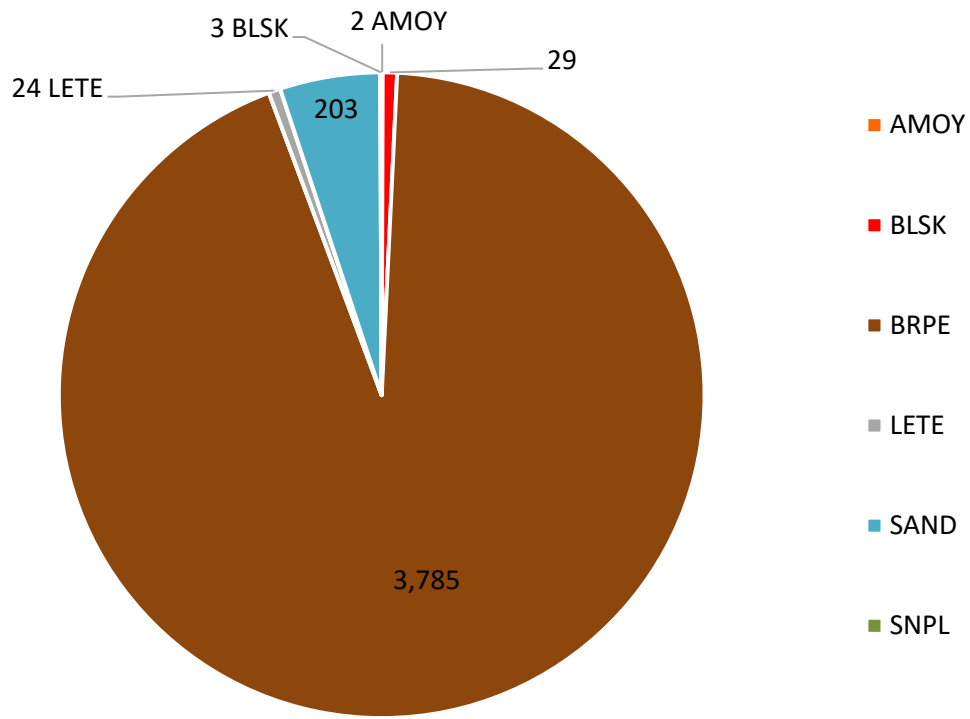


Figure 30. Priority bird observations recorded at Public Beach East during ACBS 2017-2020.

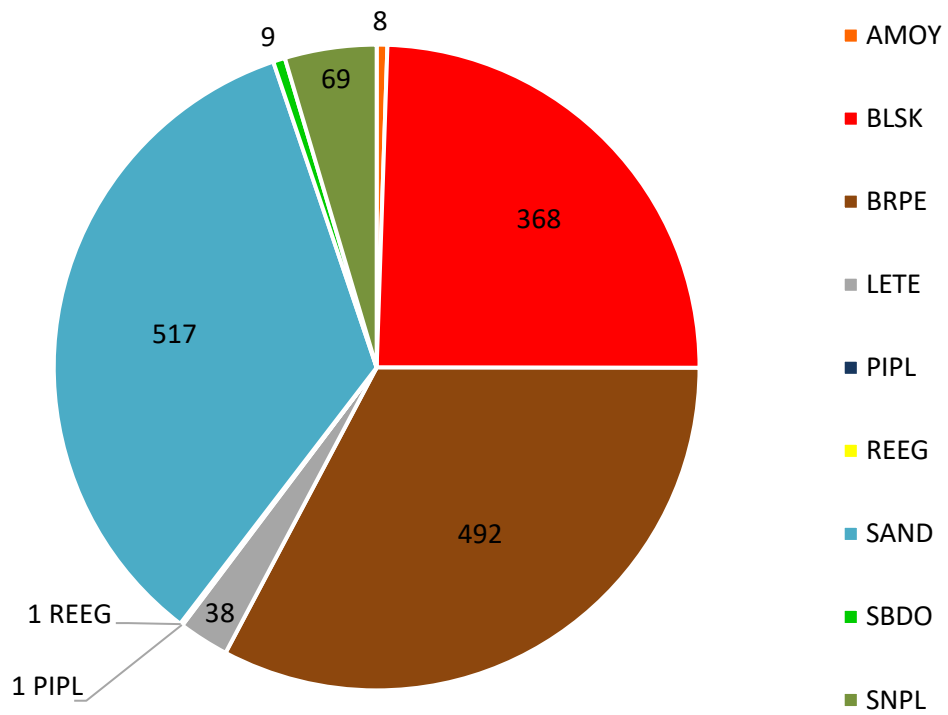


Figure 31. Priority bird observations recorded at Public Beach West during ACBS 2017-2020.

**Table 1. List of priority bird species recognized by Alabama Audubon.**

Species	Species Code	Annual Status
American Oystercatcher	AMOY	Resident
Black Skimmer	BLSK	Resident
Brown Pelican	BRPE	Resident
Least Tern	LETE	Breeding, Migration
Piping Plover	PIPL	Wintering
Reddish Egret	REEG	Resident
Red Knot	REKN	Migration, Wintering
Sanderling	SAND	Migration, Wintering
Short-billed Dowitcher	SBDO	Migration, Wintering
Snowy Plover	SNPL	Resident
Wilson's Plover	WIPL	Breeding, Migration

**Table 2. Number of priority species recorded at Mobile County sites during the 2017-2018 season.**

Species	Dauphin Island West End	Pelican Bay	Pelican Island	Public Beach East	Public Beach West
AMOY	6	0	2	0	3
BLSK	4	30	41	28	0
BRPE	276	106	455	2,879	342
LETE	27	7	44	0	28
PIPL	1	4	14	0	1
REKN	0	0	5	0	0
REEG	10	6	14	0	0
SAND	279	164	292	129	292
SBDO	1	26	278	0	9
SNPL	9	1	25	1	41
WIPL	3	0	1	0	0

**Table 3. Number of priority species recorded at Baldwin County sites during the 2017-2018 season.**

Species	Alabama Point	BSNWR Fort Morgan	BSNWR Perdue	Fairhope Public Beach	Gulf State Park	Mayday Park	Orange Beach
AMOY	0	3	0	0	0	0	0
BLSK	19	12	1	0	12	0	4
BRPE	1,290	743	396	116	936	765	1,168
LETE	365	6	8	3	24	1	59
PIPL	0	0	4	0	0	0	0
REKN	0	1	0	0	0	0	0
REEG	1	0	0	0	0	0	0
SAND	385	436	374	0	498	0	315
SBDO	0	0	0	0	0	0	0
SNPL	7	38	61	0	9	0	0
WIPL	0	1	0	0	0	0	0

**Table 4. Number of priority species recorded at Baldwin County sites during the 2018-2019 season.**

Species	Alabama Point	Bayfront Park	BSNWR Fort Morgan	BSNWR Perdue	Fairhope Public Beach	Gulf State Park	Mayday Park	Orange Beach
AMOY	0	0	0	0	0	1	0	0
BLSK	15	1	44	49	0	0	0	0
BRPE	925	627	660	585	249	1,193	1,058	610
LETE	326	4	29	29	5	43	0	15
PIPL	0	0	0	0	0	0	0	0
REKN	0	0	10	0	0	0	0	0
REEG	0	0	1	0	0	0	0	0
SAND	254	0	330	253	0	400	0	177
SBDO	0	1	0	0	0	0	0	0
SNPL	12	0	30	68	0	14	0	0
WIPL	0	0	0	0	0	0	0	0

**Table 5. Number of priority species recorded at Mobile County sites during the 2018-2019 season.**

Species	Dauphin Island West End	Pelican Bay	Pelican Island	Public Beach East	Public Beach West
AMOY	8	0	7	0	1
BLSK	3	18	561	1	0
BRPE	417	171	525	600	368
LETE	64	6	195	19	38
PIPL	6	5	49	0	2
REKN	0	1	4	0	0
REEG	10	3	20	0	0
SAND	204	109	1,030	24	153
SBDO	18	9	369	0	0
SNPL	12	8	53	0	17
WIPL	0	0		0	0

**Table 6. Number of priority species recorded at Mobile County sites during the 2019-2020 season.**

Species	Dauphin Island West End	Far West End	Pelican Bay	Pelican Island	Public Beach East	Public Beach West
AMOY	0	7	0	13	2	5
BLSK	6	2	413	185	0	0
BRPE	292	202	179	392	306	112
LETE	2	8	6	19	5	8
PIPL	2	0	1	29	0	0
REKN	0	0	0	0	0	0
REEG	3	0	6	12	0	1
SAND	119	205	87	466	50	72
SBDO	4	11	0	44	0	0
SNPL	4	2	0	32	2	11
WIPL	3	0	0	0	0	0



**Table 7. Number of priority species recorded at Baldwin County sites during the 2019-2020 season.**

Species	Alabama Point	Bayfront Park	BSNWR Fort Morgan	BSNWR Perdue	Fairhope Public Beach	Gulf State Park	Mayday Park	Orange Beach
AMOY	0	0	0	0	0	0	0	0
BLSK	2	0	12	1	0	4	0	0
BRPE	426	342	628	795	172	796	304	363
LETE	70	3	6	9	2	47	1	19
PIPL	0	0	1	0	0	0	0	0
REKN	0	0	0	0	0	2	0	0
REEG	1	0	2	0	0	0	0	0
SAND	292	0	322	272	0	317	0	171
SBDO	0	0	0	0	0	0	0	0
SNPL	14	0	32	44	0	8	0	0
WIPL	0	0	0	1	0	0	0	0

**Table 8. Number of priority species recorded at island sites during winter 2020.**

Species	Cat Island	Coffee Island	Little Dauphin Island	Marsh Island
AMOY	0	2	0	0
BLSK	1	0	0	0
BRPE	45	2	74	1
LETE	0	0	0	0
PIPL	0	0	11	0
REKN	0	0	0	0
REEG	0	1	1	0
SAND	114	0	34	4
SBDO	0	60	44	0
SNPL	0	0	0	0
WIPL	0	0	0	0

\* Offshore Island sites were surveyed only in winter during 2020 season.

**Table 9. All species recorded during ACBS surveys in the 2017-2018 season.**

<b>Shorebirds</b>	<b>Gulls and Terns</b>	<b>Wading Birds</b>	<b>Raptors</b>	<b>Landbirds</b>	
American Avocet	Black Tern	American Coot	American Kestrel	American Crow	Indigo Bunting
American Oystercatcher	Bonaparte's Gull	American White Pelican	Bald Eagle	American Goldfinch	Loggerhead Shrike
Black Skimmer	Caspian Tern	Black-crowned Night-Heron	Burrowing Owl	American Robin	Marsh Wren
Black-bellied Plover	Common Tern	Brown Pelican	Cooper's Hawk	Bank Swallow	Mourning Dove
Dunlin	Forster's Tern	Canada Goose	Great Horned Owl	Barn Swallow	Northern Cardinal
Greater Yellowlegs	Glaucous Gull	Cattle Egret	Merlin	Belted Kingfisher	Northern Flicker
Killdeer	Great Black-backed Gull	Clapper Rail	Northern Harrier	Black-and-white Warbler	Northern Mockingbird
Least Sandpiper	Gull-billed Tern	Common Gallinule	Osprey	Black-throated Green Warbler	Northern Parula
Lesser Yellowlegs	Herring Gull	Great Blue Heron	Peregrine Falcon	Blue Grosbeak	Northern Rough-winged Swallow
Piping Plover	Laughing Gull	Great Egret	Red-shouldered Hawk	Blue Jay	Orchard Oriole
Red Knot	Least Tern	Greater White-fronted Goose	Swallow-tailed Kite	Blue-gray Gnatcatcher	Palm Warbler
Ruddy Turnstone	Lesser Black-backed Gull	Green Heron	Turkey Vulture	Boat-tailed Grackle	Pine Warbler
Sanderling	Ring-billed Gull	Little Blue Heron		Bobolink	Prairie Warbler
Semipalmated Plover	Royal Tern	Reddish Egret		Brown Thrasher	Prothonotary Warbler
Semipalmated Sandpiper	Sandwich Tern	Snow Goose	<b>Pelagic</b>	Brown-headed Cowbird	Purple Martin
Short-billed Dowitcher		Snowy Egret	Magnificent Frigatebird	Brown-headed Nuthatch	Red-bellied Woodpecker
Snowy Plover		Tricolored Heron	Northern Gannet	Carolina Chickadee	Red-eyed Vireo
Spotted Sandpiper	<b>Waterfowl</b>	White Ibis	Parasitic Jaeger	Carolina Wren	Red-headed Woodpecker
Stilt Sandpiper	Black-bellied Whistling-Duck	Yellow-crowned Night-Heron		Cedar Waxwing	Red-winged Blackbird
Western Sandpiper	Blue-winged Teal	Double-crested Cormorant		Chimney Swift	Rock Pigeon (Feral Pigeon)
Whimbrel	Bufflehead			Cliff Swallow	Ruby-crowned Kinglet
White-rumped Sandpiper	Common Loon			Common Grackle	Ruby-throated Hummingbird
Willet	Greater Scaup			Common Ground-Dove	Savannah Sparrow
Wilson's Plover	Green-winged Teal			Common Nighthawk	Scarlet Tanager
Wilson's Snipe	Hooded Merganser			Common Yellowthroat	Seaside Sparrow
	Horned Grebe			Downy Woodpecker	Sedge Wren
	Lesser Scaup			Eastern Bluebird	Summer Tanager
	Mallard			Eastern Kingbird	Swamp Sparrow
	Mottled Duck			Eastern Phoebe	Tree Swallow
	Northern Shoveler			Eastern Towhee	Tufted Titmouse
	Red-breasted Merganser			Eastern Wood-Pewee	Veery
	White-winged Scoter			Eurasian Collared-Dove	White-eyed Vireo
				European Starling	White-throated Sparrow
				Fish Crow	Wood Thrush
				Gray Catbird	Yellow Warbler
				Gray Kingbird	Yellow-bellied Sapsucker
				Great Crested Flycatcher	Yellow-billed Cuckoo
				House Finch	Yellow-rumped Warbler
				House Sparrow	Yellow-throated Vireo
					Yellow-throated Warbler

**Table 10. All species recorded during ACBS surveys in the 2018-2019 season.**

<b>Shorebirds</b>	<b>Gulls and Terns</b>	<b>Wading Birds</b>	<b>Raptors</b>	<b>Landbirds</b>	
American Avocet	Black Tern	American Coot	American Kestrel	American Goldfinch	Indigo Bunting
American Oystercatcher	Bonaparte's Gull	American White Pelican	Bald Eagle	American Redstart	Loggerhead Shrike
Black Skimmer	Caspian Tern	Black-crowned Night-Heron	Barred Owl	American Robin	Marsh Wren
Black-bellied Plover	Common Tern	Brown Pelican	Broad-winged Hawk	Bank Swallow	Mourning Dove
Dunlin	Forster's Tern	Canada Goose	Cooper's Hawk	Barn Swallow	Nelson's Sparrow
Greater Yellowlegs	Glaucous Gull	Cattle Egret	Great Horned Owl	Belted Kingfisher	Northern Cardinal
Killdeer	Great Black-backed Gull	Clapper Rail	Northern Harrier	Blue Grosbeak	Northern Flicker
Least Sandpiper	Gull-billed Tern	Common Gallinule	Osprey	Blue Jay	Northern Mockingbird
Lesser Yellowlegs	Herring Gull	Double-crested Cormorant	Peregrine Falcon	Blue-gray Gnatcatcher	Northern Parula
Marbled Godwit	Laughing Gull	Great Blue Heron	Red-shouldered Hawk	Blue-headed Vireo	Northern Rough-winged Swallow
Pectoral Sandpiper	Least Tern	Great Egret	Red-tailed Hawk	Boat-tailed Grackle	Orange-crowned Warbler
Piping Plover	Ring-billed Gull	Green Heron		Brown Thrasher	Orchard Oriole
Red Knot	Royal Tern	Little Blue Heron		Brown-headed Cowbird	Palm Warbler
Ruddy Turnstone	Sandwich Tern	Reddish Egret	<b>Pelagic</b>	Brown-headed Nuthatch	Pileated Woodpecker
Sanderling		Snowy Egret	Northern Gannet	Carolina Chickadee	Pine Warbler
Semipalmated Plover		Sora	Parasitic Jaeger	Carolina Wren	Prothonotary Warbler
Semipalmated Sandpiper	<b>Waterfowl</b>	Tricolored Heron		Cave Swallow	Purple Martin
Short-billed Dowitcher	Black Scoter	Virginia Rail		Cedar Waxwing	Red-bellied Woodpecker
Snowy Plover	Black-bellied Whistling-Duck	White Ibis		Chimney Swift	Red-eyed Vireo
Solitary Sandpiper	Blue-winged Teal	Yellow-crowned Night-Heron		Chipping Sparrow	Red-headed Woodpecker
Spotted Sandpiper	Bufflehead			Cliff Swallow	Red-winged Blackbird
Upland Sandpiper	Common Loon			Common Grackle	Rock Pigeon (Feral Pigeon)
Western Sandpiper	Greater Scaup			Common Ground-Dove	Rose-breasted Grosbeak
Whimbrel	Hooded Merganser			Common Nighthawk	Ruby-crowned Kinglet
White-rumped Sandpiper	Horned Grebe			Common Yellowthroat	Ruby-throated Hummingbird
Willet	Lesser Scaup			Downy Woodpecker	Savannah Sparrow
Wilson's Plover	Mallard			Eastern Bluebird	Seaside Sparrow
	Mottled Duck			Eastern Kingbird	Song Sparrow
	Red-breasted Merganser			Eastern Phoebe	Summer Tanager
				Eastern Wood-Pewee	Swamp Sparrow
				Eurasian Collared-Dove	Tree Swallow
				European Starling	Tufted Titmouse
				Fish Crow	Western Kingbird
				Eastern Towhee	White-eyed Vireo
				Gray Catbird	White-throated Sparrow
				Great Crested Flycatcher	Wood Thrush
				Hooded Warbler	Yellow Warbler
				House Finch	Yellow-rumped Warbler
				House Sparrow	Yellow-throated Vireo
				House Wren	Yellow-throated Warbler

**Table 11. All species recorded during ACBS surveys in the 2019-2020 season.**

<b>Shorebirds</b>	<b>Gulls and Terns</b>	<b>Wading Birds</b>	<b>Raptors</b>	<b>Landbirds</b>	
American Avocet	Black Tern	American White Pelican	American Kestrel	American Goldfinch	Mourning Dove
American Oystercatcher	Bonaparte's Gull	Black-crowned Night-Heron	Bald Eagle	American Robin	Nelson's Sparrow
Black Skimmer	Caspian Tern	Brown Pelican	Cooper's Hawk	Bank Swallow	Northern Cardinal
Black-bellied Plover	Common Tern	Canada Goose	Great Horned Owl	Barn Swallow	Northern Flicker
Dunlin	Forster's Tern	Cattle Egret	Merlin	Belted Kingfisher	Northern Mockingbird
Greater Yellowlegs	Great Black-backed Gull	Clapper Rail	Northern Harrier	Blue Grosbeak	Northern Parula
Killdeer	Gull-billed Tern	Double-crested Cormorant	Osprey	Blue Jay	Northern Rough-winged Swallow
Least Sandpiper	Herring Gull	Great Blue Heron	Peregrine Falcon	Blue-gray Gnatcatcher	Orange-crowned Warbler
Lesser Yellowlegs	Laughing Gull	Great Egret	Red-tailed Hawk	Blue-headed Vireo	Orchard Oriole
Marbled Godwit	Least Tern	Green Heron	Sharp-shinned Hawk	Boat-tailed Grackle	Painted Bunting
Piping Plover	Ring-billed Gull	Little Blue Heron		Brown Thrasher	Palm Warbler
Red Knot	Royal Tern	Reddish Egret		Brown-headed Cowbird	Pileated Woodpecker
Ruddy Turnstone	Sandwich Tern	Snowy Egret	<b>Pelagic</b>	Brown-headed Nuthatch	Pine Warbler
Sanderling		Sora	Northern Gannet	Carolina Chickadee	Prairie Warbler
Semipalmated Plover		Tricolored Heron		Carolina Wren	Purple Martin
Semipalmated Sandpiper	<b>Waterfowl</b>	Virginia Rail		Cedar Waxwing	Red-bellied Woodpecker
Short-billed Dowitcher	Black-bellied Whistling-Duck	White Ibis		Chimney Swift	Red-headed Woodpecker
Snowy Plover	Blue-winged Teal	Yellow-crowned Night-Heron		Chipping Sparrow	Red-winged Blackbird
Solitary Sandpiper	Bufflehead			Cliff Swallow	Rock Pigeon (Feral Pigeon)
Spotted Sandpiper	Common Loon			Common Grackle	Ruby-crowned Kinglet
Western Sandpiper	Gadwall			Common Nighthawk	Ruby-throated Hummingbird
Whimbrel	Greater Scaup			Common Yellowthroat	Savannah Sparrow
White-rumped Sandpiper	Hooded Merganser			Downy Woodpecker	Scaly-breasted Munia
Willet	Horned Grebe			Eastern Bluebird	Scarlet Tanager
Wilson's Plover	Lesser Scaup			Eastern Kingbird	Seaside Sparrow
Wilson's Snipe	Mallard			Eastern Phoebe	Song Sparrow
	Mottled Duck			Eastern Towhee	Summer Tanager
	Northern Shoveler			Eastern Wood-Pewee	Swamp Sparrow
	Pied-billed Grebe			Eurasian Collared-Dove	Tennessee Warbler
	Red-breasted Merganser			European Starling	Tree Swallow
	Redhead			Fish Crow	Tufted Titmouse
				Gray Catbird	White-eyed Vireo
				Great Crested Flycatcher	White-throated Sparrow
				House Finch	White-winged Dove
				House Sparrow	Yellow Warbler
				House Wren	Yellow-bellied Sapsucker
				Indigo Bunting	Yellow-billed Cuckoo
				Loggerhead Shrike	Yellow-rumped Warbler
				Marsh Wren	Yellow-throated Vireo
					Yellow-throated Warbler

**Table 12. Species richness values calculated from ACBS surveys during 2017-2018.**

	Fall 2017	Winter 2018	Spring 2018
<b>Mobile County</b>			
Dauphin Island West End	17.50 ± 0.50	13.33 ± 2.35	31.00 ± 8.92
Public Beach East	16.83 ± 6.25	13.66 ± 1.24	18.33 ± 5.49
Public Beach West	15.66 ± 2.13	16.00 ± 1.63	25.33 ± 8.74
Pelican Bay	21.33 ± 9.55	24.00 ± 1.41	17.83 ± 4.59
Pelican Island	21.66 ± 5.08	21.66 ± 3.09	24.50 ± 10.07
<b>Baldwin County</b>			
Alabama Point	15.66 ± 3.29	19.00 ± 6.48	24.00 ± 8.22
Bayfront Park*	n/a	n/a	18.66 ± 6.18
Bon Secour NWR- Ft. Morgan	23.33 ± 4.88	19.66 ± 4.64	21.33 ± 10.24
Bon Secour NWR- Perdue Unit	15.00 ± 2.16	12.66 ± 5.55	18.16 ± 7.31
Fairhope Public Beach	16.66 ± 4.10	20.66 ± 2.86	20.66 ± 3.98
Gulf State Park	14.33 ± 3.34	16.00 ± 2.16	18.16 ± 4.63
May Day Park	27.66 ± 1.24	32.33 ± 2.62	22.66 ± 6.99
Orange Beach	12.16 ± 1.21	13.00 ± 0.81	25.33 ± 10.41

\*Bayfront Park route added in the Spring 2018.

**Table 13. Species richness values calculated from ACBS surveys during 2018-2019.**

	Fall 2018	Winter 2019	Spring 2019
<b>Mobile County</b>			
Dauphin Island West End	14.50 ± 6.31	15.00 ± 1.41	20.00 ± 3.55
Public Beach East	9.16 ± 1.67	8.00 ± 2.16	10.83 ± 3.89
Public Beach West	12.33 ± 3.44	12.66 ± 2.05	11.50 ± 1.50
Pelican Bay	19.16 ± 2.96	18.00 ± 0.81	21.66 ± 5.17
Pelican Island	25.16 ± 2.19	26.00 ± 0.81	27.00 ± 1.82
<b>Baldwin County</b>			
Alabama Point	14.66 ± 1.63	15.66 ± 2.05	13.16 ± 1.46
Bayfront Park	30.16 ± 6.84	32.66 ± 6.64	39.33 ± 4.10
Bon Secour NWR- Ft. Morgan	15.33 ± 3.68	15.33 ± 2.86	19.33 ± 2.13
Bon Secour NWR- Perdue Unit	10.83 ± 3.43	14.66 ± 2.49	21.16 ± 2.96
Fairhope Public Beach	20.66 ± 2.92	23.66 ± 8.37	29.16 ± 4.17
Gulf State Park	17.40 ± 3.26	18.00 ± 1.41	21.33 ± 2.92
May Day Park	25.50 ± 4.57	30.66 ± 4.78	30.33 ± 10.27
Orange Beach	7.16 ± 1.95	12.66 ± 0.47	10.33 ± 1.37

**Table 14. Species richness values calculated from ACBS surveys during 2019-2020**

	Fall 2019	Winter 2020	Spring 2020
<b>Mobile County</b>			
Cat Island*	n/a	10.50 ± 3.50	n/a
Coffee Island*	n/a	22.50 ± 3.50	n/a
Dauphin Island West End	15.66 ± 6.18	14.33 ± 0.47	18.00 ± 5.00
Far West End*	n/a	n/a	19.50 ± 2.50
Little Dauphin Island*	n/a	34.5 ± 0.40	n/a
Marsh Island*	n/a	17.00 ± 4.00	n/a
Public Beach East	11.16 ± 2.19	15.33 ± 2.05	13.00 ± 1.00
Public Beach West	8.66 ± 2.80	10.00 ± 3.55	12.50 ± 2.50
Pelican Bay	17.00 ± 2.44	19.66 ± 2.05	15.00 ± 2.00
Pelican Island	22.16 ± 4.81	19.66 ± 2.05	24.00 ± 3.00
<b>Baldwin County</b>			
Alabama Point	12.83 ± 2.47	12.33 ± 2.49	6.00 ± 1.00
Bayfront Park	37.16 ± 4.29	34.66 ± 4.64	38.50 ± 5.50
Bon Secour NWR- Ft. Morgan	18.50 ± 4.11	17.00 ± 0.81	16.00 ± 0.00
Bon Secour NWR- Perdue Unit	14.00 ± 2.88	11.66 ± 2.05	12.00 ± 0.00
Fairhope Public Beach	19.50 ± 4.71	27.33 ± 1.24	30.00 ± 0.00
Gulf State Park	15.50 ± 2.21	16.00 ± 2.16	18.00 ± 4.00
May Day Park	28.83 ± 2.79	34.33 ± 4.18	28.00 ± 2.00
Orange Beach	10.50 ± 1.70	11.00 ± 0.81	11.00 ± 1.00

**\*Coffee, Little Dauphin, and Marsh Islands were added in the winter 2019–2020 and were not sampled during the Spring 2020 due to Covid-19 restrictions. Far West End was added in spring 2020.**

**Table 15. Monthly averages of Alabama Audubon's 11 priority species during the 2017-2018 season.**

Species	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile
	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Fairhope Public Beach	May Day Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach
American Oystercatcher	August									1			
	September								2	2	1		
	October		2							2	2		
	January												
	February												
	March												
	April		1										
Black Skimmer	August		2						1	4			
	September		7	3					11				
	October			9					2			30	3
	January												25
	February												
	March												
	April		3			12			2				
Brown Pelican	August	43	105			32			2	4	19	6	44
	September	8	70	112	156	17	21	230	32	17	46	12	66
	October	51	56	181	225	141	4	63	60	3	31	29	1202
	January	20	36	48	49	103	21	30	48	41	21	4	30
	February	17	17	295	65	37	11	32	64	9	4	6	21
	March	39	20	80	44	43	7	12	6		22		31
	April	13	47	43	27	50	4	18	13	26	12	6	25
Least Tern	August								2	3			
	September			7									
	October												
	January												
	February												
	March												
	April		3	37	17	1			9	4	19	3	
Piping Plover	August	2											
	September								2				
	October									1	1	1	
	January								1				

	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Fairhope Public Beach	May Day Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach
	February												
	March								1				
	April	1							3			3	
	May												
Red Knot	August												
	September												
	October								2				
	January								1				
	February												
	March												
	April								1				
May		1						1					
Reddish Egret	August								4	1			
	September			1					2	2		1	
	October								1	2		2	
	January								1			1	
	February								1			1	
	March												
	April								1	2			
May								1			1		
Sanderling	August	46	57			59			34	7	22	1	1
	September	28	18	28	20	45			21	21	15	11	6
	October	18	32	48	18	37			20	18	51	16	11
	January	41	8	4	2	9			8	12	9	7	
	February	3	47	17	5				16		9	4	
	March	6	34	14	16	15			57	12	15	14	36
	April	26	37	27	30	11			9	23	15	13	8
May	42	32	34	44	36			22	37	19	15	15	
Short-billed Dowitcher	August								6				
	September								9	1		6	
	October								3				
	January								28				
	February								24				
	March								32		9	1	
	April								30				
May								25			8		
Snowy Plover	August	12	1						4		7		
	September	4	5	2		1			5	4	4		



	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Fairhope Public Beach	May Day Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach
	October	5	5	2		2				3	5		1
	January		3						2		5		
	February	4	4						4		1		
	March	7	2							1			
	April	6	3			1				1	3		
	May	3	3			2					3	1	
Wilson's Plover	August								1	1			
	September												
	October												
	January												
	February												
	March									1			
	April		1										
	May									1			

**Table 16. Monthly averages of Alabama Audubon's 11 priority species recorded during the 2018-2019 season.**

County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Fairhope Public Beach	May Day Park	Bayfront Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach
American Oystercatcher	August									1				
	September					1				2	2	1		
	October									1	4			
	January										2			
	February													
	March													
	April													
Black Skimmer	August		1							2	2			
	September		11	2					1	14	1		6	
	October									53				
	January		31							145				
	February									3				
	March									35				1
	April			5						12				
Brown Pelican	August	49	1	8						40			6	
	September	32	10	93	33	62	35	410	182	20	103	20	14	86
	October	28	31	140	46	230	9	135	122	76	10	16	5	94
	January	58	87	40	12	44	42	110	30	57	7	18	17	35
	February	20	83	55	137	19	2	4		12	14	3	29	21
	March	27	36	73	11	26	5	3	4	5	4	1	3	
	April	69	11	9	22	64			4	27	117	80	2	6
Least Tern	May	60	52	72	47	77	4	3	4	19	22	43	10	46
	August	20	8	16	15	37	8	3	2	54	33	34	9	17
	September	2		1						16	2	22		
	October	8	5										3	
	January													
	February													
March														

	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Baldwin Fairhope Public Beach	May Day Park	Bayfront Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach	
	April	8	2	8	5	2	1		2	15	58	1			
	May	6	11	159	5	21	2		2	75	4	7	3	19	
Piping Plover	August									1					
	September									6					
	October									3		1			
	January									5	1	1			
	February									1					
	March									4					
	April									6	3		3		
	May									3					
Red Knot	August														
	September														
	October									4			1		
	January														
	February														
	March														
	April		4												
	May		6												
Reddish Egret	August									3			1		
	September		1							2	1	1	1		
	October									1	2	1	1		
	January									1	1				
	February									1					
	March									1	1				
	April									2	1				
	May									1	2				
Sanderling	August	26		38	16	14				50	21	11	5	4	
	September	19	32	11	7	34				32	11	8	6	4	
	October	18	43	20	8	23				55	5	13	5		
	January	7	25	17	10	26				21	15	5	6	1	
	February	28	25	22	2	14				109	16	8	2		

	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Baldwin Fairhope Public Beach	May Day Park	Bayfront Park	Pelican Island	Mobile Island West End	Public Beach West	Pelican Bay	Mobile Dauphin Island East Beach
	March	3	14	7	19	27				130		21	10	
	April	11	19	11	13	37				120	15	13	5	2
	May	30	15	11	19	19				59	26	7	19	5
Short-billed Dowitcher	August									24	4			
	September									24	1			
	October									2				
	January									4				
	February									14				
	March									51				
	April								1	36	12		1	
	May									46	1		8	
Snowy Plover	August	2		3		1				5	2	1		
	September	3	3	2		2				5		2	2	
	October	3	1			2				11	5	1		
	January	4		4						4	1	2		
	February	8	2	1								4		
	March	7	3			2				2				
	April	7	5			2				4	2	3	2	
	May	9	3	1						2		2		
Wilson's Plover	August										1			
	September													
	October													
	January													
	February													
	March													
	April										1			
	May													

**Table 17. Monthly averages of Alabama Audubon's 11 priority species during the 2019-2020 season.**

	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Fairhope Public Beach	Mayday Park	Bayfront Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach	Marsh Island	Cat Island	Coffee Island	Little Dauphin Island	Far West End
American Oystercatcher	August									3		1							
	September									2	1	2							
	October									2		2							
	January									2				2			2		
	February																		
	March																		
	April																		
	May									2									4
Black Skimmer	August	1	6			4				10	1								
	September		3	2						86			28						
	October												128						
	January															1			
	February																		
	March																		
	April																		
	May		1							2	3		1						2
Brown Pelican	August	133	77	47	4	114	10	45	24	21	27	1	15	21					
	September	39	103	95	58	139	26	42	31	93	26	10	10	23					
	October	226	27	34	36	43	24	55	65	33	32	12	22	38					
	January	11	70	7	25	12	3	1	3	36	5	28	18	33	1	23	1	35	
	February	7	13	2	16	14	6	7	6	12	8	2	26	21				39	
	March																		
	April																		
	May	33	19	6	24	71	20	8	44	3	52	5	9	21					101
Least Tern	August	4								5									
	September																		
	October																		

	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Fairhope Public Beach	Mayday Park	Bayfront Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach	Marsh Island	Cat Island	Coffee Island	Little Dauphin Island	Far West End
	January																		
	February																		
	March																		
	April																		
	May	5	3	35	10	24	1	1	3	7	2	4	6	3					8
Piping Plover	August		1							2	1								
	September									1		1							
	October									3									
	January									7								7	
	February									6	1							4	
	March																		
	April																		
Red Knot	August																		
	September					2													
	October																		
	January																		
	February																		
	March																		
	April																		
Reddish Egret	August									3	1								
	September		1							2	1		1						
	October		1	1						2		1	2						
	January									1			1				1	1	
	February									1	1								
	March																		
	April																		

	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Fairhope Public Beach	Mayday Park	Bayfront Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach	Marsh Island	Cat Island	Coffee Island	Little Dauphin Island	Far West End
	May																		
Sanderling	August	20		20	3	14				28	10		2	4					
	September	14	47	15	4	25				12	10	7	3	4					
	October	30	16	36	3	38				19	12	8	3	3					
	January	22	28	45	28	24				51	14	13	6	6	4	57		14	
	February	29	7	33	15	23				182	19	2	48					20	
	March																		
	April																		
	May	40	45	17	44	42				18	5	10	6	14					103
Short-billed Dowitcher	August									6									
	September									1									
	October									6	2								
	January									11							30	23	
	February																	21	
	March																		
	April																		
	May									4									11
Snowy Plover	August	6	7	1						8									
	September	4	4	2		2				3									
	October	3	4	2		1				6	2								
	January	7	3	1		2				1		6							
	February		3	1								5							
	March																		
	April																		
	May	4	1							2				2					2
Wilson's Plover	August										2								
	September	1																	
	October																		

	County	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Baldwin	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile	Mobile
Species	Month	Bon Secour Perdue	Bon Secour Ft. Morgan	Alabama Point	Orange Beach	Gulf SP Beach	Fairhope Public Beach	Mayday Park	Bayfront Park	Pelican Island	Dauphin Island West End	Public Beach West	Pelican Bay	Dauphin Island East Beach	Marsh Island	Cat Island	Coffee Island	Little Dauphin Island	Far West End
	January																		
	February																		
	March																		
	April																		
	May										1								