

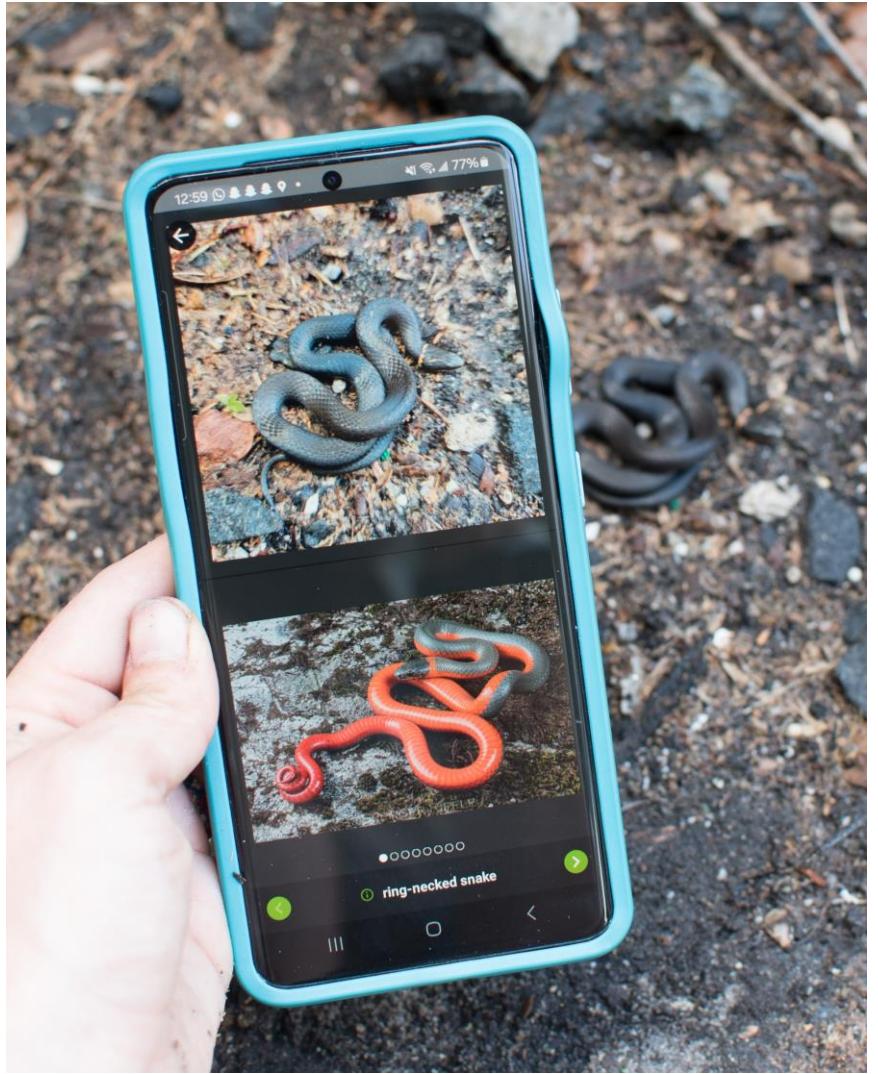


UF|IFAS
UNIVERSITY of FLORIDA



A comprehensive literature review on the use of iNaturalist data in scientific research

BRITTANY M. MASON AND COREY T.
CALLAGHAN



What is iNaturalist?

A global platform where users submit observations of any living thing using either the application or website

A community of naturalists then provide identification suggestions, and when the observation reaches over 2/3rds agreement the data becomes “Research Grade”

iNaturalist mission: “Connect people to nature and advance biodiversity science and conservation”





Observations



Species

Location

Go

Filters

The World

264,202,143
OBSERVATIONS528,578
SPECIES444,898
IDENTIFIERS3,801,858
OBSERVERS



Get data

How-to

Tools

Community

About

Occurrences



Search all fields



Simple filters

All filters

Occurrence status !

Licence

Scientific name

 Sciurus carolinensis Gmelin, 1788

Dataset

Search

- iNaturalist Research-grade Observations 187,795
- The Scottish Squirrel Database 83,074
- Living with Mammals survey 59,342
- National Mammal Atlas Project, online rec... 35,783
- MammalWeb records 14,863
- Mammal Mapper App Sighting Records 10,637
- Cumbria Non Native Invasive Species 9,556
- NBIS Records to December 2016 5,891
- Mammal records from Britain from the Atla... 5,889
- RECORD Mammal Data 5,230

SEARCH OCCURRENCES | 479,427 WITHIN 100 KM

TABLE GALLERY MAP TAXONOMY METRICS DOWNLOAD

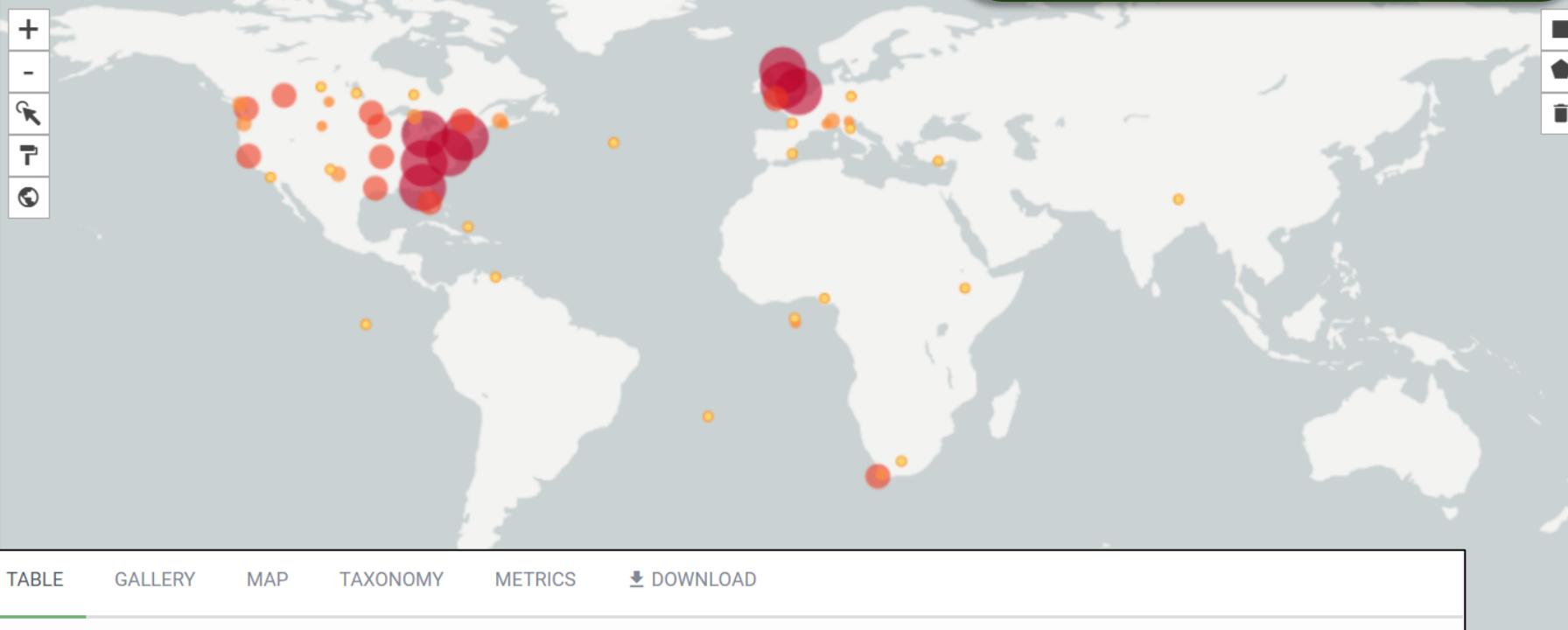


TABLE GALLERY MAP TAXONOMY METRICS DOWNLOAD

⋮	Scientific name	Country or area	Coordinates	Event date	Occurrence status
	Sciurus carolinensis Gmelin, 1788	United Kingdom of Great ...	51.6N, 0.3W	2024 Jan 01	Present
	Sciurus carolinensis Gmelin, 1788	United Kingdom of Great ...	52.1N, 3.1W	2024 Jan 07	Present
	Sciurus carolinensis Gmelin, 1788	United Kingdom of Great ...	52.2N, 3.6W	2024 Jan 28	Present

**GBIF**
Global Biodiversity
Information Facility



How are researchers
using this data?

The re-discovery in Sumatra of a rarely seen moth, *Heterosphecia tawonoides*, and its identification using citizen science platform iNaturalist

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Green Hill, Bukit Lawang, Langkat 20774, North Sumatra, Indonesia

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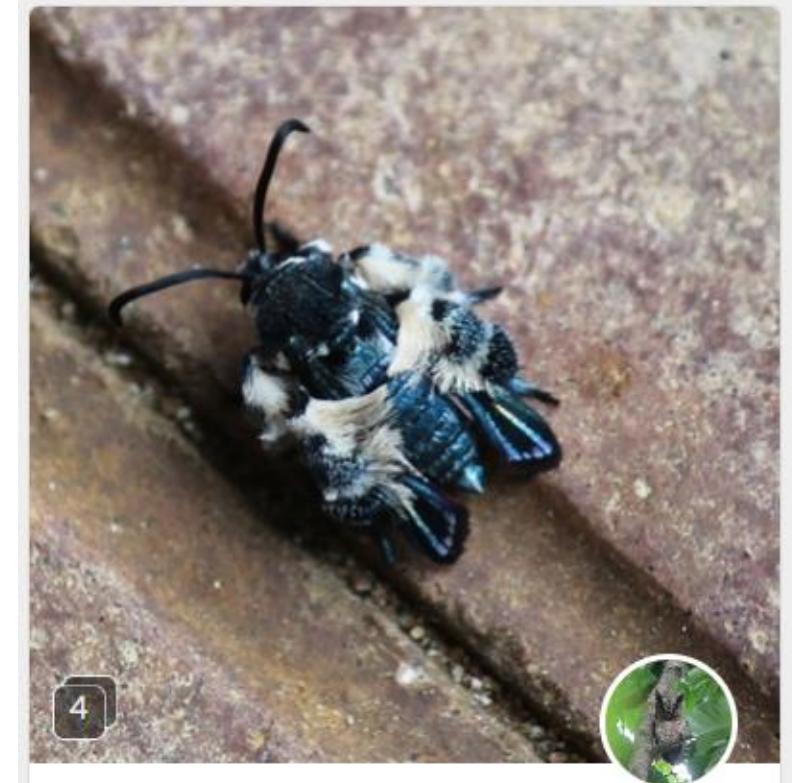
Submitted 6 March 2023; Accepted 19 April 2023

ABSTRACT

Traditional methods of species identification involve the collection and killing of specimens. The associated costs and expertise required are prohibitory. In this paper we describe the first documented record of *Heterosphecia tawonoides* in its natural habitat in Sumatra since 1887, reporting its identification using photographs uploaded to the citizen science platform iNaturalist. Our findings add valuable information to the small body of work on this species and demonstrate the importance of having freely available high-quality tools such as iNaturalist without which this important record would not have been reported and the observation of this rarely seen moth species in Sumatra would have remained unknown.



Here we show that high quality photographic records can be used to identify a poorly known and rarely seen species of moth using iNaturalist in the field. Having access to a large network which included an 'expert



4



Oriental Blue Clearwing
(*Heterosphecia tawonoides*)

Research Grade

14 6 31

May '15

Article

<https://doi.org/10.11646/zootaxa.4816.3.6>
<http://zoobank.org/urn:lsid:zoobank.org:pub:6B260EBD-967D-4BB0-9DB4-BA545383AD57>

A new bee-mimicking stiletto fly (Therevidae) from China discovered on iNaturalist

SHAUN L. WINTERTON

California State Collection of Arthropods, California Department of Food & Agriculture, Sacramento, California, USA.

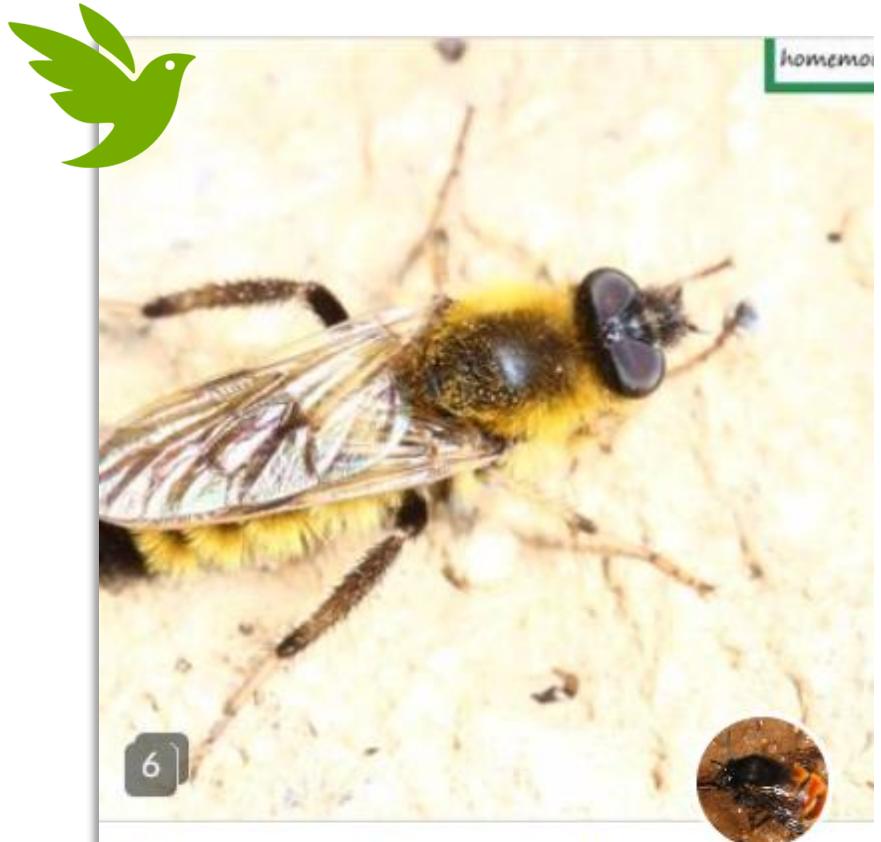
 wintertonshaun@gmail.com;  <https://orcid.org/0000-0001-8995-0907>

<urn:lsid:zoobank.org:author:37F5AC48-EC3A-47ED-902B-2BD1467CCA72>

Abstract

The Chinese stiletto fly fauna is poorly known, with few species previously described and no endemic genera. A new genus and species of charismatic stiletto fly is described from northern China. Although the species was previously known from a poorly preserved specimen, the true form of this apparent bumble bee-mimic was not known until images of a live individual were discovered amongst photographs posted on iNaturalist, an online citizen scientist and biodiversity social network.

elusive, new stiletto fly was finally revealed. Based on the specimen collected in 2013 and these new images subsequently posted to iNaturalist, this new bee-mimicking stiletto fly can now be formally described here as *Sinothereva shangui* gen. et sp. n.



Mountain Ghost Stiletto Fly

(*Sinothereva shangui*)

Research Grade

2 20 23

Apr '19



Research



Cite this article: Vrettos M, Reynolds C, Amar A. 2021 Malar stripe size and prominence in peregrine falcons vary positively with solar radiation: support for the solar glare hypothesis. *Biol. Lett.* 17: 20210116. <https://doi.org/10.1098/rsbl.2021.0116>

Received: 23 February 2021
Accepted: 7 May 2021

Subject Areas:
ecology, evolution

Keywords:
falcon, peregrine, *Falco peregrinus*, malar stripe, animal coloration, solar glare

Evolutionary biology

Malar stripe size and prominence in peregrine falcons vary positively with solar radiation: support for the solar glare hypothesis

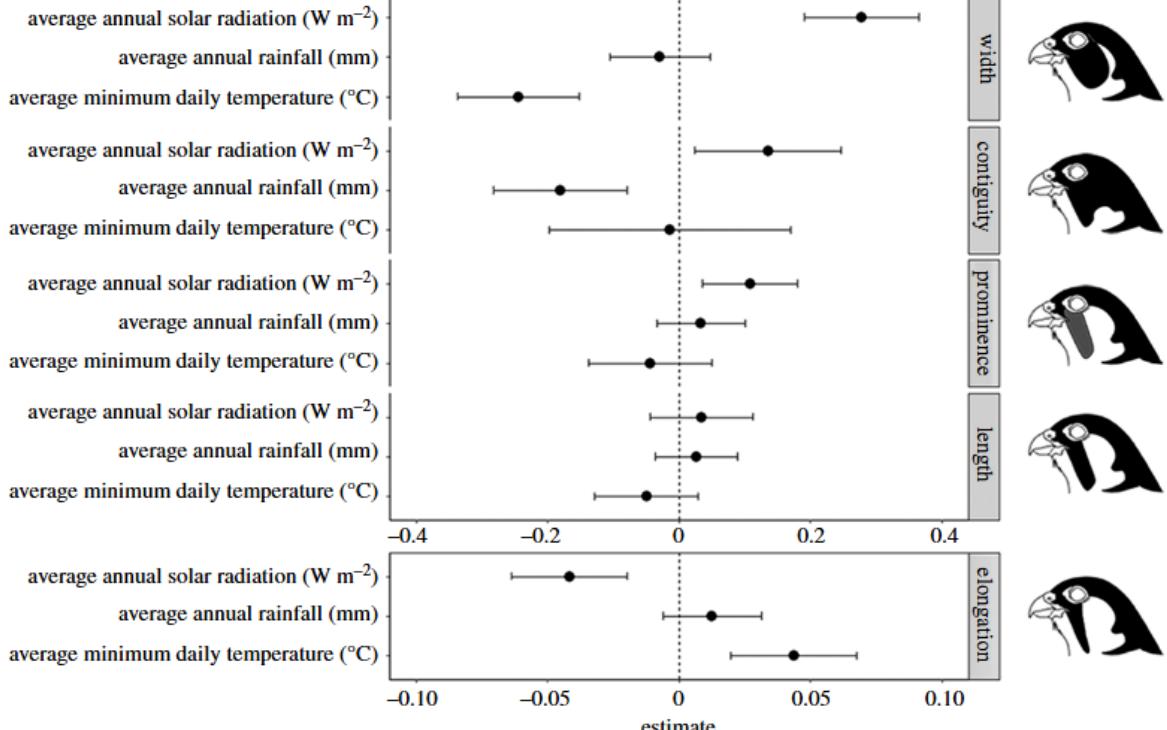
Michelle Vrettos¹, Chevonne Reynolds^{1,2} and Arjun Amar¹

¹FitzPatrick Institute of African Ornithology, DST-NRF Centre of Excellence, Department of Biological Sciences, University of Cape Town, South Africa

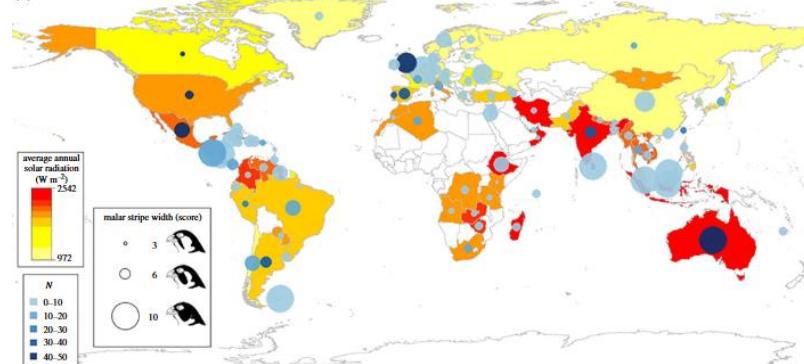
²School of Animal, Plant and Environmental Sciences, University of the Witwatersrand, Johannesburg, South Africa

iD MV, 0000-0002-5556-9523; CR, 0000-0002-2345-7017; AA, 0000-0002-7405-1180

Many falcons (*Falco* spp.) exhibit a distinct dark plumage patch below the eye, termed the malar stripe. This stripe is hypothesized to reduce the amount of solar glare reflected into the eyes while foraging, thereby increasing hunting efficiency in bright conditions. Here, we use a novel, global-scale correlative approach to test this 'solar glare hypothesis' in peregrine falcons (*Falco peregrinus*), the most widespread falcon species, using web-sourced photographs from across the species' global range. We found that the size and prominence of the malar stripe were positively associated with average annual solar radiation, but not with other environmental variables, such as temperature and rainfall. Our results provide the first published evidence for the hypothesis that this plumage feature functions to reduce the amount of solar glare reflected into the falcon's eyes, thereby improving the ability to pinpoint and target agile prey in bright conditions.



(a)



Citizen science plant observations encode global trait patterns

Received: 16 February 2022

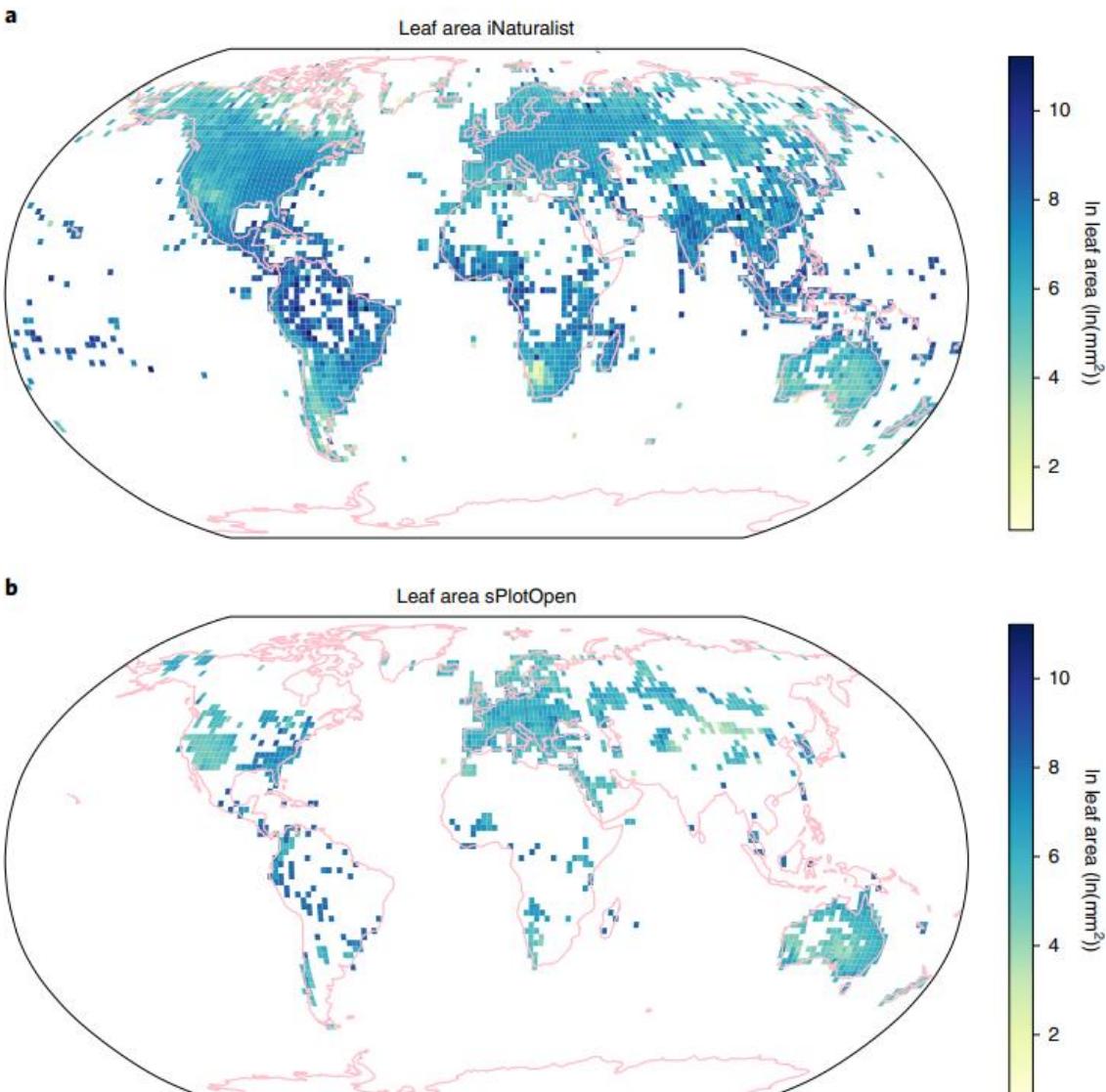
Accepted: 9 September 2022

Published online: 20 October 2022

 Check for updates

Sophie Wolf  ¹, Miguel D. Mahecha  ^{1,2,3}, Francesco Maria Sabatini  ^{3,4,5}, Christian Wirth  ^{3,6,7}, Helge Bruehlheide  ^{3,8}, Jens Kattge  ^{3,7}, Alvaro Moreno Martinez  ⁸, Karin Mora  ^{1,3} and Teja Kattenborn  ^{1,3}

Global maps of plant functional traits are essential for studying the dynamics of the terrestrial biosphere, yet the spatial distribution of trait measurements remains sparse. With the increasing popularity of species identification apps, citizen scientists contribute to growing vegetation data collections. The question emerges whether such opportunistic citizen science data can help map plant functional traits globally. Here we show that we can map global trait patterns by complementing vascular plant observations from the global citizen science project iNaturalist with measurements from the plant trait database TRY. We evaluate these maps using sPlotOpen, a global collection of vegetation plot data. Our results show high correlations between the iNaturalist- and sPlotOpen-based maps of up to 0.69 (r) and higher correlations than to previously published trait maps. As citizen science data collections continue to grow, we can expect them to play a significant role in further improving maps of plant functional traits.



iNaturalist and Structured Mammal Surveys Reflect Similar Species Richness but Capture Different Species Pools Across the United States

Daniel J. Herrera¹  | Christopher M. Schalk²  | Alex J. Jensen¹  | Benjamin R. Goldstein^{1,3}  | Brigit R. Rooney⁴  | Roland Kays^{1,3}  | William J. McShea⁴  | Michael V. Cove¹ 

Using iNaturalist as a tool to monitor roosting behavior of bats in Panama

Shem Unger^{1*} 

¹ Wingate University, Wingate, North Carolina, USA.
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Reviewing Observations for the Idaho Amphibian and Reptile iNaturalist Project For Improved Data Quality

Charles Russell Peterson[‡], Patrick D Giltz[‡]

[‡] Idaho State University, Pocatello, United States of America

Connecting to nature through tech? The case of the iNaturalist app

Soledad Altrudi 
University of Southern California, USA

'First Known Photographs of Living Specimens': the power of iNaturalist for recording rare tropical butterflies

Thomas Mesaglio¹  · Aaron Soh² · Steven Kurniawidjaja³ · Chuck Sexton⁴

On the Road Again: Touring iNaturalist for roadkill observations as a new tool for ecologists

Shem Unger

A global citizen science effort via iNaturalist reveals food webs of large predatory rove beetles

Fang-Shuo Hu ^a   , Yun Hsiao ^b   , Alexey Solodovnikov ^a 

RESEARCH ARTICLE

iNaturalist as a tool in the study of tropical molluscs

Rafael Masson Rosa¹  *, Daniel Caracanhas Cavallari¹  , Rodrigo Brincalepe Salvador^{1,2} 

Article

Strengths and Challenges of Using iNaturalist in Plant Research with Focus on Data Quality

Eduard López-Guillén^{1,†}, Ileana Herrera^{2,3,*+‡} , Badis Bensid^{1,4}, Carlos Gómez-Bellver¹ , Neus Ibáñez¹ , Pedro Jiménez-Mejías⁵, Mario Mairal⁶ , Laura Mena-García¹, Neus Nualart¹ , Mònica Utjés-Mascó¹  and Jordi López-Pujol^{1,2,*} 

Quantitative look at iNaturalist data usage

iNaturalist accelerates biodiversity research

Brittany M. Mason , Thomas Mesaglio, Jackson Barratt Heitmann , Mark Chandler, Shawan Chowdhury , Simon B. Z. Gorta , Florencia Grattarola , Quentin Groom , Colleen Hitchcock , Levi Hoskins, Samantha K. Lowe, Marina Marquis, Nadja Pernat , Vaughn Shirey , Shukherdorj Baasanmunkh  and Corey T. Callaghan 

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Abstract

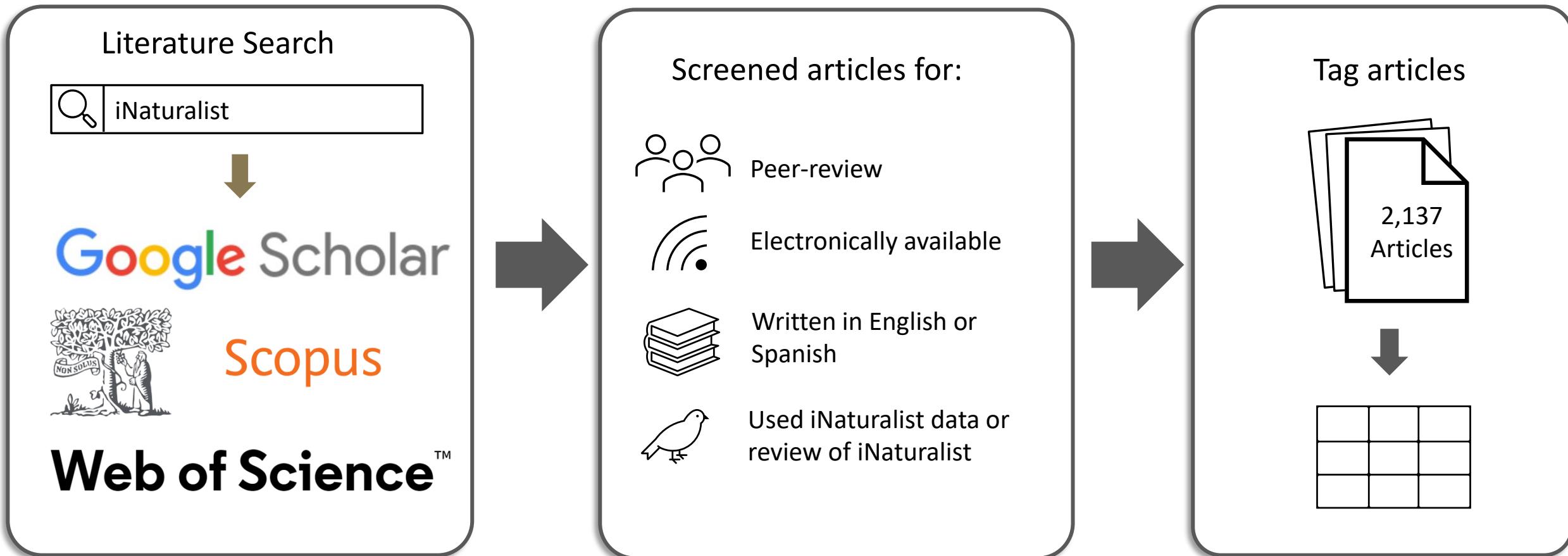
Participatory citizen science is expanding, with iNaturalist emerging as one of the most widely used platforms globally. However, its application in research is often anecdotal. To evaluate the impact of how iNaturalist is contributing to biodiversity and conservation research, we conducted a systematic review of iNaturalist data use and compared our findings with Global Biodiversity Information Facility literature citing iNaturalist. We found that the use of iNaturalist data in peer-reviewed research has grown tenfold in the last 5 years, matching the growing increase in iNaturalist observations. Geographic and taxonomic representation in the literature generally aligns with data availability, with iNaturalist data derived from 128 countries and 638 taxonomic families being used in peer-reviewed literature. Currently, data from iNaturalist are primarily used for species distribution models and range dynamics. We highlight emerging trends in the use of iNaturalist data in the literature lending to its future potential across biodiversity sciences.

Keywords: citizen science, community science, participatory science, review, GBIF

QR code to
the full paper



Methods: Obtaining and Sorting Articles



Methods: Article Tagging Fields

Article Topics

1. Species Distribution/Range
2. Biology/Behavior
3. Biodiversity/Population Assessment
4. Data Quality/Comparison
5. Climate Change/Environmental Impact
6. Species Discovery
7. Education/Community Engagement
8. Other



Article Topic



Analyses, data type,
and data role

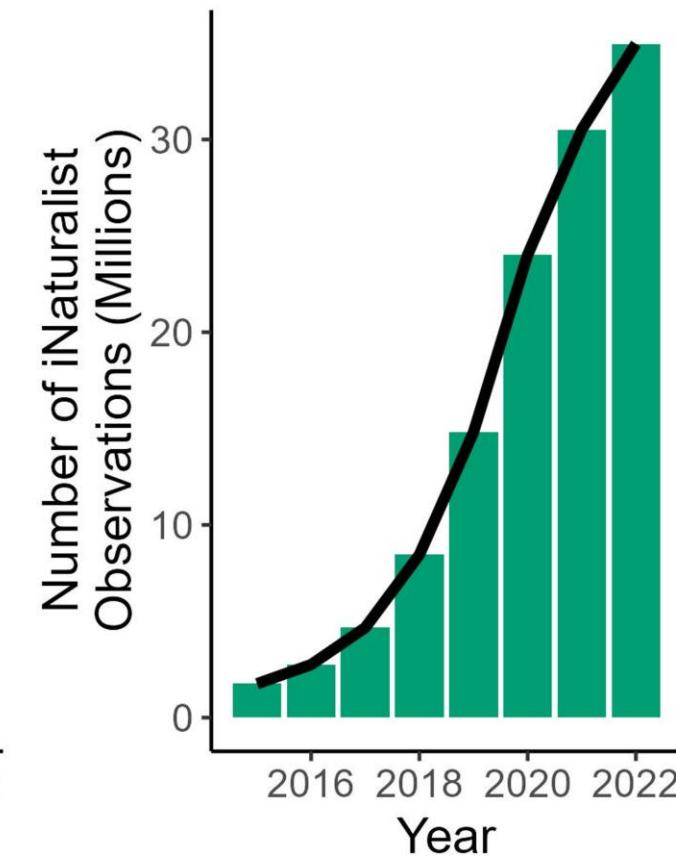
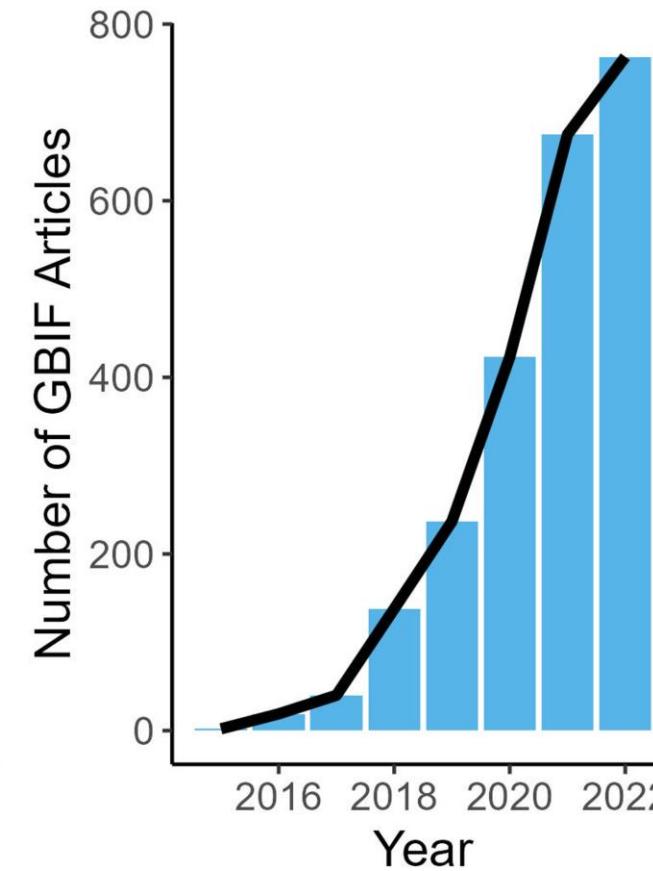
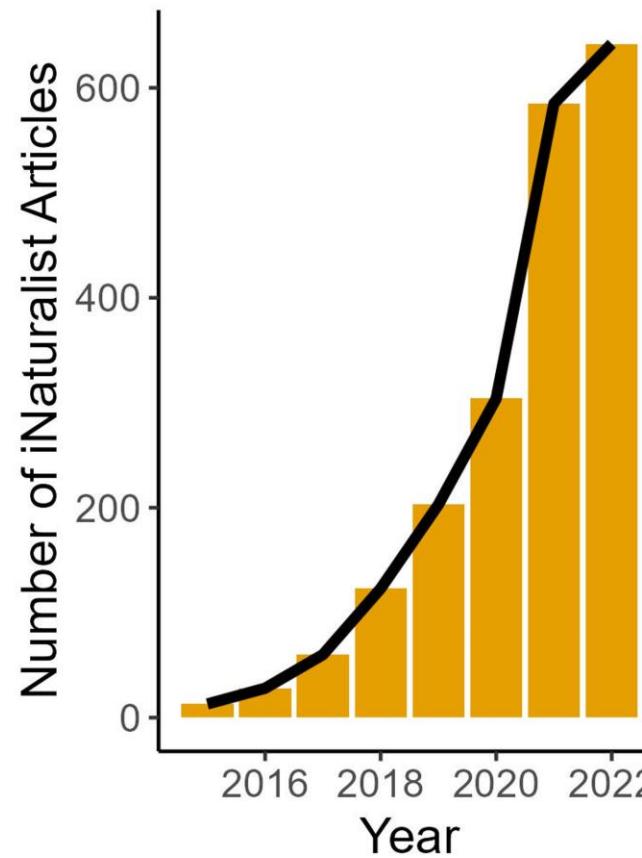
Methods: Supplemental Analysis Using GBIF

The screenshot shows the GBIF Occurrence Download interface. At the top, it displays "916,484 occurrences included in download" with a "DOWNLOAD" button and a "DOI" link (10.15468/dl.23j75z). On the left, a sidebar lists filters: "Country or area of research", "Country or area of coverage", "Literature type" (checked for "Journal article"), "Relevance", "Year of publication", "Topic", "Scientific name", "Dataset" (checked for "iNaturalist Research-group"), and "Publisher". The main content area shows filtering details: "Licence: CC BY-NC 4.0", "File: 248 MB Darwin Core Archive", "Involved datasets: 2,553", "Involved publishers: 339", and "Involved publishing countries: 41". It also includes a note to "Make sure to read the [data user agreement](#) and [citation guidelines](#)". Below this is a search interface with a tree view: "And" node with "Scientific name: Acer pseudoplatanus L.", "Has coordinate: true", and "Has geospatial issue: false". A sidebar on the right lists recent datasets with their DOIs: 10.15468/dl.2556xq, 10.15468/dl.29qj2u, 10.15468/dl.2ateq6, 10.15468/dl.2d349c, 10.15468/dl.2gzdm5, and 10.15468/dl.2nj3bu. The bottom navigation bar includes links for "DOI 10.15468/dl.zp/qmv", "DOI 10.15468/dl.zs30vu", "DOI 10.15468/dl.zsjmhu", and "DOI 10.15468/dl.2szcze".



We found that only **10.3%** of articles overlapped between the iNaturalist literature search method and GBIF method.

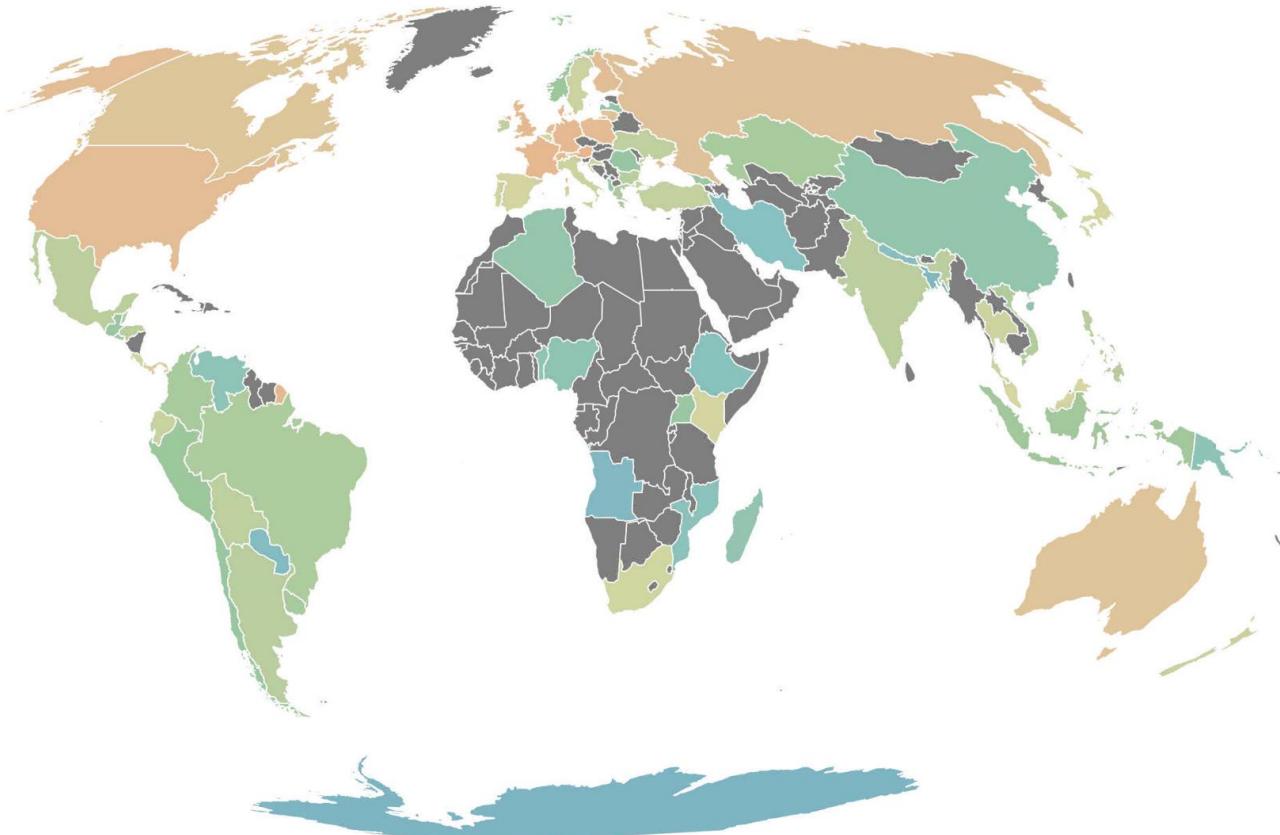
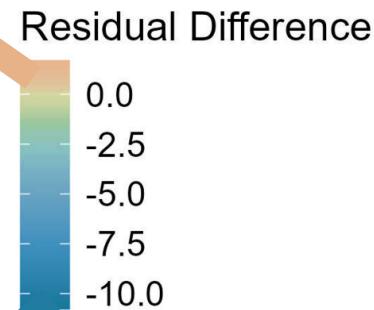
Results: The use of iNaturalist data in scientific literature has grown significantly, paralleling the rapid increase in data availability from the platform.



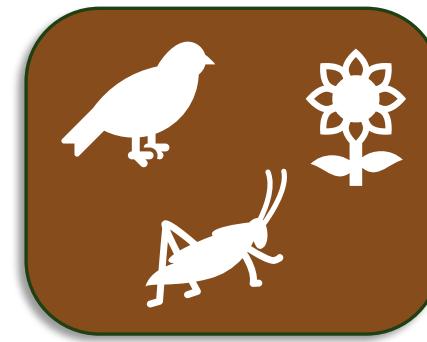
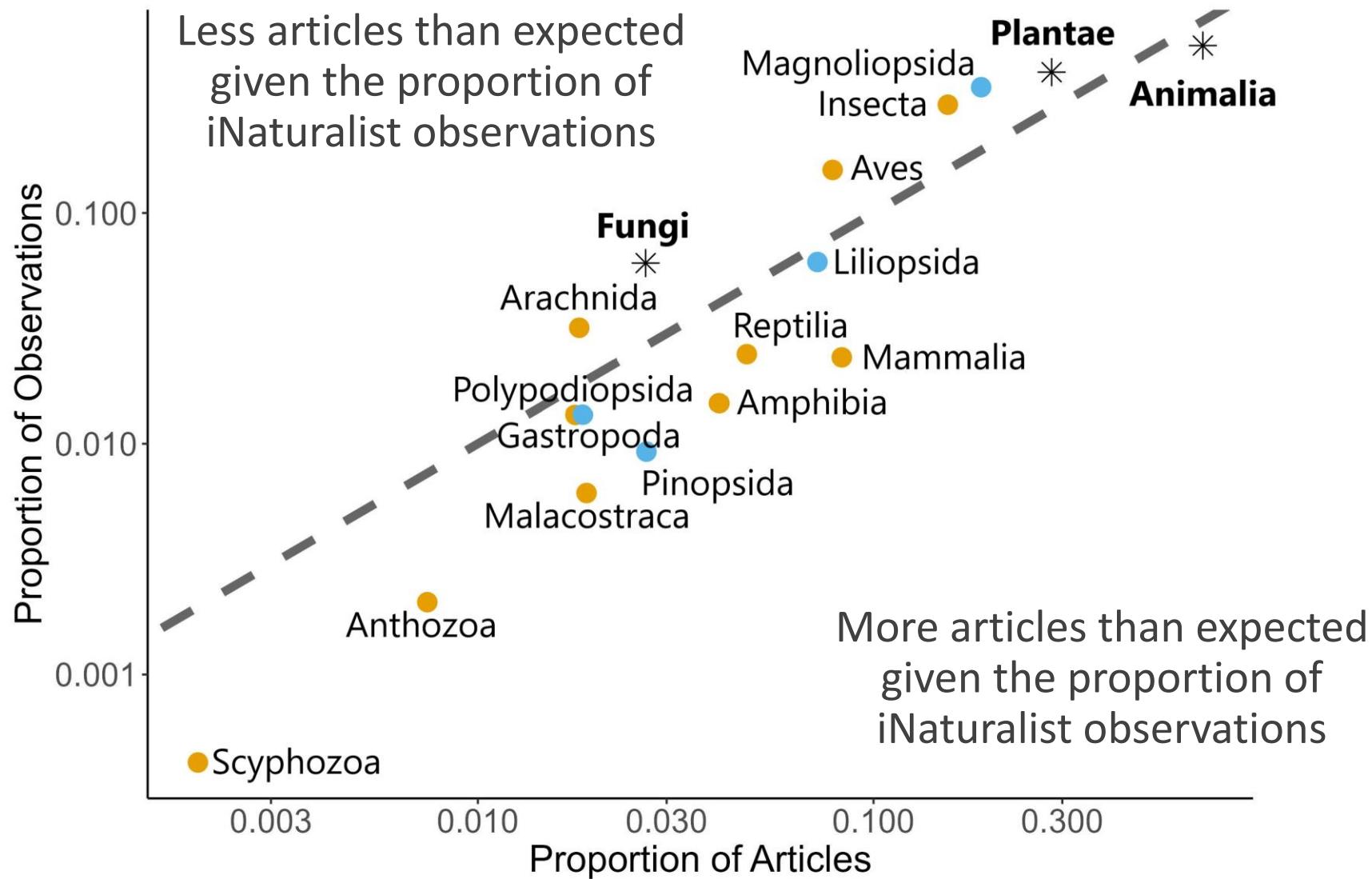
Results: iNaturalist data is used in scientific research from 128 countries

Less articles than expected given the proportion of iNaturalist observations

More articles than expected given the proportion of iNaturalist observations



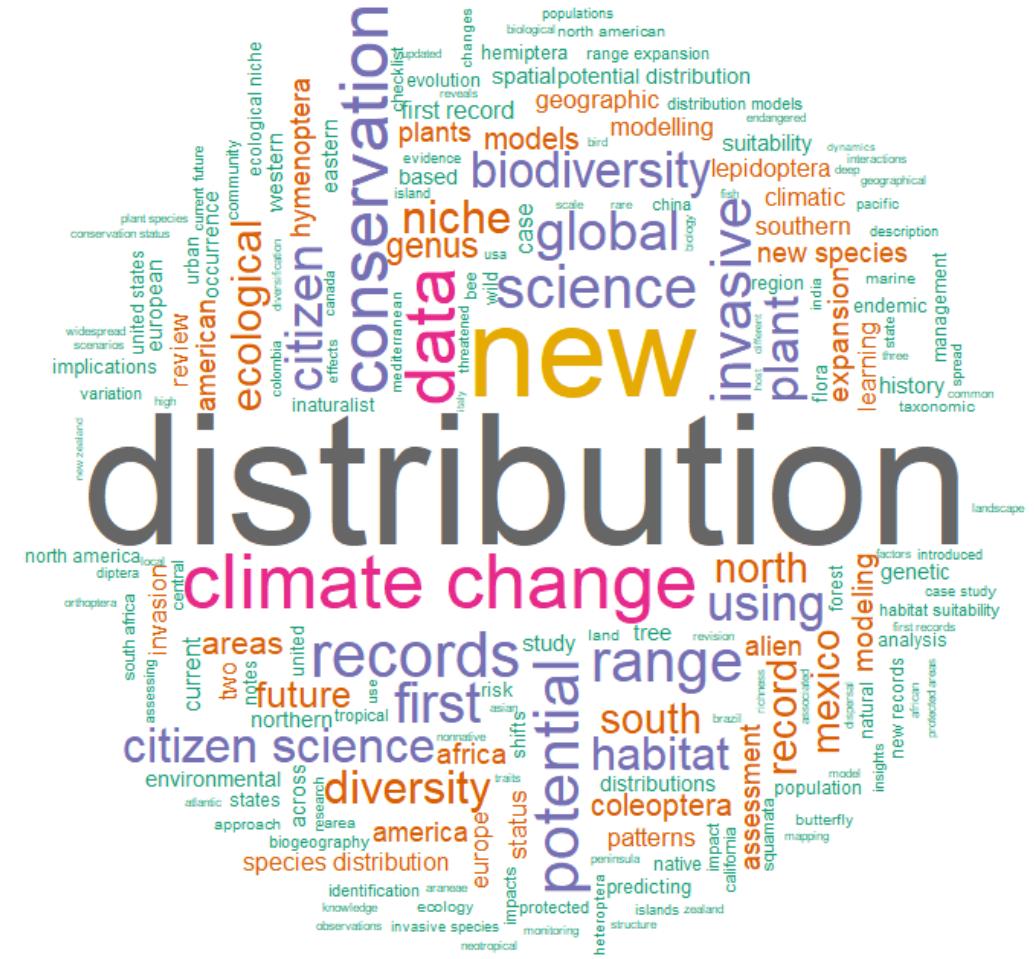
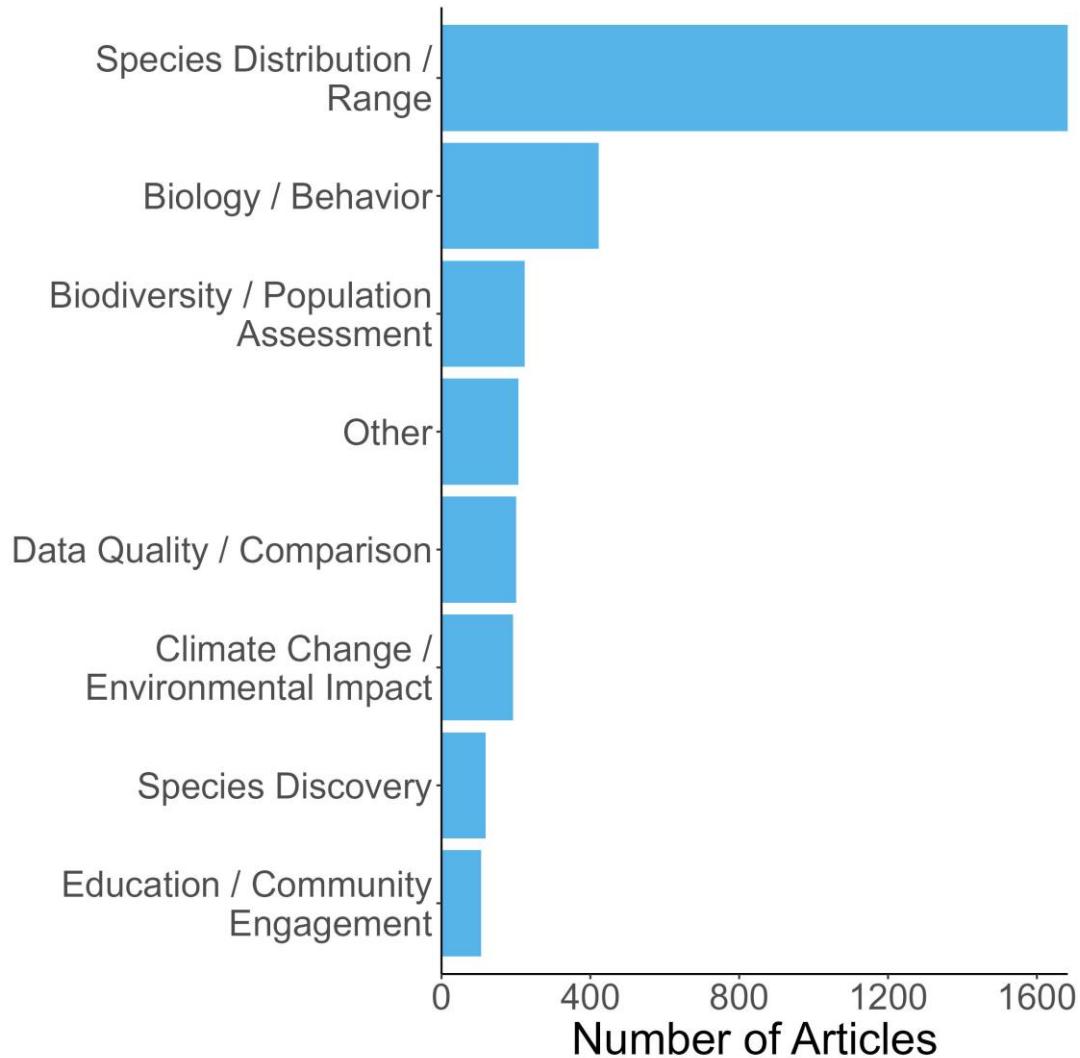
Results: 638 taxonomic families from the iNaturalist literature search



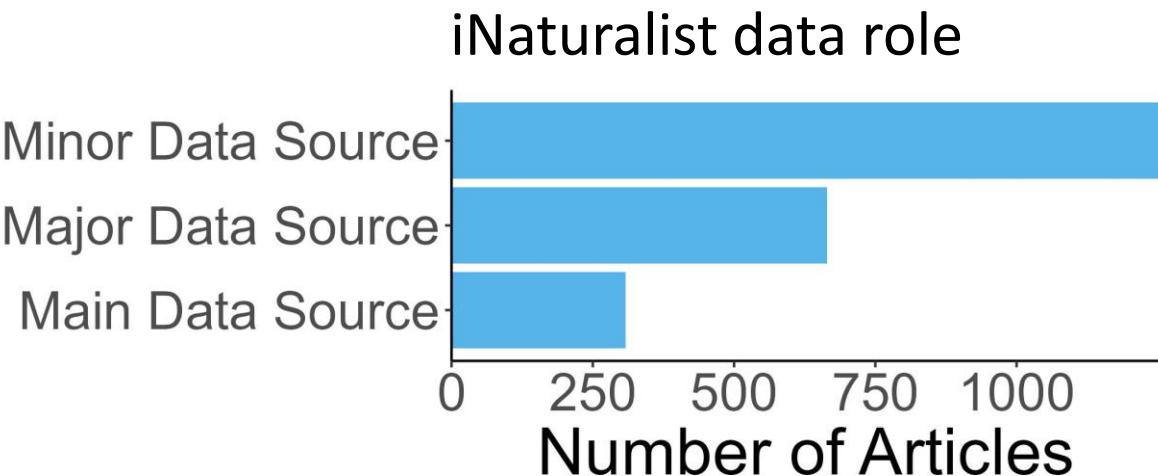
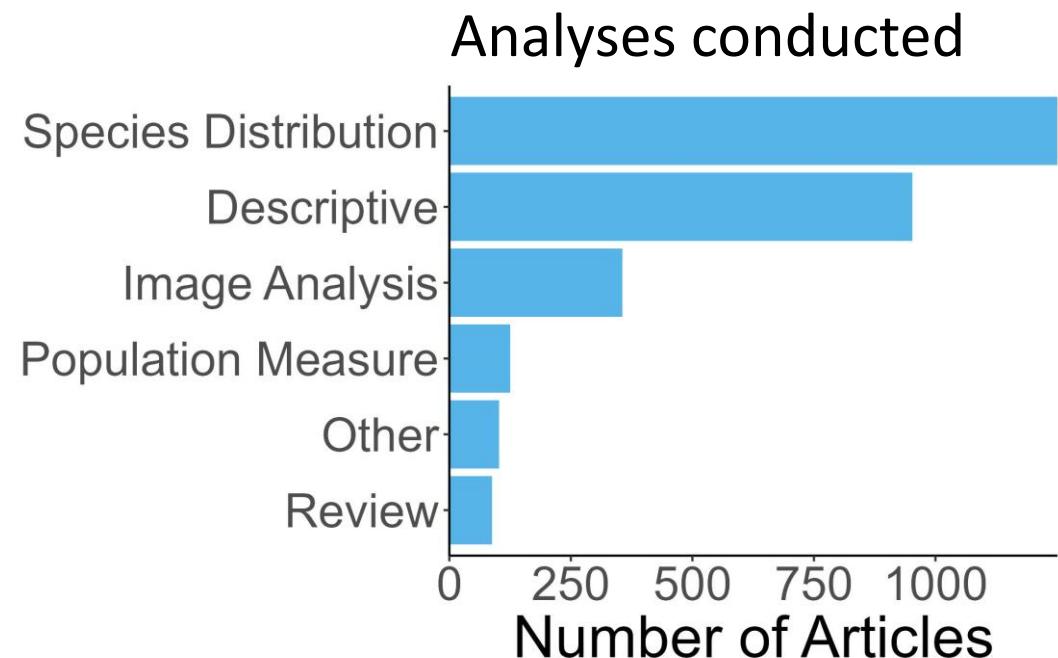
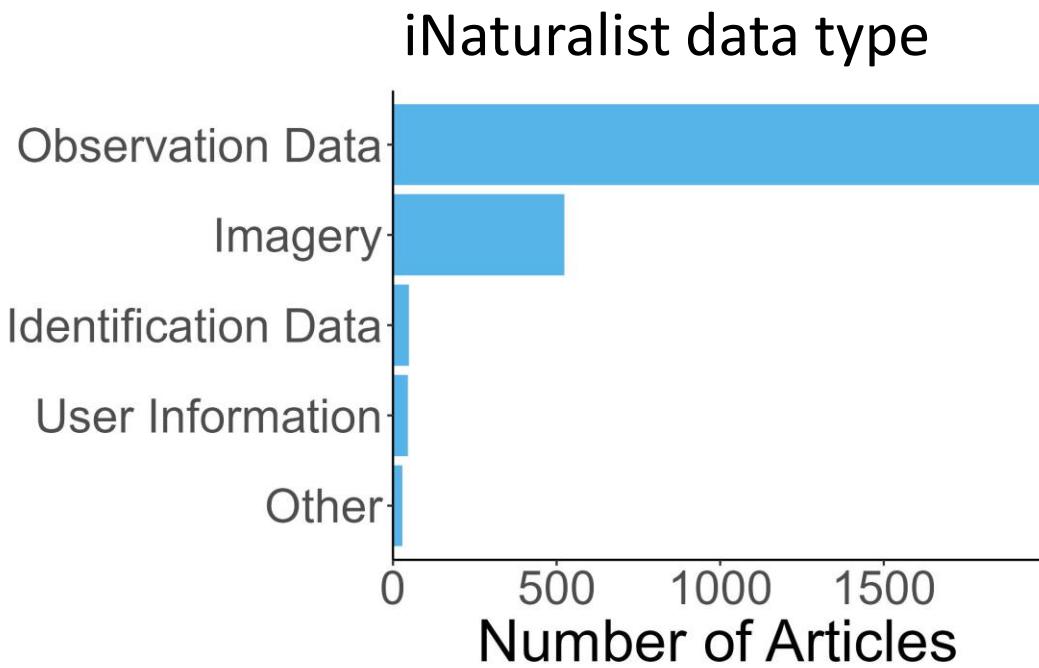


51.5% of
articles were
focused on
three or
fewer species

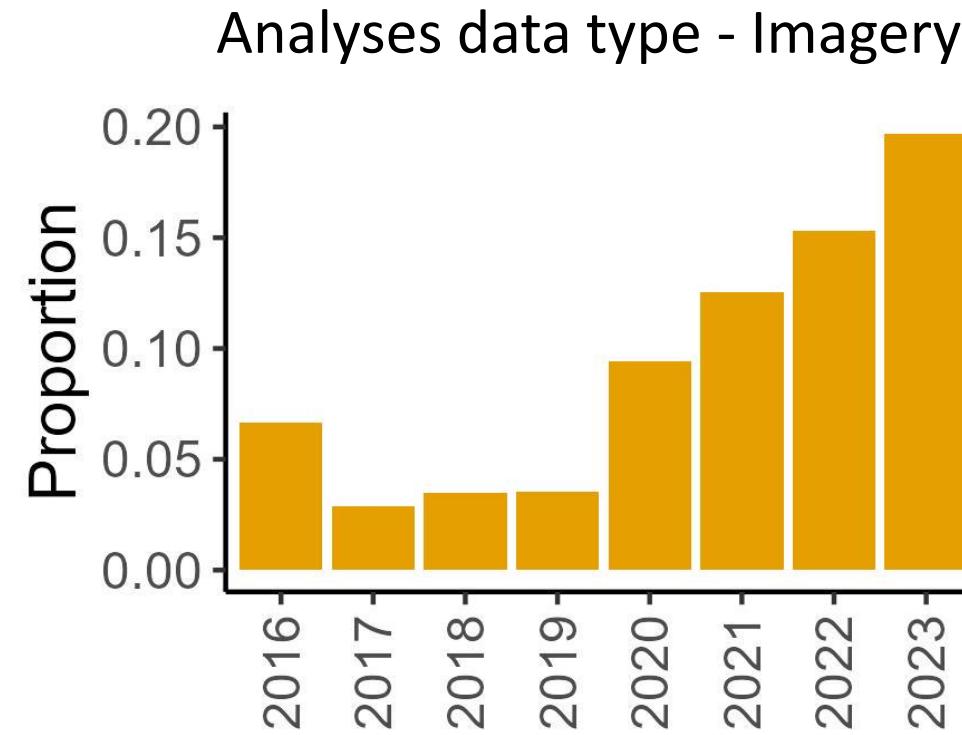
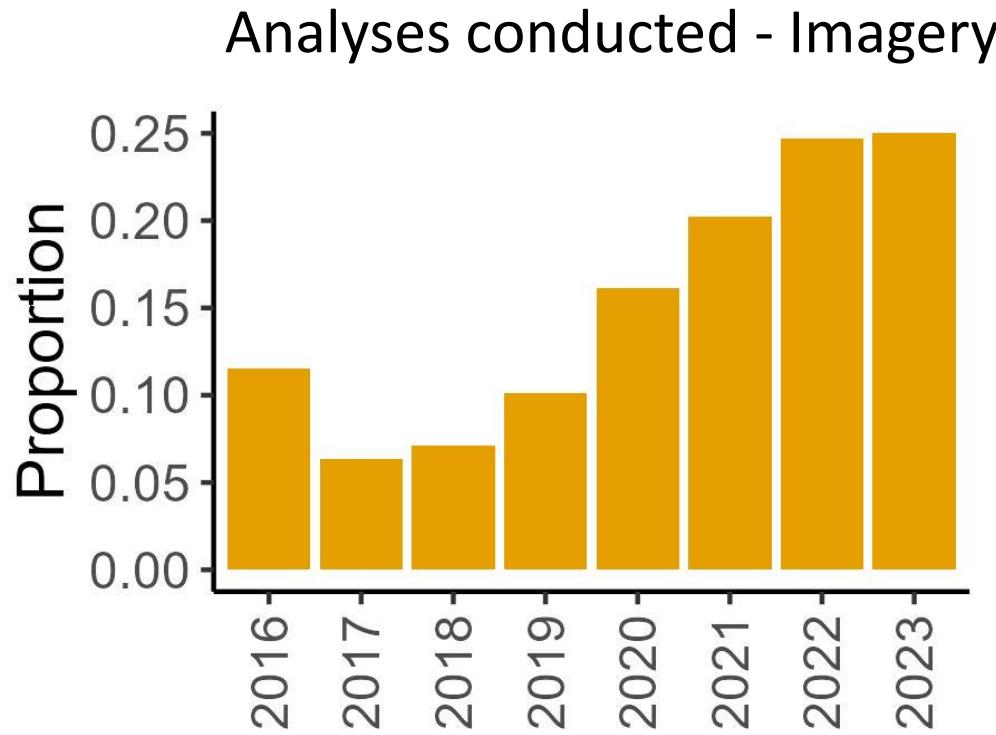
Results: Paper Topics



Results: Analyses conducted, data type, and data role



Results: Imagery trends over time



White-tailed Deer
(*Odocoileus virginianus*)

Research Grade

4d



Eastern Gray Squirrel
(*Sciurus carolinensis*)

Research Grade

May '25



Zebra Swallowtail
(*Eurytides marcellus*)

Research Grade

Feb '25

Discussion: Rapid growth of iNaturalist in the literature



We located over **5,000 publications** that used iNaturalist data



In the last 5 years, we found a **tenfold** increase in the use of iNaturalist in the literature



In 2022, **four articles were published per day** using iNaturalist data



iNaturalist data has been used for research in **128 countries** and **638 taxonomic families**



Discussion: iNaturalist Users Take-Away

iNaturalist mission: “connect people to nature and advance biodiversity science and conservation”

iNaturalist is helping democratize data collection:

- Anyone can contribute to iNaturalist and, in doing so, play a meaningful role in species management and conservation.
- As regional and taxonomic coverage of observations expands, new research opportunities emerge that were previously out of reach.

Discussion: Researcher Take-Away

Research Opportunities: iNaturalist supports a wide range of research applications — with potential growing alongside advances in science and computing.

Targeted Data Collection: Strategic outreach can recruit new users or guide existing ones to collect data tailored to your research needs, and improve regional or taxonomic coverage.

Boosting Data Quality: Contribute identifications to help more observations reach research grade and strengthen the dataset for analysis.





Conclusion: iNaturalist Accelerates Biodiversity Research

iNaturalist:

- Enables exploration of large-scale ecological and conservation questions
- Supports a wide range of topics — from species discovery and conservation to training machine learning models
- Complements professionally collected data to enhance scientific insights
- Strengthens biodiversity research through contributions from nearly 4 million users worldwide



Thank you!



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Full Paper

