



Coastal wetlands in Aransas National Wildlife Refuge, Calhoun County, Texas; Melissa Zieschang, USFWS (CC)

Assessing shorebird use of a private land parcel in Calhoun County, Texas to support land acquisition and management efforts

Conservation Contribution #19

Conservation Action: Land/Water Protection



Smithsonian
Migratory Bird Center



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This report for public audiences describes how the Shorebird Collective fulfilled a conservation request, presents key findings, and due to data privacy settings, shows only a subset of the data used in a full report to our partner.

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Project Background

Conservation Request

The International Crane Foundation (ICF) requested shorebird tracking data from the Shorebird Science and Conservation Collective (hereafter, “Shorebird Collective”) to bolster their efforts in securing funding for the acquisition and permanent protection of an 1,118-acre land parcel along the Texas Gulf Coast in Calhoun County, Texas, USA (Error! Reference source not found.). While the primary goal of this land purchase was to support the federally endangered Whooping Crane (*Grus americana*), the protection and management of the property would also provide significant benefits to a multitude of other grassland and wetland-dependent species, including shorebirds. Specifically, ICF requested information on electronically tracked shorebirds ([see page 10 for more information on tracking data](#)) located within the private land parcel of interest and/or county. The Shorebird Collective compiled contributed shorebird tracking data and summary information to support this request.

Important Note: This report describes how the Shorebird Collective fulfilled ICF’s request and presents key outputs and findings showing only a subset of the data used to inform our partner. Due to the privacy settings of some datasets contributed to the Shorebird Collective, a full report of findings provided to ICF is for internal planning use only.

About the Shorebird Science and Conservation Collective

The Shorebird Collective is a partnership of scientists and practitioners working to translate the collective findings of shorebird tracking and community science data into effective on-the-ground actions to advance shorebird conservation in the Western Hemisphere. Learn more on our webpage: [web link for the Shorebird Collective’s webpage](#).

About the International Crane Foundation

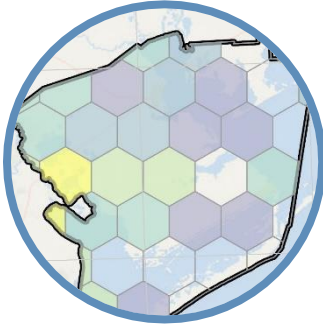
ICF works worldwide to conserve cranes and the ecosystems, watersheds, and flyways on which they depend. They provide knowledge, leadership, and inspiration to engage people in resolving threats to cranes and their diverse landscape. Learn more on ICF’s website: [web link for ICF’s website](#).



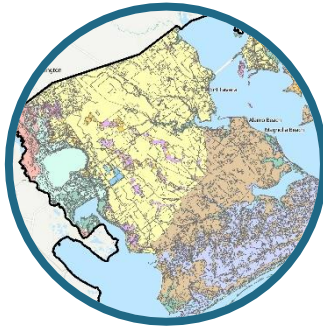
Figure 1. Map of Texas with a pink polygon denoting the boundary of Calhoun County. The specific location of the 1,118-acre private land parcel was left out of the map to respect the privacy concerns of ICF.

Key Outputs & Recommendations

Below we summarize key outputs, findings, and recommendations provided to ICF to support their funding efforts in acquiring the 1,118-acre private land parcel for conservation:



1. The Shorebird Collective provided ICF with information on electronically tracked shorebird movements on or near an 1,118-acre land parcel under consideration for purchase in Calhoun County, Texas. While no individuals were tracked on the land parcel, **two** individuals of **two** species were tracked within five miles of the property. In a full report to ICF and with permission of data owners, we provided maps of their movements with details of their seasonal timing of occurrence and stopover durations, along with a summary of all shorebirds tracked in Calhoun County.



2. Tracking data can be biased to the individuals and/or species equipped with tracking devices. Therefore, an absence of shorebird tracking data in ICF's land parcel of interest does not necessarily indicate lack of use by or value to shorebirds. The Shorebird Collective explored habitat data to provide ICF with additional context about the potential value of the land parcel to shorebirds.



3. Additional information may become available as data contributors continue to share new tracking data with the Shorebird Collective. We invited the ICF to periodically check in with the Shorebird Collective on the availability of new data to support their work.

Images: 1. Shorebird species density map in Calhoun County; 2. Map of habitats in Calhoun County using the Texas Ecosystem Analytical Mapper (TPWD 2014); 3. Red Knot (*Calidris canutus*) with 3.4 g GPS tag, Tim Romano, Smithsonian



Summary of Results

Of the shorebirds tracked by GPS and Argos satellite technologies and contributed to the Shorebird Collective¹ (**Box 1**), 312 moved through the state of Texas during their annual cycle between 2008 and 2024. No shorebirds were tracked on the land parcel of interest, but **one Hudsonian Godwit** (*Limosa haemastica*) and **one Lesser Yellowlegs** (*Tringa flavipes*) had tracked locations within five miles of the land parcel during northbound (spring) migration. The Hudsonian Godwit stopped for ten days in April 2020, while the Lesser Yellowlegs stopped for approximately six days in March 2021. Note that maps of their movements cannot be shown in this public-facing report due to the privacy settings of the datasets but were provided to ICF for their internal planning use.

Box 1. Summary of shorebird tracks in ICF's area of interest

1,976 individuals of 24 species contributed to the Shorebird Collective



312 individuals of 15 species tracked in Texas

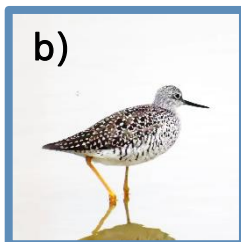
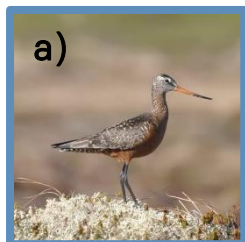


2 individuals of 2 species with tag transmissions within 5 miles of the land parcel of interest



Outside of the five-mile buffer, **22** additional shorebirds of **10** species were tracked in Calhoun County (**Table 1, Figure 2**) during the overwintering and migration periods between 2017 and 2024. Most individuals were tracked in the central and western portions of the county as well as along the Gulf Coast. Tracking data in these areas overlapped with bottomland, blackland, prairie, and tidal flat habitats (Figure 4, TPWD 2014). The land parcel of interest contains tidal flat and salty prairie habitats (TPWD 2014), which are consistent with other areas in the county used by shorebirds. Although no tracked shorebirds were detected on ICF's land parcel of interest, the habitats present could support shorebirds; however, on-the-ground surveys would be necessary to confirm shorebird use of the property.

Additional information may become available as data contributors continue to share new tracking data with the Shorebird Collective. We invited ICF to periodically check in with the Shorebird Collective on the availability of new data to support their efforts.



Images: **a)** Hudsonian Godwit, Kristine Sowl, USFWS (CC); **b)** Lesser Yellowlegs, Jill Shannon, USFWS (CC)

¹ These data come from 86 organizations, collected from 2006 to 2024. *Data version 2024-09-24*



Methods

The Shorebird Collective used statistical models to account for spatial uncertainty and determined the most likely movement path of each bird recorded by the tracking device (example code is available on GitHub: [web link for GitHub page](#)). We then overlaid shorebird tracks on a map of the 1,118-acre private land parcel of interest.

In a full report to ICF, we provided maps of tracked shorebird movements within a five-mile buffer of the land parcel² with details of their seasonal timing of occurrence and stopover durations, along with a summary of all shorebirds tracked in Calhoun County (Table 1, Figure 2). We also used the Texas Ecosystem Analytical Mapper (TPWD 2014) to compare the habitats on ICF's land parcel of interest to other nearby areas in the county used by tracked birds to provide ICF with additional context about the potential value of the land parcel to shorebirds (Figure 3).

Table 1. Tracked individuals with tag transmissions in Calhoun County, Texas.

Number of Individuals	Scientific Name
1 Black-bellied Plover	<i>Pluvialis squatarola</i>
5 Buff-breasted Sandpiper	<i>Calidris subruficollis</i>
4 Hudsonian Godwit	<i>Limosa haemastica</i>
2 Lesser Yellowlegs	<i>Tringa flavipes</i>
4 Long-billed Curlew	<i>Numenius americanus</i>
2 Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>
3 Pectoral Sandpiper	<i>Calidris melanotos</i>
1 Short-billed Dowitcher	<i>Limnodromus griseus</i>
1 Stilt Sandpiper	<i>Calidris himantopus</i>
1 Upland Sandpiper	<i>Bartramia longicauda</i>

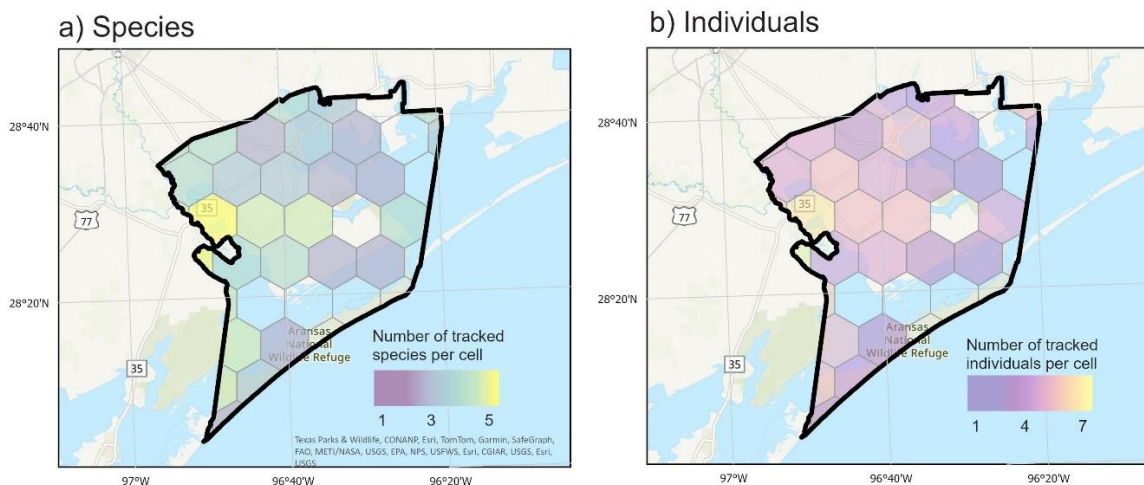


Figure 2. Gridded density maps of the number of shorebird species (a) and individuals (b) tracked with Argos or GPS technologies per 10 x 10 km hexagonal cell across all seasons in Calhoun County, Texas. Data were summarized at the original timestep of each tag and include tag transmissions that occurred during stops and flights. Note that the 1,118-acre private land parcel under consideration for purchase is not shown to respect the privacy concerns of ICF.

² Maps of tracked shorebird movements cannot be shown in this public-facing report due to the privacy settings of the datasets but were provided to ICF for their internal planning use.

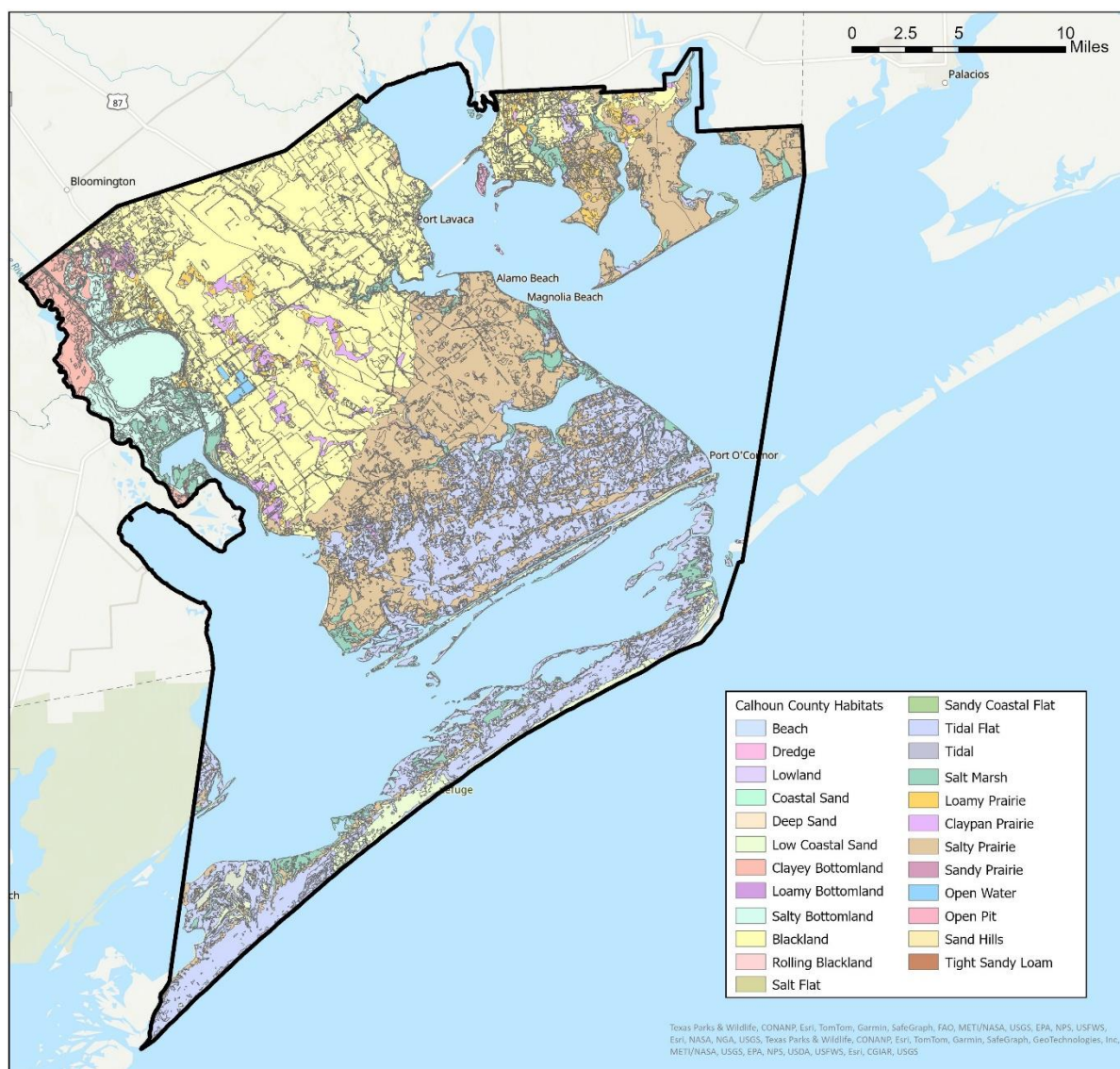


Figure 3. Habitats in Calhoun County, Texas (TPWD 2014). Note that the 1,118-acre private land parcel under consideration for purchase is not shown to respect the privacy concerns of ICF. Tidal flat and salty prairie habitats are within ICF's land parcel of interest.

Coastal Texas and Shorebirds

The Gulf Coast is considered one of the most significant regions in the United States for shorebirds (Elliot and McKnight 2000). Along the Texas coast in particular, the variety of wetland, riparian, and coastal prairie habitats provide critical breeding, stopover, and/or wintering habitat for at least 38 Nearctic shorebird species (Elliot and McKnight 2000). For shorebirds using the midcontinent, areas along the Texas coast also provide the first and/or last suitable habitat for individuals migrating to and from more distant wintering sites in Central and South America, providing an important area for shorebirds to rest and refuel before and/or after a strenuous journey over the Gulf (Withers 2002).

Calhoun County hosts a myriad of riparian and coastal prairie habitats which provide key resources for shorebirds, waterfowl, waterbirds, and other coastal wildlife species. The county and surrounding coastal area also contain several protected areas (**Figure 4**, UNEP-WCMC and IUCN 2021), including Aransas National Wildlife Refuge and Marine Protected Area, Guadalupe Delta Wildlife Management Area (WMA), Mad Island WMA, and a suite of other key sites. These protected lands play a vital role in supporting shorebirds and other migratory species throughout their annual cycles.

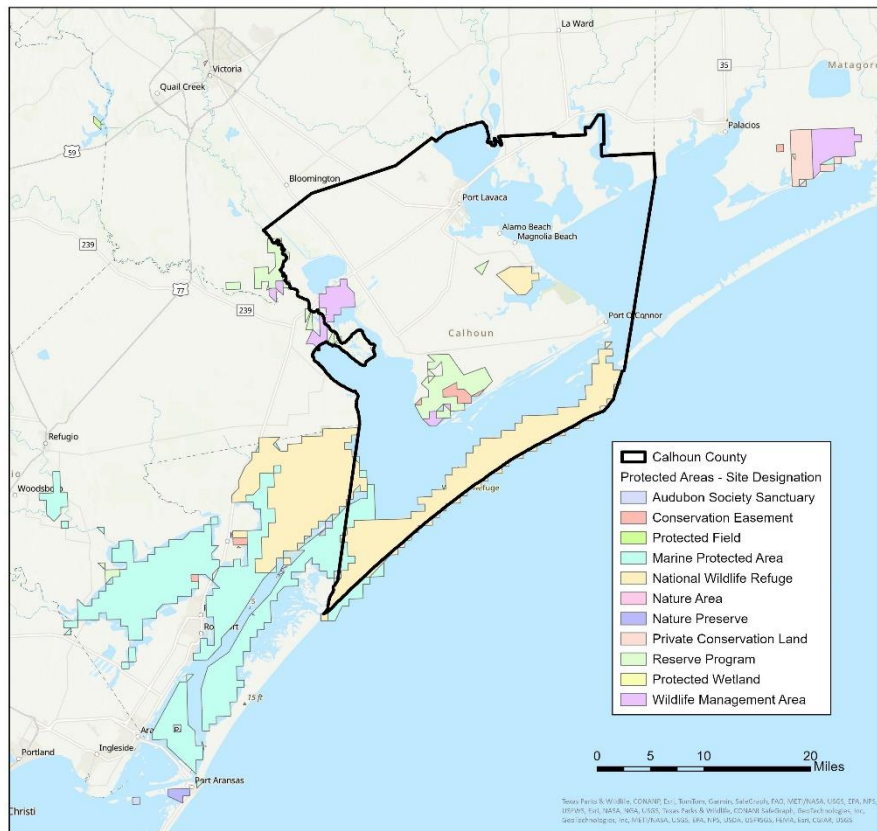


Figure 4. Map of Calhoun County, Texas with labeled surrounding protected areas (UNEP-WCMC and IUCN 2021).

Shorebird Background

Shorebirds are a diverse group of birds in the order Charadriiformes, including sandpipers, plovers, avocets, oystercatchers, and phalaropes. There are approximately 217 shorebird species in the world (O'Brien et al. 2006), 81 of which occur in the Americas. 52 species breed in North America (Morrison et al. 2000) and 35 species breed in Latin America and the Caribbean (Lesterhuis and Clay 2019). They are among the planet's most migratory groups of animals. Many species in the Western Hemisphere, for example, travel thousands of miles every year between their breeding grounds in the Arctic and wintering grounds in the Caribbean and Central and South America, stopping at key sites along the way to rest and refuel. Across their vast range, shorebirds depend on a variety of habitats, including coastlines, shallow wetlands, mudflats, lake and pond edges, grasslands, and fields.



Long-billed Curlew;
Tim Romano, Smithsonian

Although shorebirds are often seen in large flocks, it may surprise some to know that their populations are rapidly declining. Many populations have lost over 70% of their numbers in the past 50 years (NABCI 2022, Rosenberg et al. 2019, Smith et al. 2023), making them one of the most vulnerable bird groups in North America. Habitat loss and alteration, human disturbance, and climate change are just some of the major threats shorebirds face today. Effective shorebird management is even more of a challenge due to many species depending on habitats across multiple countries under different political jurisdictions. Despite these trends, many public and private groups are working to protect shorebirds and the habitats they depend on.



Flock of Marbled Godwits (*Limosa fedoa*) to a shorebird scientist;
Tim Romano, Smithsonian



Scientists attaching a GPS transmitter to a Red Knot to track its migration; Tim Romano, Smithsonian

About Shorebird Tracking Data

Tracking data provide valuable insight into where shorebirds move and are located throughout the year (**Figure 5**). These data can ultimately help biologists and practitioners make more informed conservation and land management decisions to protect shorebirds and their habitats. Tracking data are collected via tiny electronic devices (often called “tags”) which are attached directly to individual birds (typically with either leg bands, harnesses, or glue) and may be carried by the birds year-round. Data from shorebirds tracked with satellite tags were shared with ICF.



Satellite tags work by sending signals to orbiting satellites that re-transmit location data back to a receiving station which researchers can access through their computer. The two types of satellite tags commonly used to study birds include Global Positioning System (GPS) and Argos tags. GPS tags typically have high spatial accuracy (i.e., minimal location error, generally <10 meters), while Argos tags can have location error of 500-2,500 meters. The Shorebird Collective compiled contributed GPS and Argos satellite data to support ICF's request. [Web link for more information on satellite tags.](#)

One key benefit of tracking data compared to other data types such as survey or count data is that they give detailed information on movements and habitat use of individual animals in areas that are otherwise difficult to access, such as remote areas or private lands. Therefore, the birds themselves show us where they are, independent of the need for direct human observation.

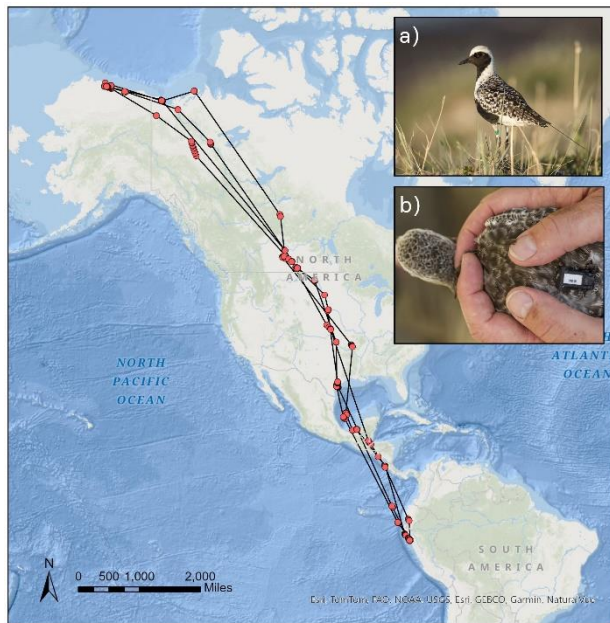


Figure 5. Full cycle track line across two years for an individual Black-bellied Plover (*Pluvialis squatarola*); contributed by Autumn-Lynn Harrison, Smithsonian Migratory Bird Center; David Newstead, Coastal Bend Bays & Estuaries Program; and Lee Tibbitts, U.S. Geological Survey, Alaska Science Center. Photos: **a)** Breeding male Black-bellied Plover with leg flag and <5 g solar satellite tag, Ryan Askren, USGS/Smithsonian; **b)** Satellite tag attached to the back of a Black-bellied Plover; Tim Romano, Smithsonian.

Data Contributors

Tracking data for this project were contributed to the Shorebird Collective by the following people and organizations. A full list of data contributors to the Shorebird Collective can be found on our webpage: [web link for the Shorebird Collective's webpage](#).

The following contributors provided detailed tracks and maps of shorebird movements:

Hudsonian Godwit

Data contributed by Nathan Senner (University of South Carolina, University of Massachusetts Amherst), Mitch Weegman (University of Missouri, University of Saskatchewan), Bart Ballard (Texas A&M University, Kingsville) and co-owned by Jennifer Linscott (University of South Carolina), Jorge Ruiz and Juan Navedo (Universidad Austral de Chile)

Lesser Yellowlegs

Data contributed by Callie Gesmundo and Jim Johnson (U.S. Fish and Wildlife Service) and co-owned by Katie Christie (Alaska Department of Fish and Game), Laura McDuffie (U.S. Geological Survey, Alaska Science Center), Christian Friis, Benoit Laliberté, and Jennie Rausch (Canadian Wildlife Service, Environment and Climate Change Canada), Christopher Harwood (U.S. Fish and Wildlife Service), Erica Nol (Trent University), Audrey Taylor (University of Alaska Anchorage), Jay Wright (Ohio State University), Department of Defense - Joint Base Elmendorf-Richardson

The following contributors provided summary information of shorebirds tracked in Texas:

Bart Kempenaers, Mihai Valcu, and Eunbi Kwon (Department of Ornithology, Max Planck Institute for Biological Intelligence); Lee Tibbitts, Daniel Ruthrauff, Dave Douglas (U.S. Geological Survey, Alaska Science Center); Gary Page and Kirsti Carr (Point Blue Conservation Science); Nils Warnock (Audubon Canyon Ranch); Richard Lanctot, Sarah Saalfeld, and Zachary Pohlen (U.S. Fish and Wildlife Service); Jay Carlisle and Stephanie Coates (Intermountain Bird Observatory, Boise State University); Andy Boyce and Autumn-Lynn Harrison (Smithsonian Migratory Bird Center); Jeff Kelly, Kate Goodenough, and Paula Cimprich (University of Oklahoma); David Newstead (Coastal Bend Bays & Estuaries Program); Shiloh Schulte (Manomet); Sarah Hoepfner (Iowa State University); Philipp Maleko (University of Wisconsin-Madison)

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