Bioblitzes Provide Valuable Biodiversity Data

Authors: Hoskins, Levi P., Mason, Brittany M., Heitmann, Jackson Barratt, Alvarez-Abreu, Oniel, Bearhs, Kelly, et al.

Source: Natural Areas Journal, 46(2) : 122-130

Published By: Natural Areas Association

URL: https://doi.org/10.3375/2162-4399-46.2.4

Research Article

Bioblitzes Provide Valuable Biodiversity Data

Levi P. Hoskins,[1,2] Brittany M. Mason,[1] Jackson Barratt Heitmann,[1] Oniel Alvarez-Abreu,[1] Kelly Bearhs,[1] Shannon Carnevale,[3] C. Analise Fussell,[1,2] Thomas Lilkendey,[1] Marina Marquis,[1] Brent A. Sellers,[4] Jiayi Song,[1,2] Anna Swigris,[1,2] Mario Zuliani,[1] and Corey T. Callaghan[1,2,5]

[1]Department of Wildlife Ecology and Conservation, Fort Lauderdale Research and Education Center, Institute of Food and Agricultural Sciences, University of Florida, Davie, FL
[2]School of Natural Resources and the Environment, University of Florida
[3]Polk County Extension, Institute of Food and Agricultural Sciences, University of Florida
[4]Agronomy Department, Range Cattle Research and Education Center, Institute of Food and Agricultural Sciences, University of Florida, Ona, FL

[5]Corresponding author: c.callaghan@ufl.edu

Associate Editor: Katelyn Lawson

ABSTRACT

Bioblitzes are increasingly popular participatory science events aimed at documenting as many species as possible over a predefined period. They enhance community engagement and increase scientific literacy, while also contributing immense amounts of biodiversity data in a relatively short time span. Yet, the value of the biodiversity data generated is rarely quantified. In this study, we used the DeLuca Bioblitz as a case study to develop a biodiversity utility framework and a list of biodiversity metrics to evaluate the biodiversity data contributions from bioblitzes. We calculated summary statistics, including the total number of observations, number of observers, and number of species from the DeLuca Bioblitz. We compared these summary statistics to random polygons of the same area across Florida to evaluate the impacts of bioblitz efforts compared to participatory science generally. Bioblitzes tend to generate more biodiversity data when compared to other random polygons of the same size throughout the state of Florida. Importantly, bioblitz data was collected over a 24-hour period for 4 y, yet it outpaced biodiversity contributions in random polygons with data collected over multiple years on iNaturalist. The bioblitz in our case study also generated key records of new invasive species, new continental records, and records of imperiled species in Florida. Together, these data can help land managers and conservation professionals collect robust data, over a short duration, to create baseline species inventories and document species of concern for both management and conservation.

Index terms: adaptive management; bioblitz; citizen science; community science; iNaturalist

INTRODUCTION

Site-level species inventories, such as a list of possible species in a certain property or park, often serve as baseline data for natural resource managers (Maes et al. 2015; Katzer et al. 2025). This information is essential for natural resource managers to prepare management plans and monitor ecological changes over time, particularly as species shift their ranges (Weiskopf et al. 2020) and local extinction and colonization events become increasingly common (Cowie et al. 2022; Storch et al. 2022). However, gathering such data can be time-consuming and costly; therefore, inventories can be difficult to maintain (Katzer et al. 2025). Advances in technology have given rise to many long-term monitoring platforms, including participatory citizen science, sometimes referred to as community science or citizen science. Participatory citizen science is increasingly contributing to biodiversity research (Fauzia et al. 2023; Mason et al. 2025a), conservation (Hsu et al. 2025), and natural resource management (McKinley et al. 2017; Mason et al. 2025b), for example by quantifying species distributions (Zulian et al. 2021) or detecting biological invasions (Larson et al. 2020). The bulk of all biodiversity data in the world now comes from platforms such as eBird and iNaturalist—upwards of 80% of all global biodiversity data since 2010 (Callaghan et al. 2021).

Bioblitzes are one mechanism in which participants are encouraged to contribute data through participatory science. A bioblitz has many definitions (Meeus et al. 2023), but in general, it involves a set time period where the goal is to document as many species as possible within a predefined geographic region (Meeus et al. 2023). This can range from a single park to large geographic regions. One particularly well-known example is the City Nature Challenge—a 4-day bioblitz organized annually by the California Academy of Sciences—where cities across the world participate in a friendly competition to get the most observations, species, and people using iNaturalist (Kishimoto and Kobori 2021; Sakurai et al. 2022; Palma et al. 2024). Bioblitzes are useful for engaging the public in conservation and creating a sense of personal involvement in environmental research (Roger and Klistorner 2016). They are also useful for generating large amounts of data in a given location (Meeus et al. 2021, 2023). The City Nature Challenge alone provides the most data of any week to the iNaturalist platform each year (Meeus et al. 2023; Palma et al. 2024). Despite their global popularity,

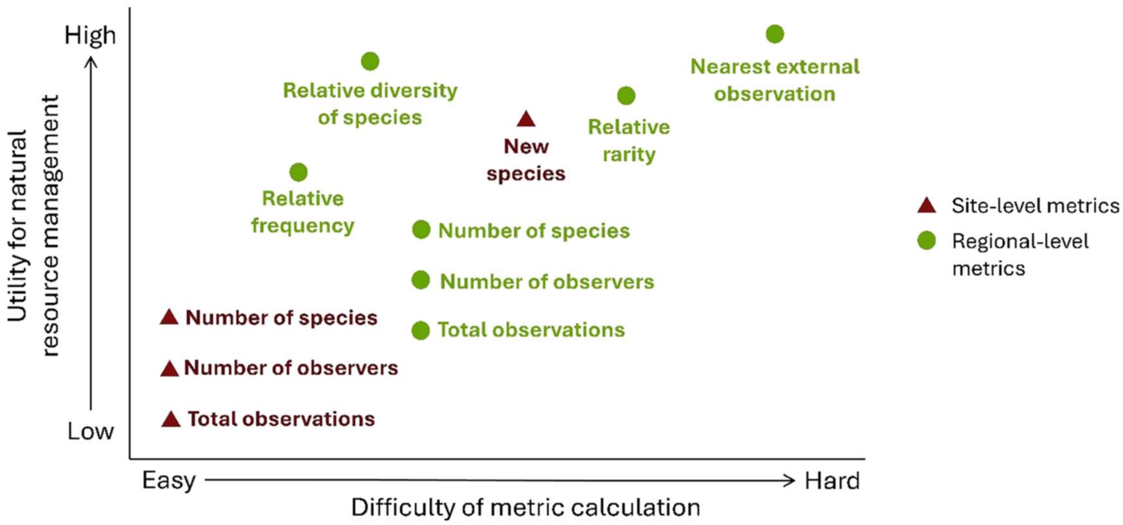

Figure 1.—Conceptual diagram showing the utility and difficulty of calculating the bioblitz biodiversity utility metrics explored in this paper. Metrics are grouped as either site-level (defined relative to the bioblitz site) or regional-level (defined as the contribution of the bioblitz site to the broader region). See Table 1 for definition of each metric.

most bioblitzes occur at localized scales and consequently their scientific value has been less frequently quantified.

Bioblitzes can have a variety of outcomes, including building community, increasing engagement in science, incentivizing continued participation on platforms like iNaturalist, and generating biodiversity data (Pollock et al. 2015; Postles and Bartlett 2018; Meeus et al. 2021, 2023). They also contribute to species inventories, but less is known about other types of biodiversity data they help generate. Bioblitzes may be beneficial for biodiversity monitoring by detecting rare and cryptic species, new invasive species to a region, or range shifts in imperiled species, or by helping fill gaps in a species' geographic distribution. Therefore, it is critical to uncover the varied biodiversity utility that bioblitzes offer beyond simple species inventories for both land managers and conservation practitioners alike.

Here, we evaluate the value of a bioblitz to generate biodiversity data, using the DeLuca Preserve, Florida, USA, as a case study. First, we provide a replicable framework that can be expanded outside of our study site, with the aim of helping natural resource managers leverage bioblitzes to enhance land stewardship goals and advance biodiversity data collection. We then use this framework to illustrate the scientific value of a bioblitz as a mechanism for generating biodiversity data, including baseline species inventories, novel species records, and indicators of regional biodiversity utility (Figure 1). Our work highlights how concentrated, short-term efforts can uncover locally novel records and contribute to site-level species inventories in ways that complement broader-scale biodiversity monitoring.

Bioblitz Biodiversity Utility Framework

We present a conceptual framework for evaluating the biodiversity value of bioblitzes by organizing metrics along two dimensions: their biodiversity utility for management and monitoring, and the analytical complexity required to calculate them (see Figure 1). The framework distinguishes site-level metrics that characterize biodiversity patterns within the site defined for the bioblitz (this includes total observations, number of species, number of observers, and new species) from regional-level metrics that contextualize bioblitz observations relative to broader regional biodiversity data (this includes relative frequency, relative rarity, and relative diversity of species, sampling intensity, and nearest external observation). Together, these metrics capture complementary dimensions of biodiversity value, ranging from baseline inventory completeness to the contribution of short-term, concentrated effort to regional biodiversity knowledge. Because we separate site-level and regional-level metrics, this framework provides a flexible tool that natural resource managers can adapt to evaluate the biodiversity outcomes of bioblitzes across different regions, taxa, and management objectives.

METHODS

Study Area

The DeLuca Preserve (27.67, −80.95) is situated in Osceola County in central Florida. The DeLuca Preserve is located near Yeehaw Junction, Florida, a census-designated place in southern Osceola County about 3 hr south of the main University of Florida campus in Gainesville, Florida, and about 3 hr north of the Miami metropolitan area in South Florida. The preserve was donated to the University of Florida by Elisabeth DeLuca in 2020 to place the land in permanent conservation (in collaboration with Ducks Unlimited) and to provide high-quality habitat for student research. DeLuca Preserve is ~11,000 ha and consists of pine flatwoods, Florida scrub, hardwood hammocks, forested and emergent wetlands, imperiled dry prairie, former citrus groves, and working cattle ranchland. The preserve hosts several state and federally listed species, such as the Florida grasshopper sparrow (*Ammodramus savannarum floridanus*), red-cockaded woodpecker

Table 1.—Metrics used to assess bioblitz biodiversity utility. Metric scale is defined as site-level (SL), which characterizes biodiversity patterns within the site defined for the bioblitz, and regional-level (RL), which contextualizes bioblitz observations relative to broader regional biodiversity data. We additionally provide a brief definition of each metric and the methodology used to calculate them.

Metric	Scale	Definition	Calculation
Total observations	SL	Total observations taken at the site.	Count of Research Grade observations.
	RL	The relative number of observations at the site compared to the surrounding region.	One hundred random polygons that were the size of the site were generated within the region. For each polygon, the number of observations was calculated and compared to the corresponding values from the site.
Number of observers	SL	Unique observers who submitted observations at the site.	Count of unique observers from Research Grade observations.
	RL	The relative number of observers at the site compared to the surrounding region.	Follows same methodology as total observations (RL) but compares observers.
Number of species	SL	Number of unique species observed at the site.	Count of unique species from Research Grade observations.
	RL	The relative number of unique species at the site compared to the surrounding region.	Follows same methodology as total observations (RL) but compares number of unique species.
New species	SL	Measure of new species at the site based on sampling effort.	Species accumulation curve.
Relative frequency	RL	Frequency of species at the site relative to the region.	For each species, proportion of observations at the site is divided by its proportion of observations in the region.
Relative rarity	RL	Measure of species rarity based on number of observations at the site and region.	Relative frequency is used to define categories for rarity, including site-only, locally rare, common everywhere, rare everywhere, and underreported everywhere.
Relative diversity of species	RL	Diversity of species at the site compared to the region.	Shannon's diversity index.
Nearest external observation	RL	Distance from the site to the nearest external observation for species with fewer than 100 site-level observations.	For each qualifying species, the minimum distance to any observation outside the site boundary was computed.

(*Leuconotopicus borealis*), gopher tortoise (*Gopherus polyphemus*), and Florida panther (*Puma concolor couguar*). The area is now managed by the University of Florida Institute for Food and Agricultural Sciences (UF/IFAS) with varied management activities including active cattle ranching, hunting, and prescribed burning in the pine flatwoods and pastures.

The DeLuca Bioblitz

The DeLuca Bioblitz was initiated by the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) to promote public engagement with the newly established preserve while showcasing a conservation focal area of the Everglades Headwaters National Wildlife Refuge and Conservation Area. This annual event is designed as a free-ranging bioblitz, meaning participants are free to sample taxa and habitats of interest without any restrictions. However, we note that in the early years, there were some concerted efforts to obtain baseline biodiversity metrics with limited resources and people, which meant targeting specific portions or habitats of the property.

To date, the DeLuca Bioblitz has been running for 4 y and is expected to continue in future years. The dates of the previous bioblitzes were 26 February 2022, 24 February 2023, 1 March 2024, and 7 March 2025. Over the course of these 4 y, participants have generated 13,161 total observations by 203 unique observers. With annual increases in total observations and unique observers, the DeLuca Bioblitz is positioned to play a long-term role in documenting local biodiversity trends and fostering awareness of the ecological significance of the DeLuca Preserve.

iNaturalist

iNaturalist is a citizen science platform where users can post and identify photographic or audio observations of any organism. It is accessible via the iNaturalist website or through their mobile application. As of October 2025, iNaturalist has over 3 million observers and more than 200 million observations. After an observation has been uploaded with a species identification on iNaturalist, other users can agree or disagree with the identification. Once an observation reaches a two-thirds community consensus, it is considered "Research Grade." All observations are made available for download on iNaturalist and Research Grade observations are uploaded to the Global Biodiversity Information Facility (GBIF), depending on license requirements, where they are made available to scientists around the world. The DeLuca Bioblitz used iNaturalist as the central tool to collect and engage with participants of the bioblitz, where only observations from iNaturalist were included in the bioblitz results. iNaturalist was chosen as the bioblitz platform because it is free, has many users, is user-friendly, and the resulting data are increasingly used in ecological research (Mason et al. 2025b). At check-in, participants were asked if they were familiar with iNaturalist, and those who were unfamiliar with the platform were given a brief tutorial on how to download and engage with the app.

Analysis of Records

We obtained all iNaturalist data for the DeLuca Bioblitz efforts by using the iNaturalist data export tool on 1 July 2025. Data is from the four different bioblitz efforts, described above, hereinafter referred to as the DeLuca Bioblitz. For each species with a Research Grade observation(s), we also collected the total number of observations of that species in (a) Osceola County, (b) the state of Florida, and (c) the globe using the iNaturalist API (iNaturalist 2025). We report the relative frequency of these species found as part of the bioblitz efforts (site-level) relative to the total number of observations of each species in Osceola County, as well as the state of Florida (regional-level). Additionally, we used the iNaturalist API to obtain species origin information in relation to Florida (i.e., introduced, endemic) for all species recorded during DeLuca Bioblitz. To assess the extent to which the bioblitz filled in locations in species distributions, for every species with fewer than 100 observations from the DeLuca Bioblitz, we found the next-closest Research Grade observation outside of DeLuca Preserve. To do this, we used all Research Grade iNaturalist data in Florida through 27 June 2025, downloaded using the iNaturalist data export tool. While using the Global Biodiversity Information Facility (GBIF) is the recommended approach for obtaining Research Grade data, we noticed that the taxonomy did not fully align between iNaturalist-exported data and GBIF. Therefore, we chose to use iNaturalist data export, so our methods aligned with our methods for obtaining the DeLuca Preserve data.

We also compared the cumulative spatial sampling effort from the DeLuca Bioblitz to other randomly distributed locations across Florida. To do this, we used the *create_square* function in the *sf* package (Pebesma 2018; Pebesma and Bivand 2023) and randomly generated 100 different polygons (i.e., square boundaries) in the state of Florida that matched the size of the DeLuca Preserve (Supplemental Figure S1). In each of these randomly generated polygons, we gathered the number of observers, number of observations, and number of species documented at Research Grade level using the iNaturalist API. Comparisons between the DeLuca Bioblitz and the randomly generated polygons did not have the same temporal resolution. The DeLuca Bioblitz cumulatively represented data collected on four days from four separate years, whereas the randomly generated polygons included all-time records (i.e., there was no temporal filter applied to the polygon-generated data).

Data Analysis and Availability

All data analysis was conducted in R (R Core Team 2026) and relied heavily on the Tidyverse workflow (Wickham et al. 2019). All data and code are available in Zenodo (https://doi.org/10.5281/zenodo.18483505).

RESULTS

Overview of Biodiversity Outcomes

Across 4 annual bioblitzes, concentrated sampling at the DeLuca Preserve generated a dense, taxonomically diverse dataset ($N = 892$ Research Grade species) that revealed numerous locally rare, novel, and under-documented species, while contributing disproportionately to regional biodiversity records. The highest reported species were pink sundew (*Drosera capillaris*; 210 observations), fourpetal St. Johnswort (*Hypericum tetrapetalum*; 207 observations), shiny blueberry (*Vaccinium mrysinites*; 159 observations), saw palmetto (*Serenoa repens*; 155 observations), and orange milkwort (*Senega lutea;* 149 observations). A total 45% of Research Grade species were documented two times or less, and 31% were only documented by a single observation. The spatial distribution of observations was heterogeneous across the preserve, with a pronounced concentration in areas of high accessibility (Figure 2). Species accumulation curves revealed a pronounced long-tailed distribution of species detection frequency and a non-asymptotic trajectory, indicating that species richness continues to increase with each sampling effort and that sampling completeness has not yet been achieved (Figure 3), suggesting that more species will be found with ongoing efforts.

Using iNaturalist data to define species origin, we also examined the accumulation of Florida-endemic and introduced species across the four bioblitzes (Supplemental Figure S2). Both groups exhibited upward trajectories consistent with the overall species accumulation curve, indicating that continued sampling will likely reveal additional taxa. To date, 69 introduced and 20 endemic species have been recorded; however, these counts are provisional and likely underestimate true totals due to incomplete sampling and ongoing data curation.

Comparison with Random Landscape Benchmarks

When comparing with randomly sampled polygons, we found that the efforts associated with the DeLuca Bioblitz led to markedly higher observations per km^2 (118.0 vs. 20.1 $\pm$ 44.7; $t_{99} = -21.9$, $p < 0.001$) and species per km^2 (7.98 vs. 4.28 $\pm$ 3.77; $t_{99} = -9.80$, $p < 0.001$) than the statewide average, while observers per km^2 did not differ significantly (1.82 vs. 2.40 $\pm$ 3.79; $t_{99} = 1.52$, $p = 0.13$) (Figure 4). Shannon's diversity index further confirmed high diversity of observations at the preserve ($H' = 5.81$), approaching statewide diversity ($H' = 6.82$), indicating that the DeLuca Bioblitz captured both common and rare taxa in a relatively short time frame compared to the entire time frame for the 100 random polygons.

For species with less than 100 observations recorded during the DeLuca Bioblitz, we found that the average median linear nearest distance of the species recorded outside of the DeLuca Preserve was 7.043 km and ranged from 0.0035 to 7595 km. The nearest observations represent common species such as white beggarticks (*Bidens alba*), ballmoss (*Tillandsia recurvata*), and pickerelweed (*Pontederia cordata*). The species that was farthest away was false smut of palm (*Graphiola phoenicis*), a fungal leaf disease that affects palm species, where the nearest observation was in Lisbon, Portugal. Although there are no other Research Grade iNaturalist observations in Florida, this species has been known to occur in this region (Elliott 2005). Upon speaking with an expert in this field, they agree with the genus-level identification of this species, *Graphiola*, but did not agree that species-level identification is possible based on photographic evidence, given that there are multiple species of *Graphiola* worldwide (Piepenbring et al. 2012). Nevertheless, this is still the first observation of *Graphiola* on iNaturalist in the United States.

An Analysis of Relative Rarity

Comparison with county- and state-level biodiversity baselines revealed that the DeLuca Bioblitz contributed disproportionately to records of regionally rare and infrequently

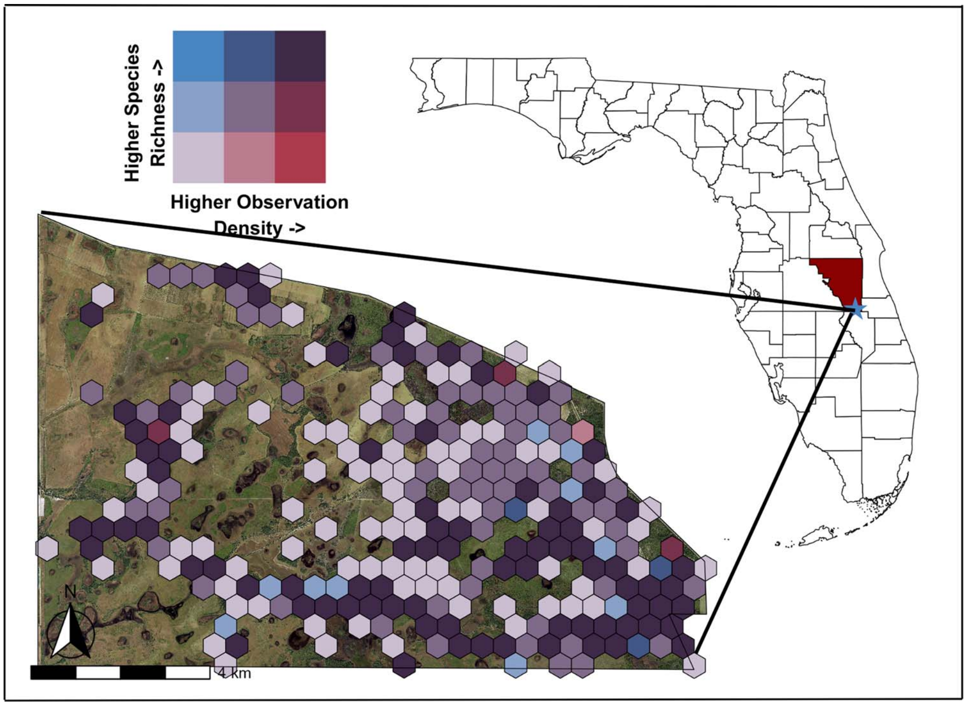

Figure 2.—A map of DeLuca Preserve, showing its location in Florida and its relative remoteness. Osceola County, where the preserve is located, is highlighted in red. Additionally displayed is a density heat map of where the observations within the preserve have been derived from the DeLuca Bioblitzes, and the concentration of observations and species richness. Bivariate colors reflect quantile-based classification (dim = 3) of observation density and species richness. A color version of this figure is available in the online version of the journal.

documented species. A subset of species recorded at DeLuca (2 species: *Condylostylus flavipes* and *Aethes triassumenta*) were observed only within the preserve and had not been documented elsewhere in Florida (Figure 5). Bioblitz-derived observations accounted for a disproportionately high share of county-level occurrence records, particularly within Osceola County, where many species were represented primarily or exclusively by DeLuca Bioblitz observations (Supplemental Figure S3).

DISCUSSION

Bioblitzes are increasingly popular events (Supplemental Figure S4), concomitant with a general increase in participatory citizen science (Feldman et al. 2021). While there are many benefits of such events for both engagement and natural resource management (Mason et al. 2025b), we provide a framework and an assortment of biodiversity metrics that can be used to evaluate the utility of bioblitzes for collecting relevant biodiversity data. Using a four-year case study, we show that a concentrated bioblitz effort can (1) generate dense, taxonomically diverse datasets over short time frames, (2) detect rare, endemic, and introduced species of management relevance, and (3) contribute disproportionately to regional biodiversity records. We evaluate potentially valuable data both for local, place-based adaptive management of natural resources, where, in this instance, observers found at least 33 endemic species and 71 introduced species. We also illustrate how data from a bioblitz can contribute to broad, regional-scale knowledge about biodiversity, with biodiversity metrics from the DeLuca Bioblitz matching or exceeding those from randomly selected polygons across Florida despite the much shorter sampling duration. Overall, our results demonstrate that concentrated bioblitz efforts can generate essential biodiversity information for natural resource management.

The value of a given biodiversity observation is context-dependent. Biodiversity observations may be locally common species, new county occurrences, threatened species, or the first detection of a potential invader. However, we note that there are often context-dependent qualitative findings, where a single record of a specific species can be very valuable, such as a finding of a nonnative species (Yeshwanth et al. 2025) or of a species of conservation concern (Wilson et al. 2020; Mesaglio et al. 2021). The DeLuca Bioblitz uncovered several notable findings including a critically imperiled species, the Florida black dark bee (*Stelis ater*), along with multiple threatened (e.g., *Hemiargus ceraunus*) and endemic species (e.g., *Lupinus floridanus*), underscoring the conservation value of this property and the importance of continued biodiversity monitoring through the bioblitz. Since bioblitzes concentrate effort in space and time, they are especially powerful in this regard, acting as early-detection systems that complement ongoing monitoring programs. Further, when enough observations accumulate at a local site, they provide the foundation for mapping biodiversity patterns with increasing resolution (e.g., Figure 1). As analytical approaches for citizen science data continue to advance (Beninde et al. 2023; Stewart et al. 2023), such datasets could

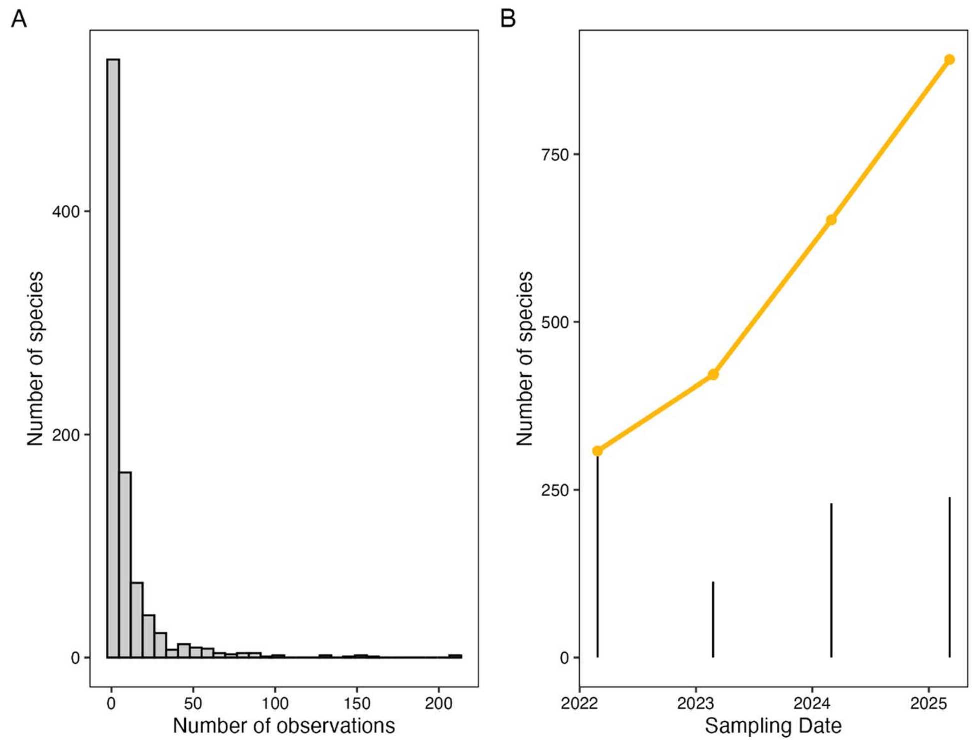

Figure 3.—(A) Frequency distribution of species detection rates across the DeLuca Bioblitz dataset, showing the number of species in each observation group. (B) Species accumulation across sequential bioblitz events (2022–2025), indicating continued discovery of novel taxa and incomplete sampling saturation. The vertical lines represent the number of new Research Grade species found that year.

allow researchers not only to document presence but also to estimate relative abundance and detect temporal trends. In this way, repeated and well-organized bioblitzes could form the basis of long-term biodiversity monitoring at the site scale.

At a broader scale, we situated the DeLuca Bioblitz efforts in a statewide context by leveraging a random polygon approach to benchmark the biodiversity data generated from a short-temporal scale bioblitz. In terms of observations and species per unit area, the DeLuca Bioblitz efforts contributed 487% greater observations per km^2 and 86.5% greater species per km^2 than the mean of random polygons, despite the dramatically shorter time frame. Our random polygon analysis (Figure 4, Supplemental Figure S1) provides a way to benchmark bioblitz contributions against broader iNaturalist activity. However, we acknowledge that underlying biodiversity, habitat composition, and accessibility vary across polygons, and observer behavior on iNaturalist is not spatially random, all of which can contribute to variation among polygons. As such, these comparisons are best interpreted as coarse contextual benchmarks rather than direct ecological contrasts. Nevertheless, this analysis illustrates that bioblitzes can produce unusually dense datasets, creating snapshots of biodiversity that provide a complementary and powerful perspective. We further conducted an exploratory analysis, comparing DeLuca Bioblitz data to iNaturalist data from 39 Florida state parks (Lowe et al. 2026), to evaluate active versus passive sampling (Supplemental Figure S5). Despite the DeLuca Bioblitz data being collected over just 4 d, compared to the full temporal extent of the state park data, the bioblitz yielded more

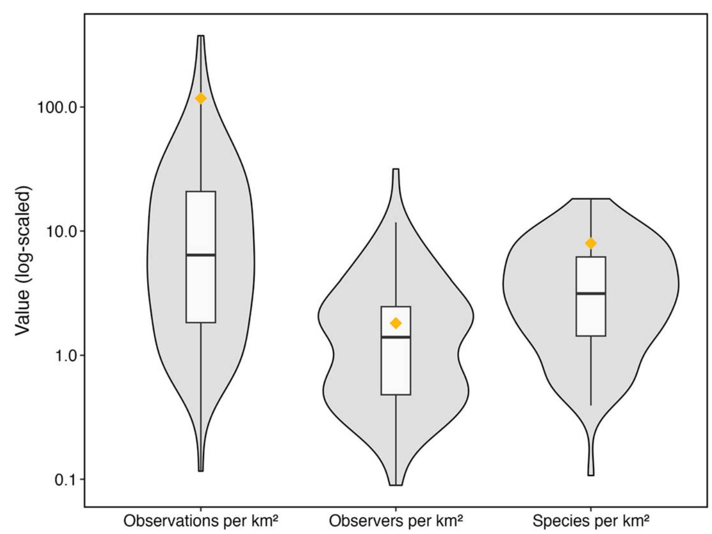

Figure 4.—Comparison of biodiversity metrics at the DeLuca Preserve relative to 100 randomly selected polygons of equivalent area across Florida. Violin and boxplots represent the statewide distribution of iNaturalist data in random polygons for three metrics normalized by area (observers, observations, and species per km^2), while the diamond markers indicate values from the DeLuca Bioblitz dataset. DeLuca exhibited markedly higher observation density (118.0 vs. 20.1 ± 44.7; $t_{99} = -21.9$, $p < 0.001$) and species density (7.98 vs. 4.28 ± 3.77; $t_{99} = -9.80$, $p < 0.001$) than the statewide average, whereas observer density did not differ significantly (1.82 vs. 2.40 ± 3.79; $t_{99} = 1.52$, $p = 0.13$).

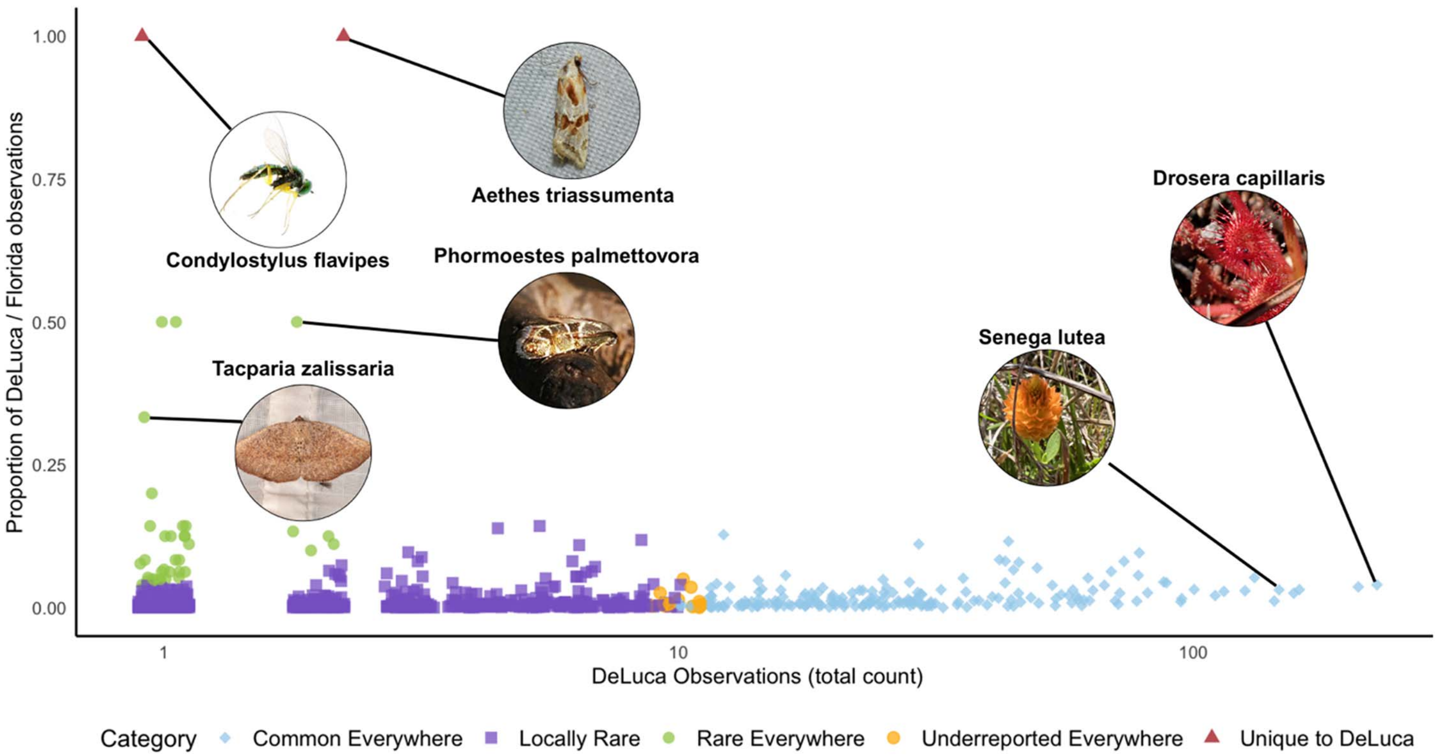

Figure 5.—Each point represents a species observed at DeLuca, plotted by its total observation count at DeLuca (log-scale) versus its proportional representation relative to Florida-wide observations. Color/shape combinations indicate rarity categories: blue diamonds represent common everywhere (>10 observations in DeLuca; >25 observations in Florida), yellow circles represent underreported everywhere (=10 observations in DeLuca; <=25 observations in Florida), purple squares represent locally rare (<10 observations in DeLuca; >25 observations in Florida), green circles represent rare everywhere (<10 observations in DeLuca; <25 observations in Florida); and red triangles represent unique to DeLuca. Image attributions: Odin Toness (*Condylostylus flavipes*), Laura Gaudette (*Tacparia zalissaria*), Jeff Niznik (*Aethes triassumenta*), Liz Childress (*Phormoestes palmettovora),* Aurora Alcaide (*Senega lutea*), and Donald Fraser (*Drosera capillaris*). A color version of this figure is available in the online version of the journal.

observations and species than expected based on state park trends. This illustrates the value of bioblitzes in generating more observations and species than passive sampling. Given that bioblitzes can generate robust species inventories in 24 hr that rival entire temporal scales in our random polygons, land managers should consider the benefits of these nontraditional sampling events to create baseline species inventories. Lastly, conservation practitioners interested in both rare and potentially invasive species can leverage bioblitz events to document large amounts of data rapidly, compared to more traditional monitoring methods that can be more costly and time-consuming.

Our evaluation focused on quantitative metrics that are broadly applicable across bioblitz events, but this represents only one dimension of their value. Future work could strengthen these insights by directly comparing bioblitz outcomes with professionally collected survey data, assessing how well volunteer-collected records align with standardized monitoring (Katzer et al. 2025). Additional approaches might include examining taxonomic biases (e.g., toward charismatic or easily photographed taxa or taxonomic uncertainty), quantifying participant learning or engagement outcomes (Echeverria et al. 2021; Niemiller et al. 2021), or integrating bioblitz data with other monitoring tools such as eDNA or remote sensing (Cavender-Bares et al. 2022; Granqvist et al. 2025). Importantly, the results we present here emphasize short-term outcomes—the concentrated biodiversity snapshots generated over the course of a single event. The longer-term value, particularly the potential for repeated bioblitzes to build cumulative datasets that enable site-level monitoring and adaptive management, remains to be fully realized. As such, bioblitzes represent not only a means to engage the public but also an underutilized mechanism for generating robust, repeatable biodiversity data with clear relevance for conservation and management.

Conclusions

We provide an overview of how a bioblitz can provide valuable biodiversity data. We introduce quantitative metrics and provide a conceptual framework (Figure 1) for how data from a bioblitz can contribute to both local place-based natural resource management as well as regional-scale biodiversity research. However, we stress that hosting a bioblitz is time-consuming and requires logistical planning (Tiago et al. 2024). Nevertheless, based on our results and collective experience, we suggest that natural resource managers should consider the use of bioblitzes and how they can contribute to adaptive management goals.

ACKNOWLEDGMENTS

We thank the participants of the DeLuca Bioblitz and all iNaturalist contributors, observers, and identifiers, for their valuable observations and species identifications, which made this research possible. We also thank those who assisted with event coordination and execution. We thank Braham Dhillon for identification help. CTC acknowledges that this research was supported in part by the intramural research program of the U.S. Department of Agriculture, Hatch, FLA-FTL-006297. This work is supported by the McIntire-Stennis program, project award no. FLA-FTL-006659, from the U.S. Department of Agriculture's National Institute of Food and Agriculture.

Levi Hoskins is a graduate student in the School of Natural Resources and Environment at the University of Florida. Their research focuses on urban greenspaces and migratory birds.

Brittany Mason is a Data Management Analyst at the University of Florida. She has varied interests including participatory citizen science, herpetology, and iNaturalist.

Jackson Barratt Heitmann is a graduate student in the Department of Wildlife Ecology and Conservation at the University of Florida. His research interests include geographically isolated wetlands.

Oniel Alvarez-Abreu is a graduate student in the Department of Wildlife Ecology and Conservation at the University of Florida. His research focuses on molluscs.

Kelly Bearhs is an undergraduate student in the Department of Wildlife Ecology and Conservation at the University of Florida. Her interests include marine ecology.

Shannon Carnevale is an extension agent at the University of Florida Institute of Food and Agricultural Sciences. She focuses on natural resource programming.

Cynthia Analise Fussell is a graduate student in the School of Natural Resources and Environment at the University of Florida. Her research focuses on wading birds.

Thomas Lilkendey was an undergraduate student in the Department of Wildlife Ecology and Conservation at the University of Florida. His research focused on pollinator diversity in urban greenspaces using iNaturalist data.

Marina Marquis is a graduate student in the Department of Wildlife Ecology and Conservation at the University of Florida. Their interests include pollinators, trophic ecology, and socio-ecological systems.

Brent A. Sellers is a Professor in the Department of Agronomy at the University of Florida. His research examines weed biology and ecology related to pasture and rangeland management strategies.

Jiayi Song is a graduate student in the School of Natural Resources and Environment at the University of Florida. His research focuses on geospatial AI techniques applied to natural resources and biodiversity.

Anna Swigris is a graduate student in the School of Natural Resources and Environment at the University of Florida. Her interests include restoration ecology and trophic ecology.

Mario Zuliani is a postdoctoral fellow at the University of Florida. His research focuses on restoration ecology.

Corey T. Callaghan is an Assistant Professor in the Department of Wildlife Ecology and Conservation at the University of Florida. His research focuses on how participatory citizen science data can be used in natural resource management and biodiversity conservation.

LITERATURE CITED

Beninde, J., T.W. Delaney, G. Gonzalez, and H.B. Shaffer. 2023. Harnessing iNaturalist to quantify hotspots of urban biodiversity: The Los Angeles case study. Frontiers in Ecology and Evolution 11:983371.

Callaghan, C.T., A.G.B. Poore, T. Mesaglio, A.T. Moles, S. Nakagawa, C. Roberts, J.J.L. Rowley, A. Vergés, J.H. Wilshire, and W.K. Cornwell. 2021. Three frontiers for the future of biodiversity research using citizen science data. BioScience 71:55–63.

Cavender-Bares, J., F.D. Schneider, M.J. Santos, A. Armstrong, A. Carnaval, K.M. Dahlin, L. Fatoyinbo, G.C. Hurtt, D. Schimel, P.A. Townsend, et al. 2022. Integrating remote sensing with ecology and evolution to advance biodiversity conservation. Nature Ecology & Evolution 6:506–519.

Cowie, R.H., P. Bouchet, and B. Fontaine. 2022. The Sixth Mass Extinction: Fact, fiction or speculation? Biological Reviews 97:640–663.

Echeverria, A., I. Ariz, J. Moreno, J. Peralta, and E.M. Gonzalez. 2021. Learning plant biodiversity in nature: The use of the citizen-science platform iNaturalist as a collaborative tool in secondary education. Sustainability 13(2):735.

Elliott, M.L. 2005. Graphiola leaf spot (false smut) of palm. University of Florida IFAS Extension. <https://doi.org/10.32473/edis-pp140-2006>

Fauzia, A.M., M.D. Kusrini, and L.B. Prasetyo. 2023. Citizen science contribution in herpetofauna data collection in Java. IOP Conference Series: Earth and Environmental Science 1271.

Feldman, M.J., L. Imbeau, P. Marchand, M.J. Mazerolle, M. Darveau, and N.J. Fenton. 2021. Trends and gaps in the use of citizen science derived data as input for species distribution models: A quantitative review. PLOS One 16(3):e0234587.

Granqvist, E., R.M. Goodsell, M. Töpel, and F. Ronquist. 2025. The transformative potential of eDNA-based biodiversity impact assessment. Current Opinion in Environmental Sustainability 73:101517.

Hsu, C.H., J. Kang, X. Zhao, S. Uryu, H. Imagawa, T. Endo, and T. Kubo. 2025. Conservation implications from a decade of online wildlife trade for land hermit crabs. Global Ecology and Conservation 62:e03722.

iNaturalist. 2025. iNaturalist API. <https://api.inaturalist.org/v1/docs/>

Katzer, A.M., E.E. Boydston, M.E. Akresh, J.S. Briggs, K. Cooper, V. Barve, L. Lee, and T.L. Morelli. 2025. Biodiversity on public lands: How community science can help. Conservation Science and Practice 7(5):e70016.

Kishimoto, K., and H. Kobori. 2021. COVID-19 pandemic drives changes in participation in citizen science project "City Nature Challenge" in Tokyo. Biological Conservation 255:109001.

Larson, E.R., B.M. Graham, R. Achury, J.J. Coon, M.K. Daniels, D.K. Gambrell, K.L. Jonasen, G.D. King, N. LaRacuente, T.I. Perrin-

Stowe, et al. 2020. From eDNA to citizen science: Emerging tools for the early detection of invasive species. Frontiers in Ecology and the Environment 18:194–202.

Lowe, S.K., B.M. Mason, N.A. Morales, and C.T. Callaghan. 2026. Participatory citizen science data complements agency-collected data for species inventories. Ecological Solutions and Evidence 7(1):e70173.

Maes, D., N.J.B. Isaac, C.A. Harrower, B. Collen, A.J. Strien, and D.B. van Roy. 2015. The use of opportunistic data for IUCN Red List assessments. Biological Journal of the Linnean Society 115:690–706.

Mason, B.M., T. Mesaglio, J.B. Heitmann, M. Chandler, S. Chowdhury, S.B.Z. Gorta, B. Grattarola, Q. Groom, C. Hitchcock, L. Hoskins, et al. 2025a. iNaturalist accelerates biodiversity research. BioScience 75:953–965.

Mason, B.M., R. Bratton, C. Crandall, H.H. Hochmair, A. Mallinak, E. Suarez, S. Tatem, and C.T. Callaghan. 2025b. Quantifying the use of citizen science as a tool for biodiversity management and engagement. Conservation Science and Practice 7:e70141.

McKinley, D.C., A.J. Miller-Rushing, H.L. Ballard, R. Bonney, H. Brown, S.C. Cook-Patton, D.M. Evans, R.A. French, J.K. Parrish, T.B. Phillips, et al. 2017. Citizen science can improve conservation science, natural resource management, and environmental protection. Biological Conservation 208:15–28.

Meeus, S., I. Silva-Rocha, T. Adriaens, P. Brown, N. Chartosia, B. Claramunt-López, A.F. Martinou, M. Pocock, C. Preda, H. Roy, et al. 2021. BioBlitz is more than a bit of fun. Biodiversity Information Science and Standards 5:e74361.

Meeus, S., I. Silva-Rocha, T. Adriaens, P.M.J. Brown, N. Chartosia, B. Claramunt-López, A.F. Martinou, M.J.O. Pocock, C. Preda, H.E. Roy, et al. 2023. More than a bit of fun: The multiple outcomes of a bioblitz. BioScience 733:168–181.

Mesaglio, T., A. Soh, S. Kurniawidjaja, and C. Sexton. 2021. First known photographs of living specimens: The power of iNaturalist for recording rare tropical butterflies. Journal of Insect Conservation 25:905–911.

Niemiller, K.D.K., M.A. Davis, and M.L. Niemiller. 2021. Addressing 'biodiversity naivety' through project-based learning using iNaturalist. Journal for Nature Conservation 64:126070.

Palma, E., L. Mata, K. Cohen, D. Evans, B. Gandy, N. Gaskell, H. Hatchman, A. Mezzetti, D. Neumann, J. O'Keefe, et al. 2024. The city nature challenge: A global citizen science phenomenon contributing to biodiversity knowledge and informing local government practices. Bioscience 74:290–299.

Pebesma, E. 2018. Simple features for R: Standardized support for spatial vector data. R Journal 10:439–446.

Pebesma, E., and R. Bivand. 2023. Spatial Data Science: With Applications in R. Chapman and Hall/CRC. <https://doi.org/10.1201/9780429459016>

Piepenbring, M., F. Nold, T. Trampe, and R. Kirschner. 2012. Revision of the genus *Graphiola* (Exobasidiales, Basidiomycota). CABI Databases 94(1/2):67–93.

Pollock, N.B., N. Howe, I. Irizarry, N. Lorusso, A. Kruger, K. Himmler, and L. Struwe. 2015. Personal BioBlitz: A new way to encourage biodiversity discovery and knowledge in K–99 education and outreach. BioScience 65:1154–1164.

Postles, M., and M. Bartlett. 2018. The rise of BioBlitz: Evaluating a popular event format for public engagement and wildlife recording in the United Kingdom. Applied Environmental Education & Communication 17:365–379.

R Core Team. 2026. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>

Roger, E., and S. Klistorner. 2016. BioBlitzes help science communicators engage local communities in environmental research. JCOM 15(03):A06.

Sakurai, R., H. Kobori, D. Togane, L. Higgins, A. Young, K. Kishimoto, G. Agnello, S. Cutajar, and Y.S. Ham. 2022. A case study from the City Nature Challenge 2018: International comparison of participants' responses to citizen science in action. Biodiversity 23:21–29.

Stewart, R.D., N.W. Bard, M. van der Bank, and T.J. Davies. 2023. Leveraging machine learning and citizen science data to describe flowering phenology across South Africa. Plants, People, Planet Early View 2025:1–13. <https://doi.org/10.1002/ppp3.70059>

Storch, D., I. Šímová, J. Smyčka, E. Bohdalková, A. Toszogyova, and J.G. Okie. 2022. Biodiversity dynamics in the Anthropocene: How human activities change equilibria of species richness. Ecography 2022:e05778.

Tiago, P., I. Evaristo, and B. Pinto. 2024. The role of BioBlitzes in citizen science: Insights from participants and experts. Frontiers in Environmental Science 12:1347428.

Weiskopf, S.R., M.A. Rubenstein, L.G. Crozier, S. Gaichas, R. Griffis, J.E. Halofsky, K.J.W. Hyde, T.L. Morelli, J.T. Morisette, R.C. Muñoz, et al. 2020. Climate change effects on biodiversity, ecosystems, ecosystem services, and natural resource management in the United States. Science of the Total Environment 733:137782.

Wickham, H., M. Averick, J. Bryan, W. Chang, L.D.A. McGowan, R. François, G. Grolemund, A. Hayes, L. Henry, J. Hester, et al. 2019. Welcome to the Tidyverse. Journal of Open Source Software 4(43):1686.

Wilson, J.S., A.D. Pan, D.E.M. General, and J.B. Koch. 2020. More eyes on the prize: An observation of a very rare, threatened species of Philippine bumble bee, *Bombus irisanensis*, on iNaturalist and the importance of citizen science in conservation biology. Journal of Insect Conservation 24:727–729.

Yeshwanth, H.M., A. Viswanathan, S. Hariharakrishnan, S.D., Brown, A. Karuppannasamy, and S.R. Hiremath. 2025. Observations on iNaturalist reveal the establishment of non-native eucalyptus weevil Gonipterus platensis (Coleoptera: Curculionidae) in Tamil Nadu, India. Journal of Insect Science 25(2):18.

Zulian, V., D.A.W. Miller, and G. Ferraz. 2021. Integrating citizen-science and planned-survey data improves species distribution estimates. Diversity and Distributions 27:2498–2509.