Belize's Contributions to Global Biodiversity Information Facility (GBIF)

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UB-ERI Brief
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Maximizing impact is often the desired outcome of a dataset, once collected. Ideally, our biodiversity data will not only achieve its intended function within the bounds of a monitoring program or research project but additionally create impact outside that scope, contributing to wider initiatives at national, regional, and global scales. However, for this to occur, the data must be accessible to a wider audience, findable, and in a usable format. For biodiversity data, one such database that delivers this is the Global Biodiversity Information Facility (GBIF). To date, millions of biodiversity records from Belize have been contributed to the Global Biodiversity Information Facility (GBIF), supporting hundreds of scientific studies globally. Most of these data records originate from international platforms (e.g., eBird, iNaturalist), with limited direct contribution from Belizean organizations. As a result, while the published biodiversity data are currently used globally, nationally the ownership, visibility and local application of these data remain underrepresented.

This brief highlights Belize's contributions to GBIF and demonstrates how Belize's existing GBIF contributions are already generating impact on the global academic impact. It also identifies key opportunities to strengthen local organizations and practitioners to become involved, improve data representation across taxa, and increase the use of biodiversity data in local research, policy and conservation.

What is GBIF?

The Global Biodiversity Information Facility (GBIF) is an international online data network providing access to global biodiversity data (GBIF, 2026e). Through this access, GBIF supports science, conservation and sustainable development, by enabling organizations and researchers to publish and use biodiversity data free of charge through its platform, while ensuring appropriate attribution of the original data providers. GBIF also provides common standards, best practices, and open-source tools available for publishers and

users, to help make the process clean and frictionless (Chapman, 2020; FAIRsharing Team, 2015; Robertson *et al.*, 2014; Wilkinson *et al.*, 2016).

The primary data supported by GBIF is species occurrence data - in other words, data that has a taxonomic name (like a species name), as well as information on where and when that organism was found. The datasets uploaded may include much more additional information or be tightened to only those core data fields. However, all these datasets are structured using the same standards, referred to as Darwin Core (DwC), using common names for columns to ensure they are comparable across providers (Darwin Core Maintenance Group, 2025; Wieczorek *et al.,* 2012). These standards allow publishers and users to develop tailored pipelines designed to flow data directly to and from GBIF to create impact (Hackett *et al.*, 2019). As a result, GBIF-mediated data are now widely used in scientific research, with multiple scholarly articles a day published each day drawing on these resources (GBIF, 2026b, 2026c, 2026d).

What has Belize contributed to GBIF?

As of March 2026, Belize has contributed more than 7.8 million species occurrence records across 981 datasets from 342 unique publishers (Figure 1). The vast majority of Belize's GBIF records are published by international platforms. With the largest contributors being Cornell Lab of Ornithology (eBird), Ocean Biodiversity Information System (OBIS), and iNaturalist. These platforms compile citizen science records and institutional data, which are then submitted to GBIF. Together, these three top publishers encompass over 95% of all Belize GBIF species observations (GBIF, 2026a).

The sole organization registered as a Belizean publisher on GBIF is the University of Belize Environmental Research Institute (UB-ERI), which has contributed approximately 30,000 observations to date across 11 datasets in collaboration with national partners, including Chaa Creek Lodge, Foundation for Wildlife Conservation, Ya'axche Conservation Trust, Toledo Institute for Development and the Environment, Corozal Sustainable Future Initiative, Belize Audubon Society, and Black Rock Lodge as part of GBIF funded project "Improving natural resources management in Belize by mobilizing biodiversity data" (GBIF, 2018, 2026a).

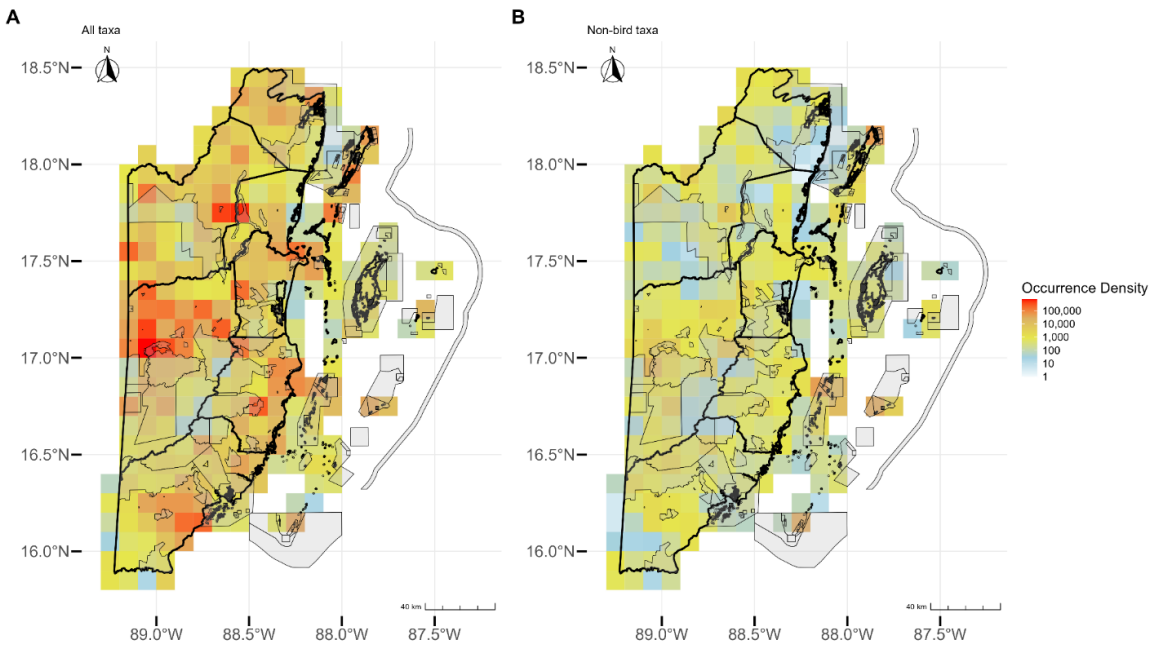

Figure 1. Density map of species occurrence records for Belize logged on GBIF both for all taxa (A) and non-bird taxa (B)

Of the Belize data published to GBIF, approximately 7.6 million observations are animals (9,216 species), 150,000 are plants (6,394 species, almost all angiosperms), and less than 5,000 are fungi (960 species), making animals overrepresented. Of the animals, birds are represented best, with

7.4 million observations (697 species), then bony fish (50,000 observations [species count here excluded due to paraphyletic nature of the group]) and insects (38,854 observations; 3,544 species). Data is present but greatly underrepresented for mammals, reptiles, molluscs, and amphibians (GBIF Secretariat, 2026) (Figure 2).

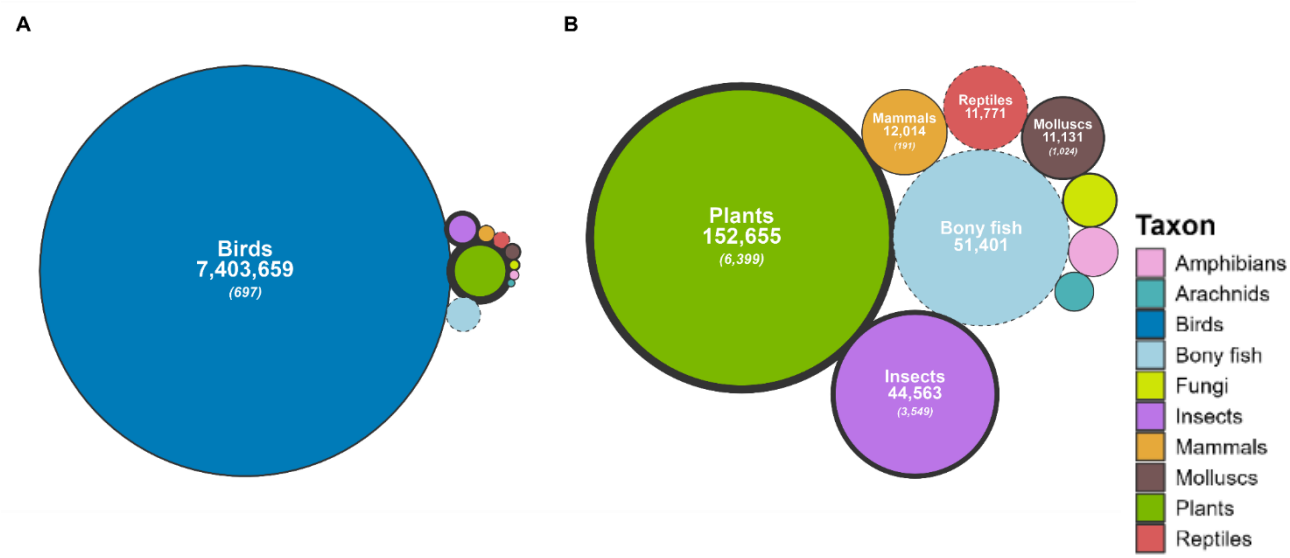

Figure 2. Packed bubble chart of species occurrence records in Belize logged in GBIF, with circle size corresponding to number of records, and border thickness corresponding to species richness (thicker borders = higher richness; dashed border means no richness data) for all primary taxa (A) and non-bird taxa (B). Text indicates taxonomic group, number of occurrences, and where present, species richness in bracketed italics.

How have these contributions impacted global academia?

The datasets published by UB-ERI have contributed to 141 academic outputs since 2017, including journal articles, working papers, theses, reports, and academic articles, with most of these being open access (Figure 3). Academic publications citing the UB-ERI have collectively received 2,084 citations showing the snowball effect of open biodiversity data and impact. Some of the most influential articles citing the UB-ERI GBIF data thus far include one on bird distributional patterns in Mesoamerica, global impacts of fire regimes on wildland bird diversity, species turnover in cities due to climate change, biodiversity scaling techniques, and drivers of lineage diversification in the Squirrel Cuckoo (Arrogante-Funes *et al.,* 2024; Beery, 2021; Chan *et al*., 2024; Filazzola *et al.,* 2024; Sánchez-González *et al*., 2023). These research papers citing the UB-ERI GBIF data have been published in high impact journals such as Nature Sustainability (Impact Factor [IF] 17.8), Nature Communications (IF 14.1), and Nature Ecology & Evolution (IF 8.9).

Most common keywords used in published papers on the UB-ERI data include “Species distribution models,” “Conservation,” and “Biological invasions,” showcasing the kinds of initiatives the data is contributing to. These papers were primarily written by authors from the United States, United Kingdom, and Germany (Figure 4).

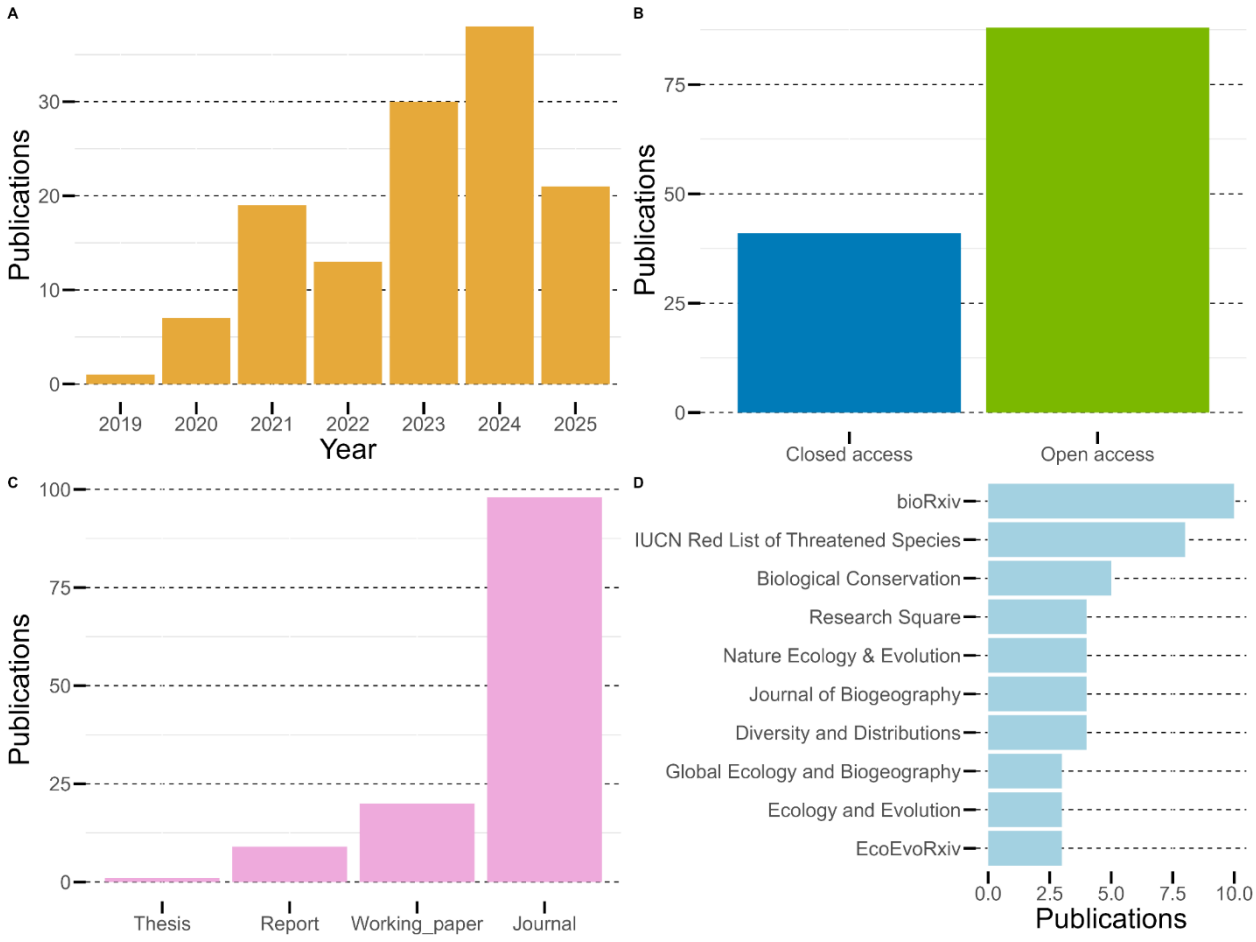

Figure 3. The impact of the UB-ERI GBIF datasets on global academia. Number of publications over time (A), whether publications are closed or open access (B), type of publications (C), and most common journals, preprint servers, and platforms (D). 2025-2026 publication counts may be incomplete due to indexing lag.

Outside of the UB-ERI datasets, Belizean researchers are also publishing on Belize's national GBIF data. Belizean researchers have contributed to publications on the Narrow-bridged Musk Turtle in Toledo District, invasive freshwater fishes in Central America, White-lipped Peccary population declines in Mesoamerica, and the global exchange and accumulation of non-native plants (Elías *et al.,* 2022; Munscher *et al.,* 2022; Thornton *et al.,* 2020; Van Kleunen *et al.,* 2015). Furthermore, the millions of records contributed to Belize's GBIF country page from external contributors such as Cornell Lab of Ornithology or iNaturalist are accumulating their own countless citations and impacts.

While these contributions to global academia are impressive, there is room for improvement and further expansion. Currently, our national data has overrepresentation from non-Belizean publishers, leaving room for Belizean organizations to bring forward their own data and create impact. Additionally, many taxa are underrepresented in Belize, including mammals, amphibians, reptiles, fungi, and molluscs.

How can we further maximize the impact of our biodiversity data?

By increasing the number of local publishers that contribute data to GBIF, Belize will be able to further maximize the impact of the data on GBIF, as it will be contributed by national organizations from across the country, protected areas and non-protected areas, and ecosystems, based on more diverse monitoring and/or research protocols. Locally-registered

publishers can be discovered through country-filtered GBIF searches, increasing visibility to regional researchers and policymakers, and allowing publishers to track impact over time.

Filling taxonomic gaps is another high priority to improve the impact of biodiversity data. In Belize, camera-trapping data, bat mist netting, plant plots, and opportunistic wildlife observations are all common types of data collected that could improve the taxonomic coverage of our countrywide GBIF dataset. Filling in these gaps will diversify the types of global projects and publications our data can contribute to.

Finally, we can maximize the impact of our biodiversity data by using it once it is on GBIF. Belizean-registered researchers haven't published a peer-reviewed journal article on our own GBIF data since 2022, but by doing so moving forward we can increase opportunities to lead scientific outputs. By using and publishing more of our national data, as well as drawing the data down into local policy and planning initiatives in partnership with government agencies, we can truly accelerate impact globally and nationally.

Belize has already made significant contributions to global biodiversity knowledge through GBIF. However, Belize has a clear opportunity to increase its national impact by expanding local data publishing, addressing taxonomic gaps, and using our own data more effectively. This will also allow Belize to standardize workflows for data collection, management, and publication, ultimately maximizing impact.

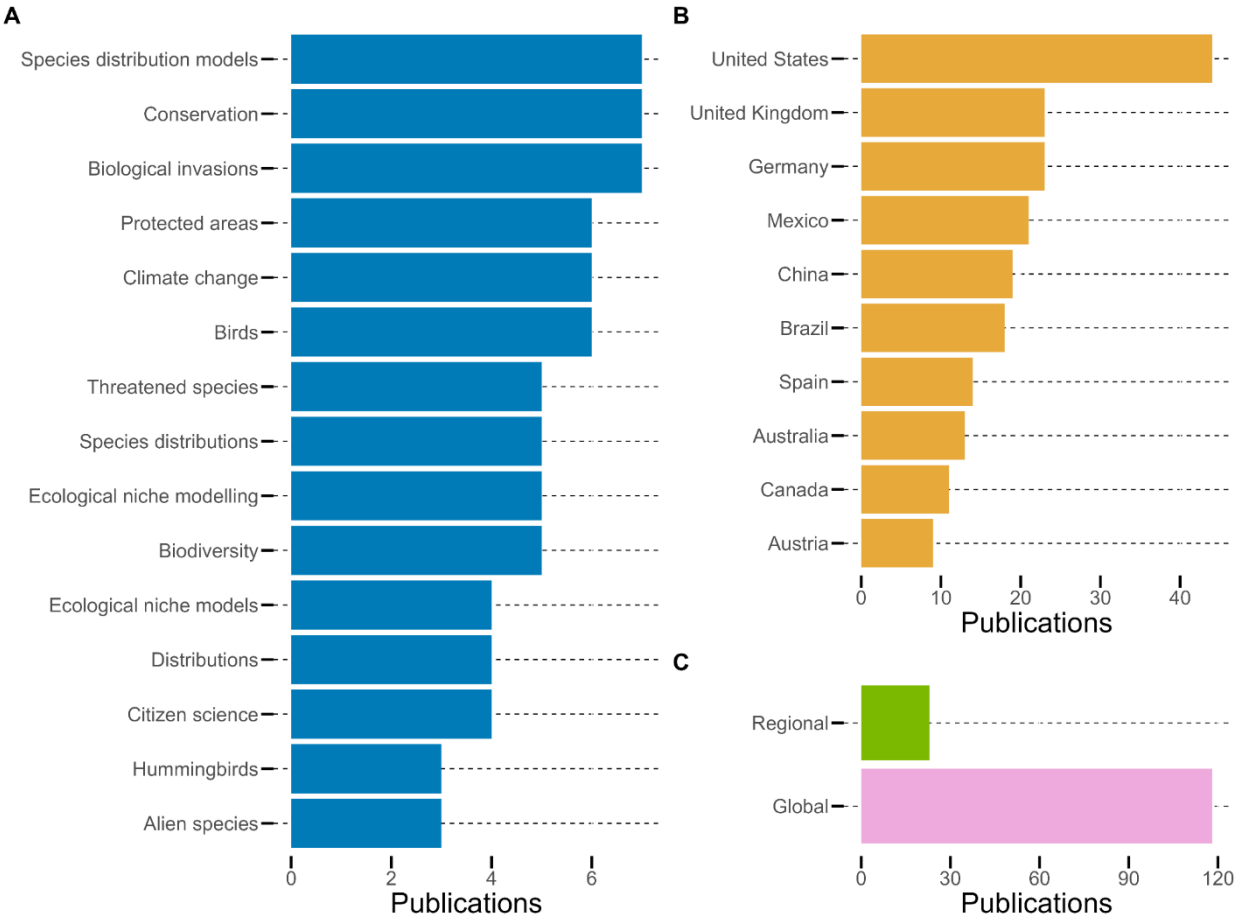

Figure 4. The nature of publications written using the UB-ERI GBIF datasets. Most common keywords of published papers (A), most common countries of publication authors (B), and whether the publications were primarily published by regional or global authors, with regional including Central American mainland and island countries (C). 2025-2026 publication counts may be incomplete due to indexing lag.

Code Availability

All code used to generate the results and figures for this brief is available for free online (Boles, 2026).

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