Marbled Godwit *(Limosa fedoa)*; Andy Boyce, Smithsonian

Assessing shorebird use of a private ranch in southwest Montana to support land acquisition and management efforts

Conservation Contribution #18

Conservation Action: Land/Water Protection

Smithsonian Migratory Bird Center

The Nature Conservancy

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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 Nature Conservancy (TNC) requested shorebird tracking data from the Shorebird Science and Conservation Collective (hereafter, "Shorebird Collective") to inform their funding efforts in acquiring a 5,552-acre conservation easement on a private ranch near the southwest border of Montana, USA (Error! Reference source not found.). Specifically, TNC requested information on electronically tracked s horebirds (see page 10 for more information on tracking data) located within the ranch and surrounding region to demonstrate the value of the area for shorebirds. 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 TNC'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 TNC 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 Nature Conservancy

TNC is a global environmental nonprofit dedicated to the protection of land and water. Founded in 1951, TNC has grown to become one of the most effective and wide-reaching environmental organizations in the world with an impact on conservation in 77 countries and territories. Learn more on TNC's website: web link for TNC's website.

Figure 1. Map of Montana with a general location of the 5,552-acre private ranch under consideration for purchase (red star). The specific location of the ranch was left out of the map to respect the privacy concerns of TNC.

Key Outputs & Recommendations

Below we summarize key outputs, findings, and recommendations provided to TNC to support their funding efforts in acquiring the 5,552-acre private ranch for conservation:

1. The Shorebird Collective provided TNC with detailed information on electronically tracked shorebird movements in or near a 5,552-acre private ranch under consideration for purchase in southwest Montana. While no individuals were tracked on the ranch property, **four** individuals of **three** species were tracked within 10 miles of the ranch. In a full report to TNC and with permission of data owners, we provided maps of their local movements with additional details on seasonal timing of land use and stopover durations.

2. Additional information from satellite imagery and eBird Status and Trends data suggests that the ranch has the potential to support Long-billed Curlews and possibly other shorebird species, though on-the-ground surveys would be needed to confirm shorebird presence.

3. Though no shorebirds were tracked on the ranch, on-the-ground surveys should be conducted to verify these patterns and fill data gaps. Additionally, new tracking data are always being contributed to the Shorebird Collective. We invited TNC to periodically check in with the Shorebird Collective on the availability of new data to support their efforts.

Images: 1. Map of Montana with the general location of the 5,552-acre private ranch (red star); **2.** Long-billed Curlew (*Numenius americanus*) tracks in Montana, contributed by Jay Carlisle and co-owned by Stephanie Coates (Intermountain Bird Observatory, Boise State University); **3.** Red Knot (*Calidris canutus*) with 3.4 g GPS tag, Tim Romano, Smithsonian

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Summary of Results

Of the shorebirds tracked by GPS and Argos satellite technologies and contributed to the Shorebird Collective[1] (**Box 1**), 137 moved through the state of Montana during their annual cycle between 2006 and 2024. No shorebirds were tracked on the ranch, but **two Long-billed Curlews** (*Numenius americanus*) had tag transmissions (i.e., tracked locations) within 10 miles of the ranch during southbound (fall) migration (**Figures 2**). Curlew #1 made a three-day stopover on agricultural fields in the region in June 2017, while curlew #2 had a single transmission in June 2015 during a flyover *en route* to a two-week stopover 30 miles south of the ranch.

Two additional birds, a **Long-billed Dowitcher** (*Limnodromus scolopaceus*) and **Marbled Godwit** (*Limosa fedoa*), had tag transmissions outside of the 10-mile buffer surrounding the ranch but with tracklines estimated to pass through the area (**Figures 2**). The Long-billed Dowitcher passed over the region in May 2020 during its northbound (spring) migration, *en route* to a brief stopover near Benton Lake National Wildlife Refuge, Montana. In contrast, the Marbled Godwit traveled through the area in July 2007 during its southbound (fall) migration, *en route* to a 50-day stopover at Willard Bay, Utah.

Box 1. Summary of shorebird tracks near TNC's area of interest

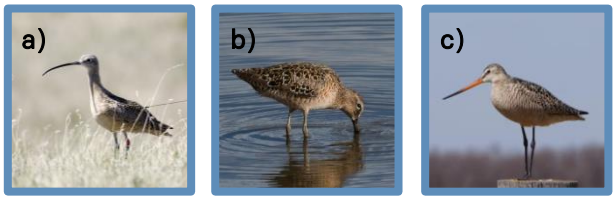
1,872 individuals of **23** species contributed to the Shorebird Collective

137 individuals of **11** species detected in Montana

4 individuals of **3** species detected within 10 miles of the 5,552-acre private ranch

- **2** curlews stopped near the ranch
- **2** additional individuals of **2** species were estimated to fly over the area near the ranch

While shorebird tracking data are limited in the area, an absence of tracking data at/near the ranch does not necessarily indicate lack of use by or value to shorebirds because tracking data are limited to the individuals tagged with tracking devices. Other data types such as habitat and standardized community science eBird data (Fink et al. 2021) suggest that the ranch could support Long-billed Curlew and possibly other shorebird species, though on-the-ground surveys would be needed to confirm shorebird presence. Additional information may become available as data contributors continue to share new tracking data with the Shorebird Collective. We invited TNC to periodically check in with the Shorebird Collective on the availability of new data to support their efforts.



a) Long-billed Curlew, Annie McLeod, Smithsonian; **b)** Long-billed Dowitcher, Andy Boyce, Smithsonian; **c)** Marbled Godwit; Corey Enger, USDA (CC)

[1] These data come from 74 organizations, collected from 2006 to 2023. Data Version 2024-06-01.

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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 overlayed shorebird tracks on a map of the 5,552-acre private ranch.

In a full report to TNC, we provided maps of tracked shorebird movements within a 10-mile buffer of the ranch (see **Figure 2** for an example), with additional details on seasonal timing of land use and stopover durations. We also explored other data types (e.g., habitat and standardized community science eBird data) to provide TCF with additional context about the potential value of the land parcels to shorebirds.

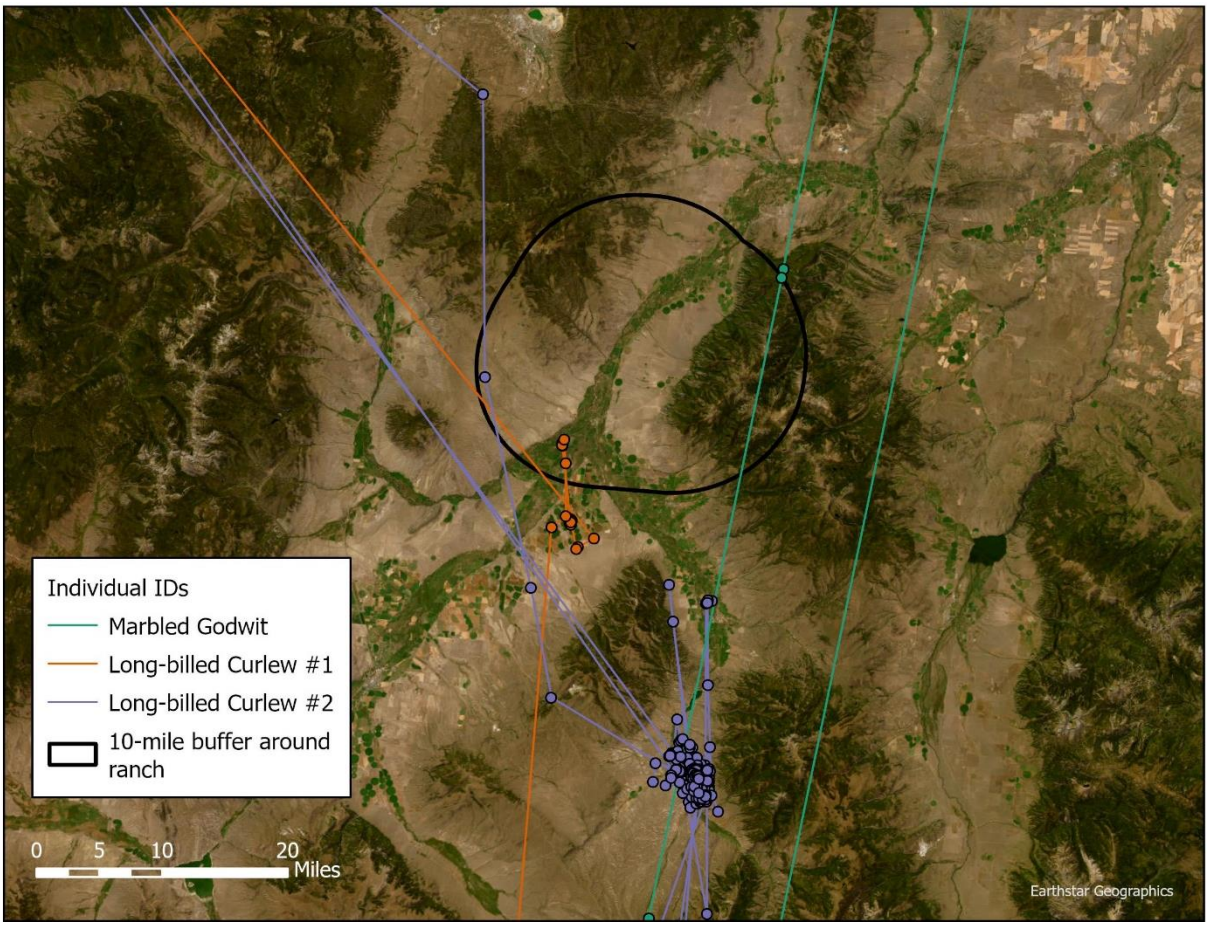

Figure 2. An example of Argos satellite locations from two Long-billed Curlew and one Marbled Godwit tracked within 10 miles of the 5,552-acre private ranch[1]. Shorebird locations are from multiple years and the map does not necessarily reflect the birds co-occurring in the area at the same time. Not shown are tracks for one Long-billed Dowitcher due to the privacy settings of the dataset but were provided to TNC for their internal planning use. Data from these example tracks contributed by Jay Carlisle, Boise State University and Bridget Olson, U.S. Fish and Wildlife Service. See page 11 for additional data contributor information.

[1] The 5,552-acre private ranch under consideration for purchase is not shown to respect the privacy concerns of TNC.

Additional Supporting Data

Tracking data can be biased to the individuals and/or species tagged with tracking devices. For example, some shorebird species are too small to carry tracking devices, while larger species can carry heavier tags that collect more detailed data. Therefore, an absence of shorebird tracking data on the ranch does not necessarily indicate lack of use by or value to shorebirds. Other types of data such as habitat and standardized community science eBird data can provide additional context on the potential value of the ranch for shorebirds.

eBird Data

eBird Status and Trends data for Long-billed Curlews (Fink et al. 2021) show that curlew relative abundance is generally higher around the ranch and other surrounding areas. For more details on eBird distribution data for Long-billed Curlew and other species, please refer to eBird's Status and Trends data (web link for eBird status and trends).

Habitat Data

We compared satellite imagery at the ranch with imagery in other nearby areas of Montana where the two Long-billed Curlew were tracked (**Figure 3**). Tag transmissions of the two curlews primarily occurred in agricultural fields and pastures/grasslands similar to those seen on the ranch. Therefore, agricultural land, grasslands, and/or pastures on the ranch have the potential to support curlews and possibly other shorebird species, though on-the-ground surveys would be needed to confirm shorebird presence.

Figure 3. Aerial view of habitats in other nearby areas of Montana where the two Long-billed Curlews were tracked (a-b). While the 5,552-acre private ranch is not shown to respect the privacy concerns of TNC, initial findings from these maps show similar habitat as the ranch, suggesting that portions of the ranch have the potential to support curlews and possibly other shorebird species.

Southwest Montana and Shorebirds

Southwest Montana is an important region for many shorebirds, providing critical breeding habitat for at least 11 species, notably Mountain Plover (*Charadrius montanus*) and Long-billed Curlew, and at least 23 additional species that occur annually as migrants (Oring at al. 2013). The 5,552-acre private ranch is situated within the Northern Rocky Mountain Bird Conservation Region (BCR, **Figure 4**), a region characterized by low-lying desert flats and boreal mountain ranges (Oring at al. 2013). Common shorebird habitats in this BCR include small wetlands, uplands with low vegetation, streams, rivers, and both natural and man-made lakes (Oring at al. 2013).

Mountain Plover in Montana grassland; Andy Boyce, Smithsonian

A significant conservation challenge for shorebirds in the region is the availability of freshwater habitat under the increasing competition for water driven by human activities and climate change (Oring at al. 2013). As habitat alteration and climate change continue to reshape the landscape, conserving sufficient freshwater habitat to support shorebird populations remains one of the most pressing conservation concerns. Additionally, a significant portion of shorebird habitat falls on private lands (Oring at al. 2013), making landowners a key stakeholder for successful conservation.

Figure 4. Boundary of the Northern Rockies Bird Conservation Region overlaid on map of Montana with a general location of the 5,552-acre private ranch under consideration for purchase (red star). The specific location of the ranch was left out of the map to respect the privacy concerns of TNC.

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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; 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 to a shorebird scientist; Tim Romano, Smithsonian

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

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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 TNC.

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 contributed Argos satellite data to support TNC'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.

Long-billed Curlew
Data contributed by Jay Carlisle (Intermountain Bird Observatory, Boise State University) and co-owned by Stephanie Coates (Intermountain Bird Observatory, Boise State University)

Long-billed Dowitcher
Data 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
Data contributed by Bridget Olson (U.S. Fish and Wildlife Service)

References

Fink, D., Auer, T., Johnston, A., Strimas-Mackey, M., Ligocki, S., Robinson, O., Hochachka, W., Jaromczyk, L., Wood, C., Davies, I., Iliff, M., and Seitz, L. 2021. eBird Status and Trends, Data Version: 2020; Released: 2021. Cornell Lab of Ornithology, Ithaca, NY.

Lesterhuis, A. J., and R. P. Clay. 2019. Conservation status of shorebird species resident to Latin America and the Caribbean, v1. WHSRN Executive Office and Manomet, Inc., Manomet, MA.

Morrison, R. I. G., Gill, R. E., Harrington, B. A., Skagen, S., Page, G. W., Gratto-Trevor, C. L., and Haig, S. M. 2000. Population estimates of Nearctic shorebirds. *Waterbirds*, 23:337-352.

[NABCI] North American Bird Conservation Initiative. 2022. The State of the Birds, USA, 2022.

O'Brien, M., Crossley, R., and Karlson, K. 2006. The shorebird guide. Houghton Mifflin Company, New York, NY.

Oring, L. W., Neel, L., and Oring, K. E. 2013. Intermountain West regional shorebird plan, Version 1.0. U.S. Shorebird Conservation Plan, Lakewood, CO.

Rosenberg, K. V., Dokter, A. M., Blancher, P. J., Sauer, J. R., Smith, A. C., Smith, P. A., Stanton, J. C., Panjabi, A., Helft, L., Parr, M., and Marra, P. 2019. Decline of the North American avifauna. *Science*, 366(6461):120-124.

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.