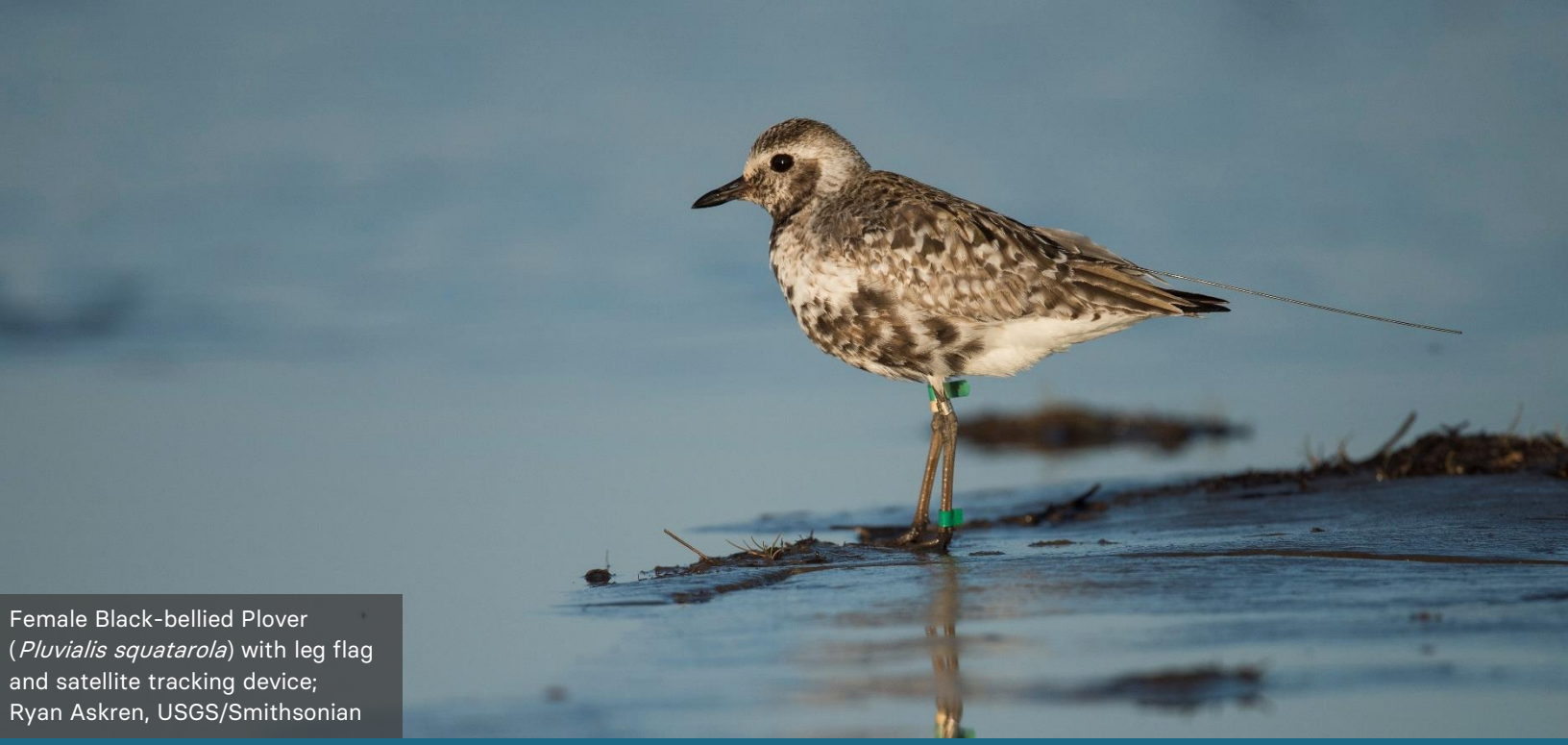

Female Black-bellied Plover (*Pluvialis squatarola*) with leg flag and satellite tracking device; Ryan Askren, USGS/Smithsonian

Using shorebird tracking data to explore the connections between shorebirds and waterfowl in North America

Conservation Contribution #16

Conservation Action: Education and Awareness

ASSOCIATION of FISH & WILDLIFE AGENCIES

Smithsonian *Migratory Bird Center*

Prepared by the Shorebird Science & Conservation Collective:
Candace Stenzel, Allie Anderson, Autumn-Lynn Harrison

January 2025

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Project Background

Project Summary

The Association of Fish and Wildlife Agencies' (AFWA) Fall Flights Team requested support from the Shorebird Science and Conservation Collective (hereafter, "Shorebird Collective") to address an important question – *Can state investments in Fall Flights benefit shorebirds as well as waterfowl?* Based on the shorebird tracking data, the answer is yes! To answer this question, the Shorebird Collective overlayed shorebird tracking data onto maps of Canadian Joint Venture waterfowl priority areas across Canada, uncovering critical overlaps between the United States and Canada. Using example tracks from 43 individuals of 13 species, the Shorebird Collective created a series of maps (see **Map 1** as an example from a subset of the tracked individuals) that were shared with the Fall Flights team and featured in two Fall Flights monthly news articles highlighting the vital connections between shorebirds and waterfowl in North America. Learn more and discover the full articles at: web link for news article #1 and web link for news article #2 (preview images of the two news articles are shown in **Figure 1**).

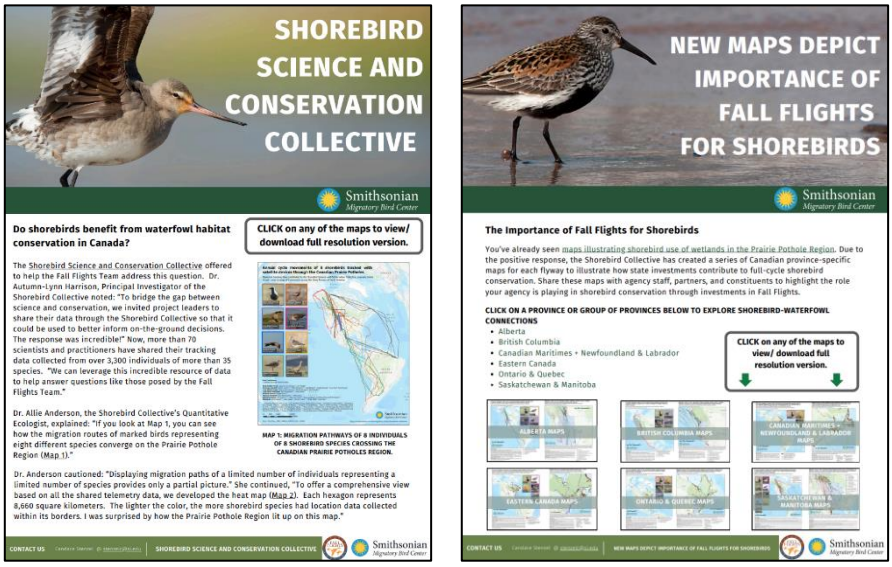


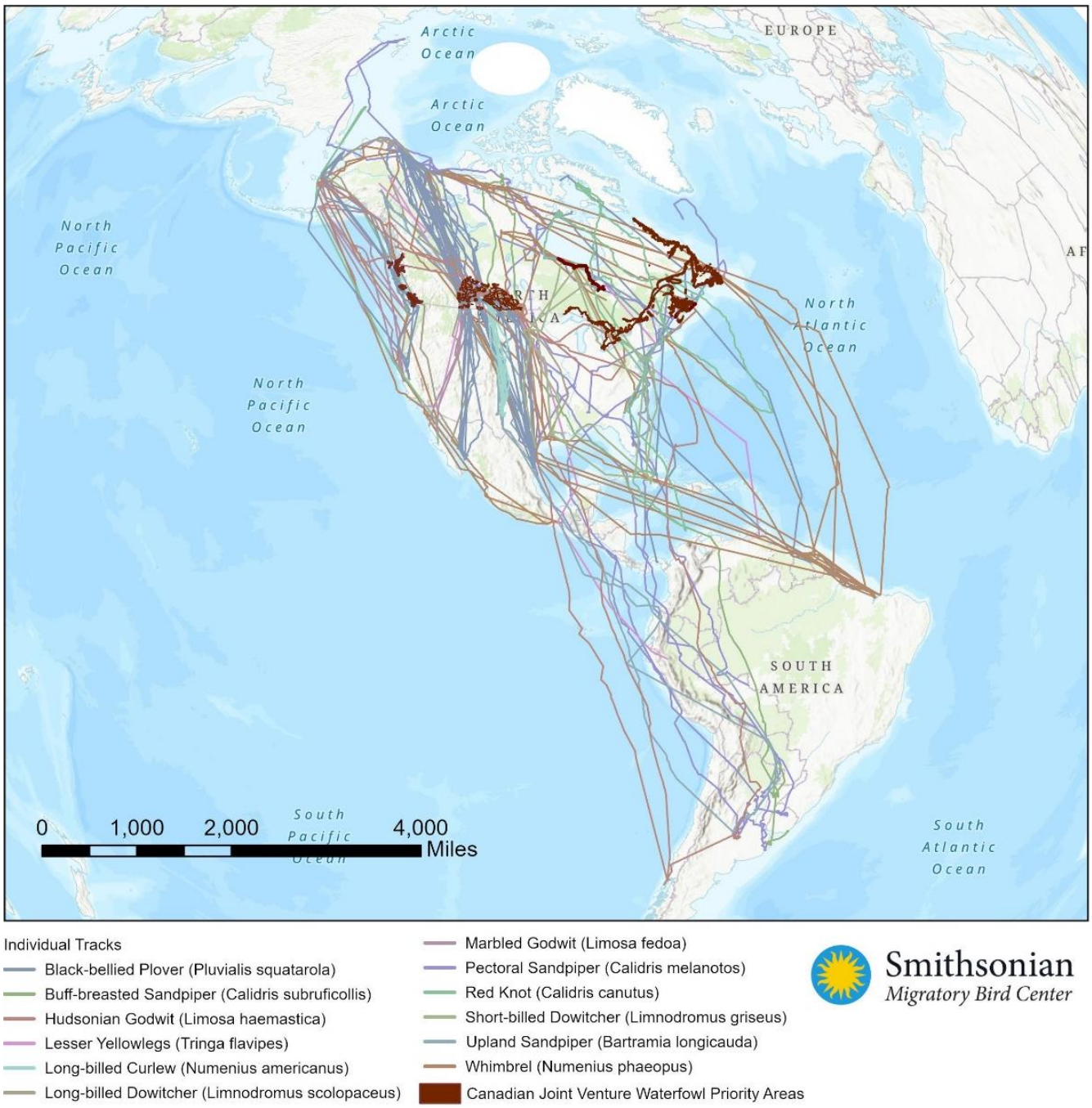
Figure 1. Preview of AFWA's shorebird news articles.

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 webpage.

About the Association of Fish & Wildlife Agencies

AFWA represents North America's fish and wildlife agencies, promoting science-based management and conservation of wildlife and habitats. In support of the North American Wetland Conservation Act (NAWCA), AFWA launched the Fall Flights Program in 1991 for U.S. state agencies to make annual contributions to breeding waterfowl habitat projects in Canada. These contributions are matched by Ducks Unlimited, Canadian partners, and NAWCA funds. From 1991 to 2020, U.S. and Canadian partners invested $2.1 billion USD in waterfowl and wetland conservation projects in Canada. Learn more about the Fall Flights Program on their website: web link for AFWA's Fall Flights Program.

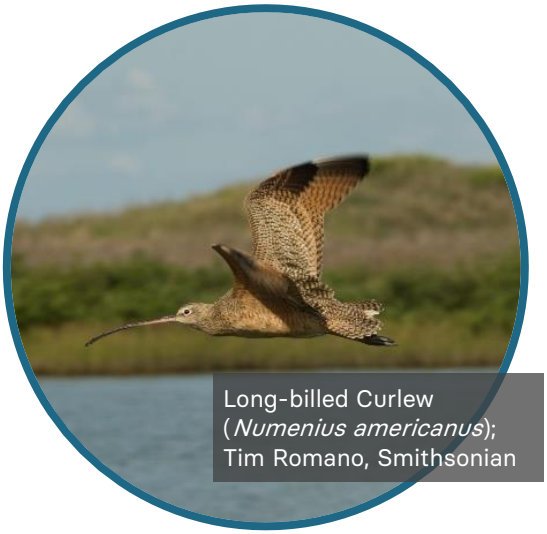


Map 1. Full cycle migratory routes of 31 shorebirds of 12 species linking Canadian Joint Venture waterfowl priority areas to U.S. states investing Fall Flights dollars to Canada. See page 8 for data contributor information.

Smithsonian
Migratory Bird Center

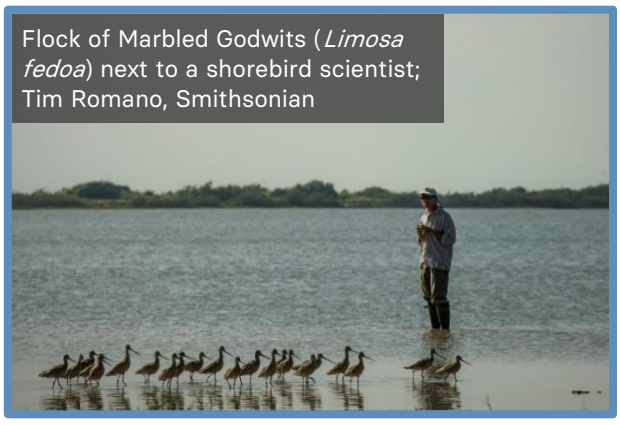
Shorebird Background

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 at 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.

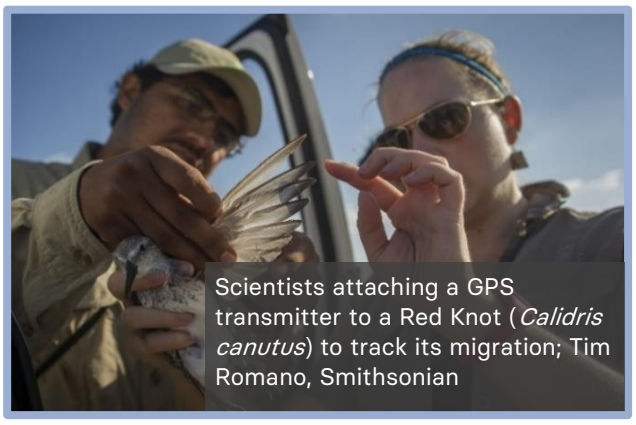


Long-billed Curlew (*Numenius americanus*); Tim Romano, Smithsonian

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*) next to a shorebird scientist; Tim Romano, Smithsonian



Scientists attaching a GPS transmitter to a Red Knot (*Calidris canutus*) 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 2**). 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 AFWA.

Black-bellied Plover (*Pluvialis squatarola*) with <5 g solar satellite tag; Ryan Askren, USGS/Smithsonian

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 both contributed GPS and Argos satellite data to support CBBEP. 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.

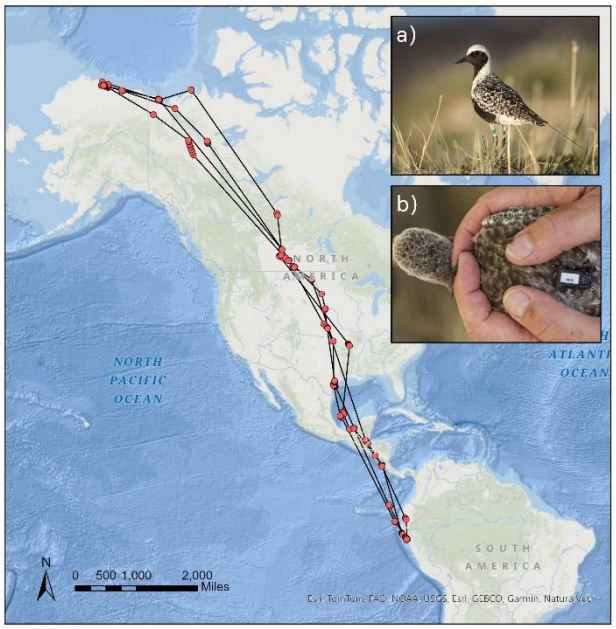
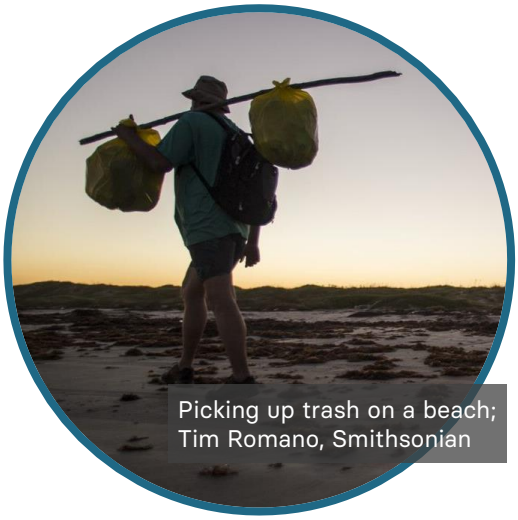


Figure 2. Full cycle track line across two years for an individual Black-bellied Plover (*Pluvialis squatarola*); contributed by Autumn-Lynn Harrison, Smithsonian Migratory Bird Center; David Newstead, Coastal Bend Bays & Estuaries Program; and Lee Tibbitts, U.S. Geological Survey, Alaska Science Center. 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.

Using Education for Conservation Action

Education and outreach programs offer a unique opportunity to raise awareness about, and action towards, specific conservation concerns. Its application can increase knowledge, shape attitudes and values, build skills that prepare individuals to take positive conservation action, and foster engagement between community members, scientists, practitioners, and decision-makers (Ardoin et al. 2020).



Picking up trash on a beach; Tim Romano, Smithsonian

AFWA's shorebird outreach efforts through the Fall Flights program is one example of a targeted outreach product designed to raise awareness about the value of waterfowl habitat for shorebirds. With many shorebird populations in decline (NABCI 2022, Rosenberg et al. 2019, Smith et al. 2023), it is now more important than ever to spread knowledge about these birds.

When planning any conservation education program, lesson, or activity, efforts must be designed in a way that align with the participants' attitudes and values and framed in way that makes them care (Lakoff 2010). For example, the maps featured in the two Fall Flights newsletters highlight how Canada's waterfowl priority areas also provide critical habitat for shorebirds, thereby helping U.S. state agencies recognize the value that their Fall Flights investments have in benefiting a broader range of species beyond waterfowl. Additionally, encouraging simple and manageable actions is often a first step to motivate change and initiate greater conservation action (Mengak et al. 2019, Schultz 2002). Relevant to helping shorebirds, there are several examples of simple and manageable "shorebird-friendly" actions that anyone can take or recommend to others.

Shorebird-Friendly Actions

1. **Avoid closed areas** – Avoid walking through roped or blocked off areas on beaches where shorebirds may be nesting.
2. **Keep dogs leashed** – Keeping dogs leashed at beaches will prevent them from rushing towards areas where shorebirds nest, rest, and feed.
3. **Don't get too close** – While it's exciting to get close to wildlife, being too close can disturb the birds. It's better to grab a pair of binoculars and observe from afar!
4. **Pick up trash** – Keeping beaches and other natural landscapes clean will prevent birds from choking or becoming entangled in trash. Garbage can also attract predators, which prey on shorebird eggs.
5. **Avoid pesticides** – Limit pesticide use around the home and yard as many are toxic to birds and other wildlife.
6. **Turn lights out** – Turning off excess lighting during the migration months will help shorebirds (and other migratory birds) become less disoriented while migrating.
7. **Protect wetlands** – Support the protection of your local wetlands, which provide important habitat for shorebirds.
8. **Share sightings on eBird** – Report your shorebird observations on eBird to help scientists better understand where shorebirds are and when, allowing for more effective conservation and land management efforts (web link for eBird).

Data Contributors

Tracking data for the example tracks in **Map 1** 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 webpage.

Black-bellied Plover:
Contributed by Jennie Rausch (Canadian Wildlife Service, Environment and Climate Change Canada) and Autumn-Lynn Harrison (Smithsonian Migratory Bird Center), and co-owned by Paul Woodard (Canadian Wildlife Service, Environment and Climate Change Canada), Lee Tibbitts (U.S. Geological Survey, Alaska Science Center)

Buff-breasted Sandpiper:
Contributed by Lee Tibbitts (U.S. Geological Survey, Alaska Science Center), and co-owned by Richard Lanctot (U.S. Fish and Wildlife Service), Dave Douglas (U.S. Geological Survey, Alaska Science Center)

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

Lesser Yellowlegs:
Contributed by Jim Johnson and Callie Gesmundo U.S. Fish and Wildlife Service), and Katie Christie (Alaska Department of Fish and Game), and co-owned by 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

Long-billed Curlew:
Contributed by Autumn-Lynn Harrison (Smithsonian Migratory Bird Center), and co-owned by David Newstead (Coastal Bend Bays & Estuaries Program), David Bradley (Birds Canada)

Long-billed Dowitcher:
Contributed by Bart Kempenaers (Department of Ornithology, Max Planck Institute for Biological Intelligence), and co-owned by Eunbi Kwon (Department of Ornithology, Max Planck Institute for Biological Intelligence)

Marbled Godwit:
Contributed by Bridget Olson (U.S. Fish and Wildlife Service), and Daniel Ruthrauff and Lee Tibbitts (U.S. Geological Survey, Alaska Science Center), and co-owned by Bob Gill and Dave Douglas (U.S. Geological Survey, Alaska Science Center)

Pectoral Sandpiper:
Contributed by Bart Kempenaers (Department of Ornithology, Max Planck Institute for Biological Intelligence), and co-owned by Mihai Valcu(Department of Ornithology, Max Planck Institute for Biological Intelligence)

Red Knot:
Contributed by Felicia Sanders (South Carolina Department of Natural Resources), Jim Johnson and Callie Gesmundo (U.S. Fish and Wildlife Service), and Stephanie Feigin and Larry Niles (Wildlife Restoration Partnerships), and co-owned by Janet Thibault, Cami Duquet, Mary Catherine Martin (South Carolina

Department of Natural Resources), Melissa Chaplain, Nick Hajdukovich, Zachary Pohlen (U.S. Fish and Wildlife Service), Fletcher Smith, Tim Keyes (Georgia Department of Natural Resources), Adam Smith (American Bird Conservancy), Abby Sterling and Allie Hayser (Manomet), Lucas DeCicco (University of Kansas), Washington Department of Fish and Wildlife, Department of Defense - Joint Base Elmendorf-Richardson

Short-billed Dowitcher:
Contributed by Autumn-Lynn Harrison (Smithsonian Migratory Bird Center), and co-owned by David Newstead (Coastal Bend Bays & Estuaries Program)

Upland Sandpiper:
Contributed by Jim Johnson and Callie Gesmundo (U.S. Fish and Wildlife Service), and co-owned by Zachary Pohlen (U.S. Fish and Wildlife Service)

Whimbrel:
Contributed by Jennie Rausch (Canadian Wildlife Service, Environment and Climate Change Canada), and Daniel Ruthrauff and Lee Tibbitts (U.S. Geological Survey, Alaska Science Center), and co-owned by Fletcher Smith (College of William and Mary, Georgia Department of Natural Resources), Bryan Watts (College of William and Mary), Brad Winn (Manomet), Julie Paquet (Canadian Wildlife Service, Environment and Climate Change Canada), Nils Warnock (Audubon Canyon Ranch), Chris Harwood (U.S. Fish and Wildlife Service), Dave Douglas and Bob Gill (U.S. Geological Survey, Alaska Science Center)

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Smith, P. A., Smith, A. C., Andres, B., Francis, C. M., Harrington, B., Friis, C., Guy Morrison, R. I., Paquet, J., Winn, B., and Brown, S. 2023. Accelerating declines of North America's shorebirds signal the need for urgent conservation action. *Ornithological Applications,* 125:1-14.