

Science in Your Hands: Using iNaturalist to Contribute Biodiversity Data from Your Backyard

Grant Foster (he/him), Zack Radford (he/him)

About us!

Grant Foster

PhD Student, USC biology

@grant226



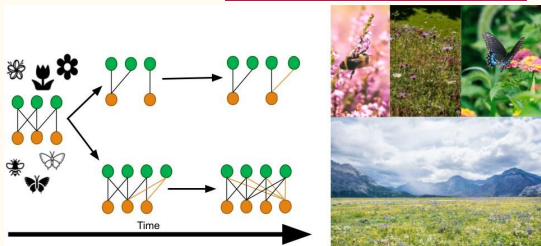
@Riverman12

eBird



Research Interests: Quantitative Ecology; Assembly and Breakdown Dynamics of Species Interaction Networks

Self described **Citizen Science Nut!**



Zack Radford

PhD Student, USC biology

@zackradford



Research Interests: Evolutionary Genetics; Diversity; Adaptation; Pollination Ecology; Evolution of Floral Traits



Citizen Science is Growing

Participation in citizen science is higher now than ever!

1 in 10 Americans have participated in a citizen science project in the last year (Thigpen, and Funk, 2020)

Citizen Science provides an **unique opportunity** to gather data in a **rapidly changing natural environment**, and engage local communities with the natural world



Citizen Science Happening Locally

Richland County

eBird: 37,000+ checklists, 3832 observers

iNaturalist: 83,000+ observations, 4,333 observers

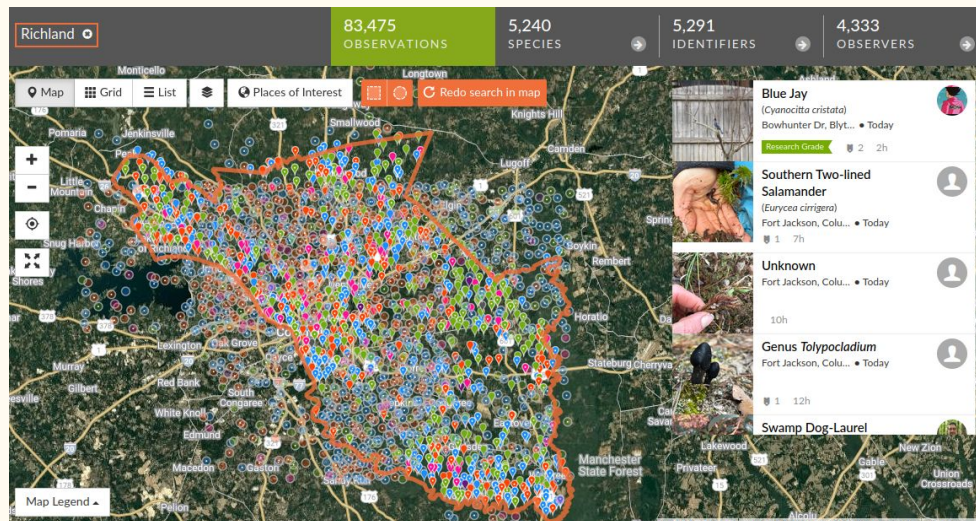
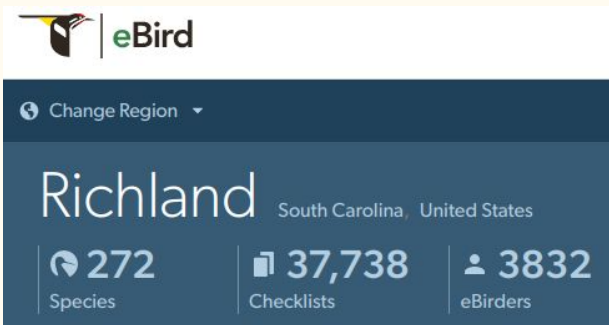
SC Adopt-a-Stream: Dozens of sites across Richland



South Carolina

Litter Journal: 12,800+ observations; 3.25 million pieces of litter collected

Nature's Notebook: 1,105 observations





At its core, iNat is

1. An organism occurrence recording tool
2. A crowdsourced species identification system
3. An online social network of people sharing biodiversity information to help each other learn about nature

Started as the Master's final project of Ken-ichi Ueda, Nate Agrin, and Jessica Kline at UC Berkeley in 2008.

Now a formal 501(c)(3) Organization, the site hosts over 225 million biodiversity records!

Submitting an observation: iNaturalist Website

Opportunistic/Incidental observations

An “observation” includes...

Who you are

You'll need to make an **iNaturalist account** and please only post your own personal observations



Where you saw it

Record both the coordinates of the encounter as well as their accuracy. You can obscure the location from the public



What you saw

Choose a group of organisms like **butterflies** or better yet a specific organism like the **Monarch butterfly**. If you provide evidence you can leave this blank and the **community can help**



When you saw it

Record the date of your encounter, not the date you post it to iNaturalist



Evidence of what you saw

By including evidence like a **photo or sound**, the community can help add, improve, or confirm the identification of the organism you encountered. Help the community by taking clear well framed photos, by including multiple photos from different angles



Submitting an observation: iNaturalist Green Upload Button

The screenshot displays the iNaturalist website interface. At the top, the navigation bar includes the iNaturalist logo, a search icon, and links for Explore, Your Observations, Community, Identify, and More. A green 'Upload' button with a circular arrow icon is highlighted with a red box. Below the navigation bar, the user's profile for 'zack_radford' is shown, featuring a profile picture and a navigation menu with links for Home, Profile, Observations, Edit Observations, Calendar, IDs, Lists, Journal, Favorites, and Projects. A '+ Add Observations' button is also visible. A red line connects the 'Upload' button to this '+ Add Observations' button. Below the profile section, a modal window for adding observations is shown, featuring the iNaturalist logo, a toolbar with '+ Add', 'Remove', 'Combine', 'Duplicate', and 'Select All' options, and a large text area that says 'Drag & drop some photos or sounds' or 'Choose files'. A 'More Import Options' button is at the bottom of the modal.

iNaturalist

Explore Your Observations Community Identify More

Upload

0 0

zack_radford

Home Profile Observations Edit Observations Calendar IDs Lists Journal Favorites Projects

All Updates Your Content Following Real Time Discussions

+ Add Observations

iNaturalist

+ Add Remove Combine Duplicate Select All

Drag & drop some photos or sounds

or

Choose files

More Import Options

Submitting an observation: iNaturalist

iNaturalist

+ Add - Remove Combine Duplicate Select All

Editing 1 observation:

Details

Q Species name

2024/11/02 1:50 PM

Georgetown County, SC, U

Notes

Location is public

☐ Captive / Cultivated

Tags

Projects

Fields

Offset Time

Q Species name

2024/11/02 1:50 PM

Georgetown County, SC, USA

Notes

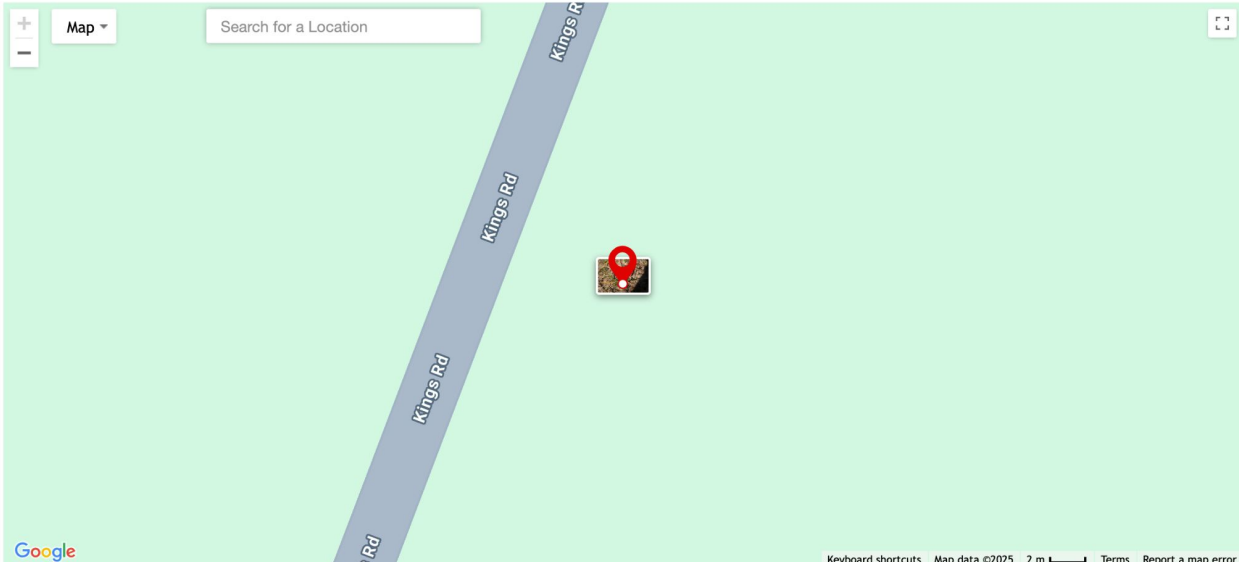


Submitting an observation: iNaturalist

Georgetown County, SC, USA

Map

Search for a Location



Map showing Kings Rd and a red location pin. The map is a Google Map of Georgetown County, SC, USA. A red location pin is placed on the map, and a small thumbnail image of a plant is visible next to the pin. The map shows a road labeled 'Kings Rd' running diagonally across the frame. The background is a light green color.

Latitude

33.353740555

Longitude

-79.22037361166667

Acc (m)

Geoprivacy

Open

Locality notes

Georgetown County, SC, USA

Pin

Cancel

Update Observations

Submitting an observation: iNaturalist

iNaturalist

+ Add ✕ Remove ✎ Combine Duplicate Select All

Editing 1 observation:

Details

Species name

2024/11/02 1:50 PM

Georgetown County, SC, U

Notes

Location is public


☐ Captive / Cultivated

Tags

Projects




Fields

Offset Time



Species name

We're not confident enough to make a recommendation, but here are our top suggestions:

	<i>Callisia graminea</i> Grassleaf Roseling Visually Similar / Expected Nearby	View
	<i>Agalinis purpurea</i> Purple False Foxglove Visually Similar / Expected Nearby	View
	<i>Agalinis fasciculata</i> Beach False Foxglove Visually Similar / Expected Nearby	View

[Include suggestions not expected nearby](#)

iNat has implemented computer-vision based ID suggestions since 2017!

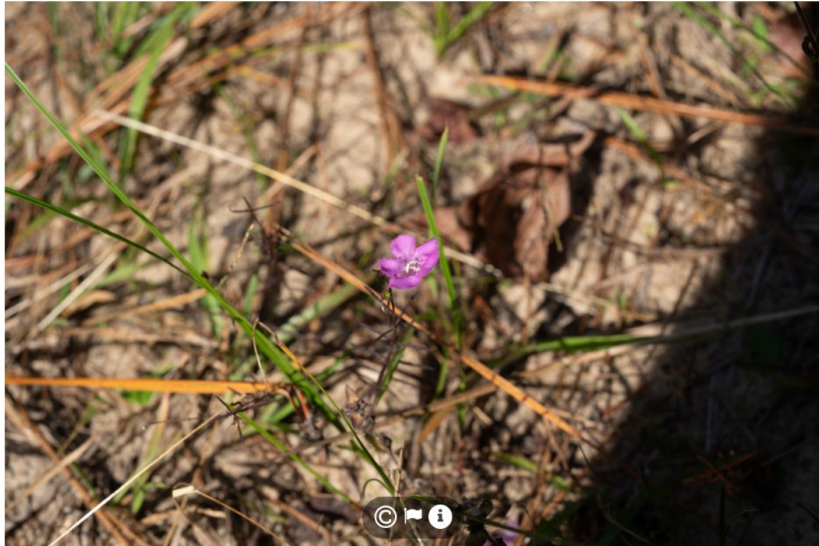


Submitting an observation: iNaturalist

Agalinis purpurea (Purple False Foxglove)

Needs ID

Edit



zack_radford

261 observations

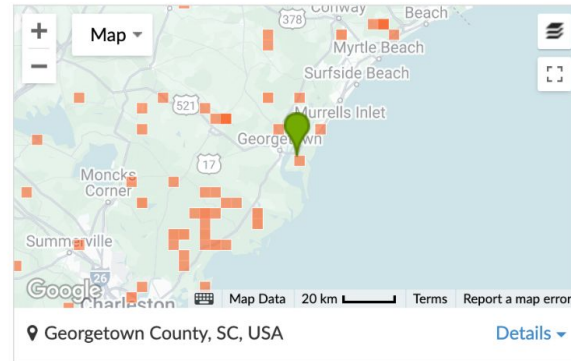


Observed:

Nov 2, 2024 · 1:50 PM EDT

Submitted:

Nov 3, 2024 · 6:03 PM EST



Be the first to fave this observation!

Simpler Observation Upload: Smartphone Application

Most smartphones have GPS data embedded in images

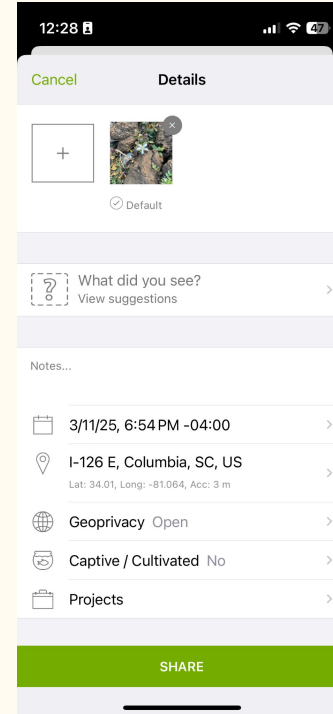
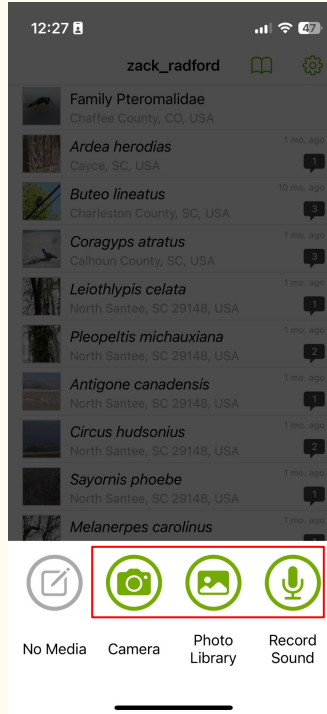
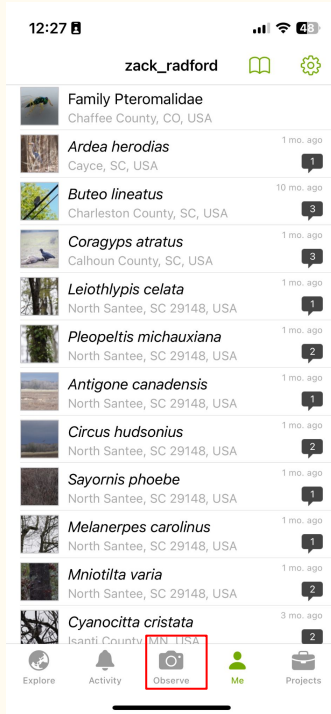
No need to upload pictures to computer

Date/Time info is usually correct

Can be harder to get “great” photos



Simpler Observation Upload: Smartphone Application




iNaturalist Community Identification

Community Driven!


Individuals are encouraged to ID other users observations to the lowest taxonomic level supported

Brown-headed Cowbird (*Molothrus ater*) Research Grade Edit



grant226
200 observations

Observed: Apr 28, 2024 - 4:45 PM EDT
Submitted: Apr 29, 2024 - 1:38 PM EDT




Richland County, SC, USA Details


Be the first to love this observation!

Activity

grant226 suggested an ID Improving 14d


 **Brown-headed Cowbird**
Molothrus ater Compare

concaenator07 suggested an ID 14d

 **Brown-headed Cowbird**
Molothrus ater

Community Taxon What's this?

Brown-headed Cowbird (*Molothrus ater*)
Cumulative IDs: 2 of 2



Agree Compare About

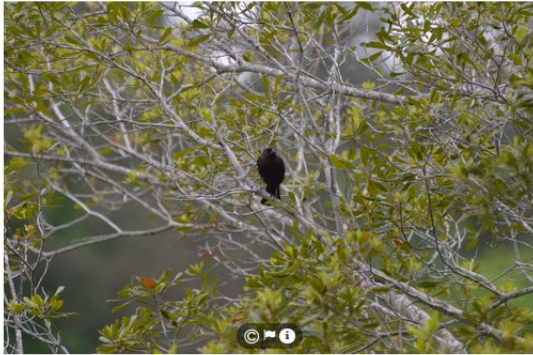
Annotations (2)

iNaturalist Community Identification

Brown-headed Cowbird (*Molothrus ater*)

Research Grade

Edit



grant226
200 observations

Observed:
Apr 28, 2024 · 4:45 PM EDT

Submitted:
Apr 29, 2024 · 1:38 PM EDT



Be the first to save this observation!

Activity



grant226 suggested an ID

Improving

14d



Brown-headed Cowbird

Molothrus ater

Compare



concavenator07 suggested an ID

14d



Brown-headed Cowbird

Molothrus ater

Community Taxon

What's this?

Brown-headed Cowbird (*Molothrus ater*)

Cumulative IDs: 2 of 2



Agree

Compare

About

Annotations (2)

“Verifiable”

- Has a date
- Is Georeferenced
- Has Photo or Sound
- Is of a non-captive/cultivated organism

“Research-Grade”

- Verifiable
- Community taxon is at species level or lower, and has at least 2 IDs

iNaturalist Community Identification

Downy Woodpecker (*Dryobates pubescens*)

Research Grade

Follow



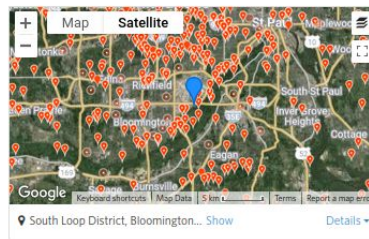
jonathan_sellman

2,701 observations



Observed:
May 12, 2024 · 10:18 AM CDT

Submitted:
May 13, 2024 · 1:07 AM EDT



☆ Be the first to favorite this observation!

Activity



jonathan_sellman suggested an ID

Improving

15h



Downy Woodpecker

Dryobates pubescens

Compare



grant226 suggested an ID

1s



Downy Woodpecker

Dryobates pubescens

Community Taxon

What's this?

Downy Woodpecker (*Dryobates pubescens*)

Cumulative IDs: 2 of 2

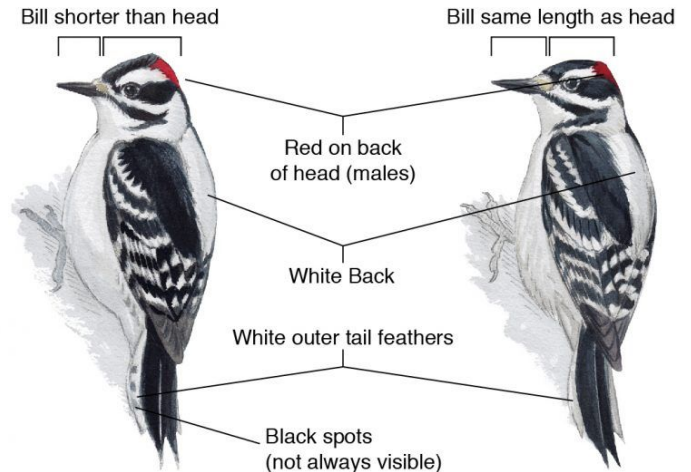


Agree

Compare

About

Annotations



Downy Woodpecker

Hairy Woodpecker

Dryobates pubescens

Dryobates villosus

iNaturalist Community Identification

Dryobates Woodpeckers (Genus *Dryobates*) Needs ID Follow

942 observations

Observed: May 10, 2024 - 3:47 PM EDT Submitted: May 10, 2024 - 3:59 PM EDT

Map Satellite

Mitchell Ct, Bluffton, SC, US

Be the first to save this observation!

Community Taxon

Dryobates Woodpeckers (Genus *Dryobates*)

Cumulative IDs: 2 of 2

0 2/3ds 2

Agree Compare About

Annotations

Attribute	Value	Agree	Disagree
Alive or Dead	Select +		
Evidence of Presence	Select +		
Life Stage	Select +		
Sex	Select +		

Projects (2)

Observation Fields

Notes

It's been awhile since I've seen a hairy woodpecker, but this female's beak seemed quite large for downy. There were also no spots on the white tail feathers and there was a black diving line down the back of the head where the red spot would be on males.

Activity

apalmieri suggested an ID

Leading 3d

Hairy Woodpecker
Dryobates villosus

Compare Agree

pieceofmind suggested an ID

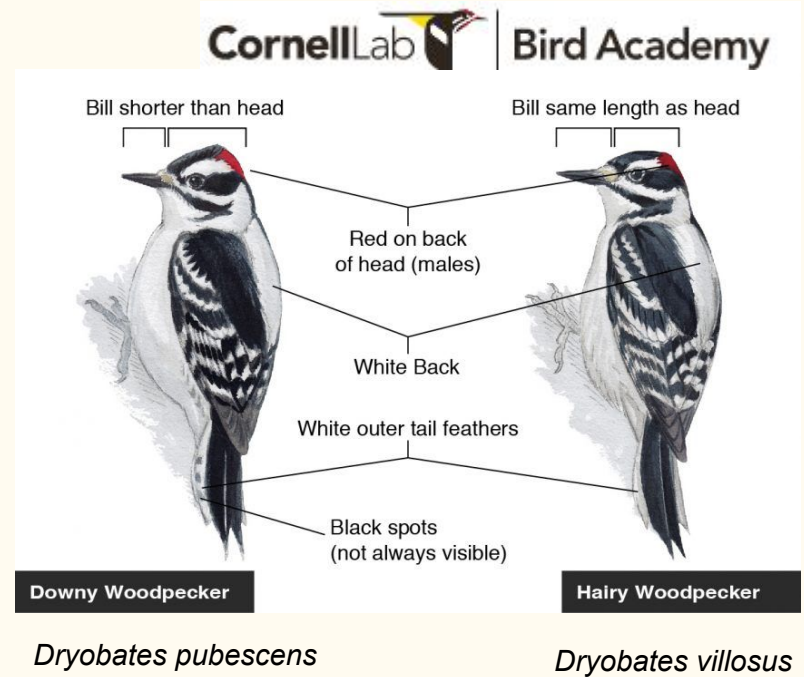
Leading 3d

Downy Woodpecker
Dryobates pubescens

Compare Agree

On feeders, usually the easiest way to distinguish downy/hairy is body size. What's the diameter of each ball/disk?

Overall, this one looks more Downy to me. The tail barring is on the outer (bottom) feathers, which are often not visible from side or top views when the tail is folded in. The red spot split by a black line is only reliable for males. In my experience, female downies are less likely to have a thick black line down the back, but there's lots of variation in both species (from none to thick). As for the beak, note that the fluffy tuft at the base is largely missing, which will make the beak look larger. There's also a fair amount of individual variation in beak size. Last, there's no black shoulder spur, which are common in hairies.



iNaturalist Community Identification

Downy Woodpecker (*Dryobates pubescens*)

Needs ID

Follow



thewoodturner
161 observations



Observed:
Apr 12, 2024 - 4:30 PM EDT

Submitted:
Apr 12, 2024 - 4:42 PM EDT



Be the first to save this observation!

Activity



thewoodturner suggested an ID

Leading



1mo



Downy Woodpecker
Dryobates pubescens

Compare

Agree



grant226 suggested an ID

Improving



1mo



Dryobates Woodpeckers
Genus *Dryobates*

Compare

Community Taxon

What's this?

Dryobates Woodpeckers (Genus *Dryobates*)

Cumulative IDs: 2 of 2



Agree

Compare

About

Annotations



Bill shorter than head

Bill same length as head

Red on back
of head (males)

White Back

White outer tail feathers

Black spots
(not always visible)

Downy Woodpecker

Hairy Woodpecker

Dryobates pubescens

Dryobates villosus

iNaturalist Community Identification

Activity



choess suggested an ID

Improving 6y ▾



Class Bryopsida
True Mosses

Compare

Agree

I'm pretty sure this is a regular moss-no strobili, etc.



allenratzlaff suggested an ID

6y ▾



Class Bryopsida
True Mosses



eraskin suggested an ID

4y ▾



Class Bryopsida
True Mosses



annkatrinrose suggested an ID

Maverick 7mo ▾



Genus *Polytrichum*
Haircap Mosses

Compare

Probably - I've seen a lot of it up at Craggy Gardens.

Community Taxon

What's this?

Class Bryopsida (True Mosses)

Cumulative IDs: 3 of 4



Agree

Compare

About

Annotations

Attribute	Value	Agree	Disagree
Sex	Select ▾		

Projects

Add to a Project

Observation Fields

Choose a field

Top Identifiers of Bryopsida

How well does this validation model work?

Data Quality Assurance is Community-driven

iNat conducts regular Quality Control Studies

Observation Accuracy Experiment (0.4)

May 13, 2024

Abstract: We generated a sample of observations on May 7, 2024 and coordinated a team of validators to assess their accuracy by May 13, 2024. All results shown below show characteristics of the sample observations at the time the sample was generated (for example Research Grade or not). The accuracy of the sample observations was assessed on May 13, 2024. See the methods tab for more details.

Research Grade Results

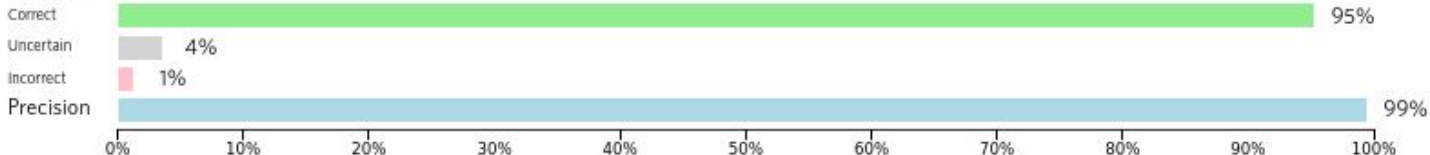
Verifiable Results

All Results

Methods

As observations from this sample are validated, the uncertain percentage will decrease and the percentage correct and incorrect will increase.

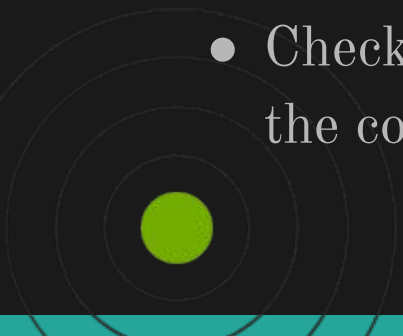
Accuracy





iNat Needs Identifiers like you!

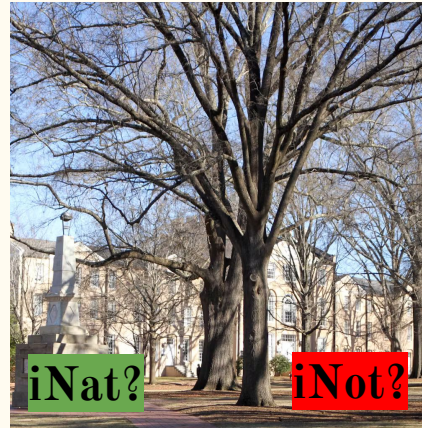
Tips:

- Start with broad, correct labels you are confident about (i.e. plants, birds, fungi)
 - Learn from the more specific identifications that follow (ask questions!)
 - Don't agree with other identifications without investigation
 - Check out resources recommended (and created!) by people in the community
- 

iNat vs iNot

Emphasizes **Wild** Organisms

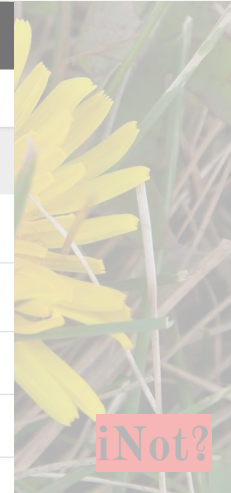
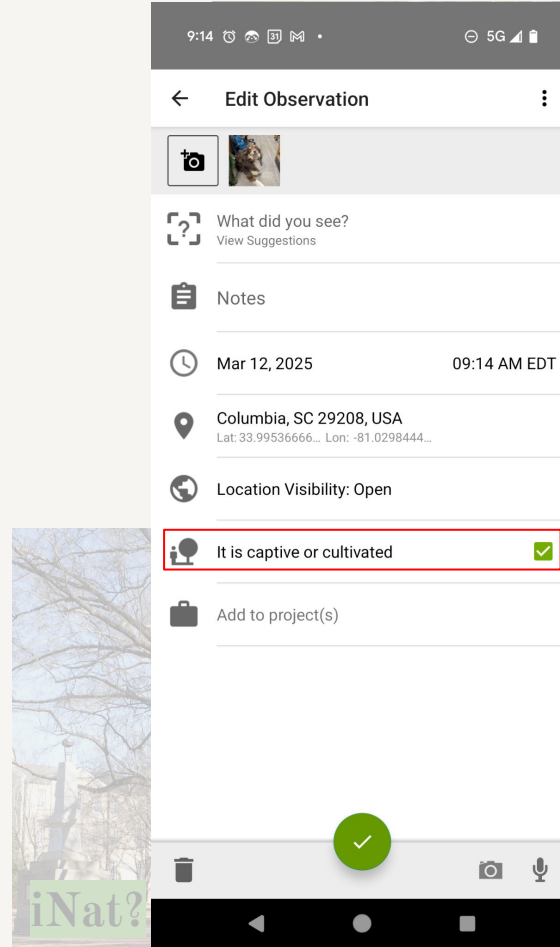
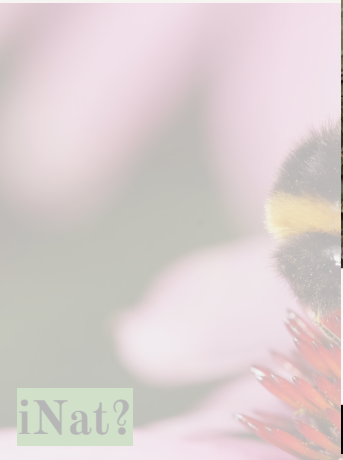
Organisms that aren't **put there** or **taken care of** by humans.



iNat vs iN

Emphasizes Wi

Organisms that
taken care of by



How is iNat data used?



GBIF | Global Biodiversity Information Facility

Free and open access to
biodiversity data

OCCURRENCES

SPECIES

DATASETS

PUBLISHERS

RESOURCES

Search



What is GBIF?

About GBIF United States of America

Crossostylis sebertii Brongn. & Gris collected by J. Munzinger near La Coulee, New Caledonia. Photo via Herbar Institut.



2,935,996,819

Occurrence records



104,853

Datasets



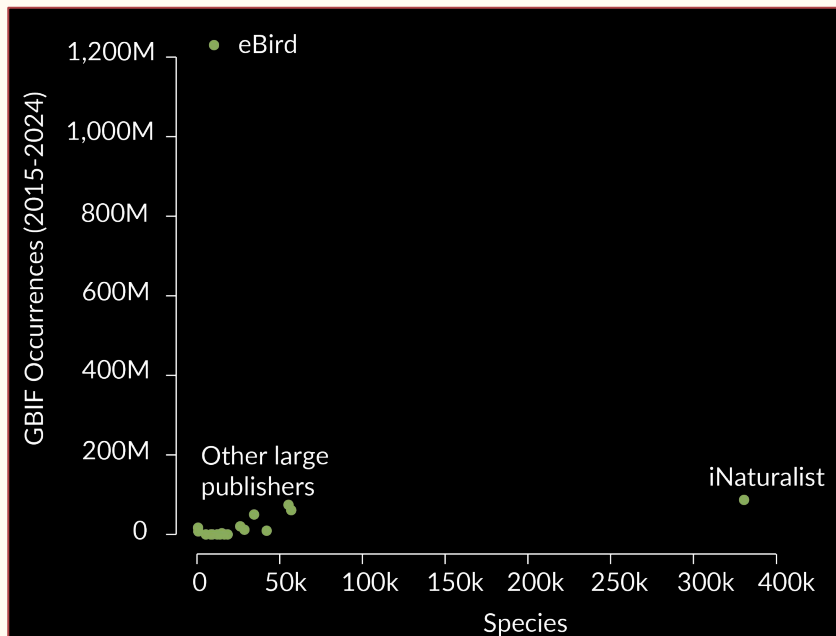
2,220

Publishing institutions

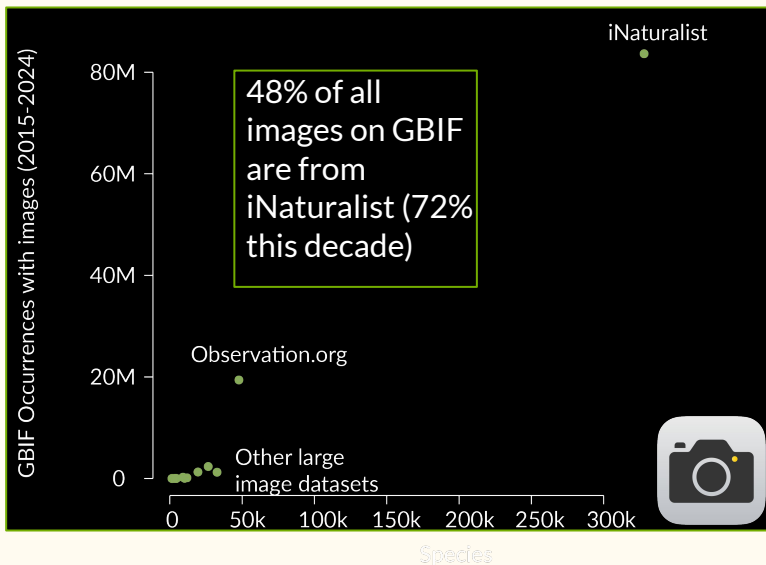


10,522

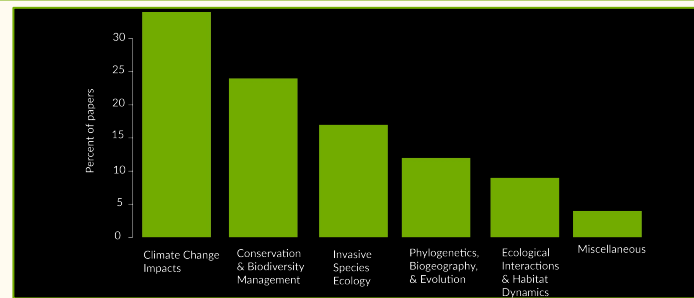
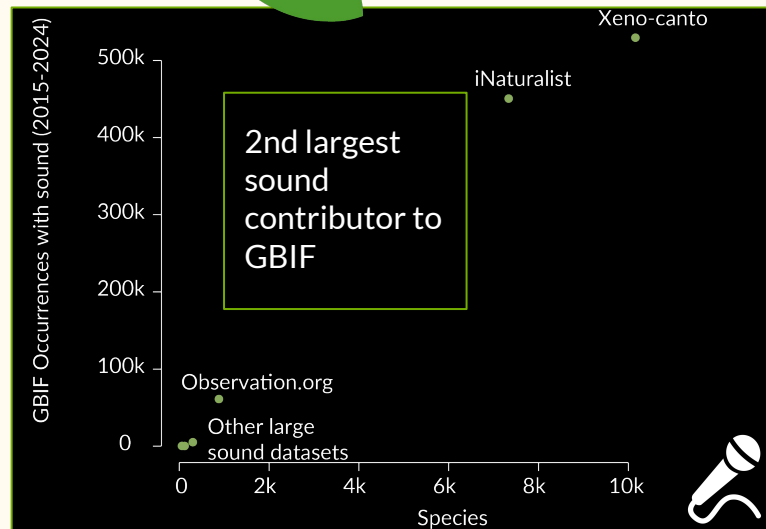
Peer-reviewed papers
using data



How is iNat data used?



5,000 citations, more than any other GBIF publisher



What types of scientific questions is iNat particularly good at answering?

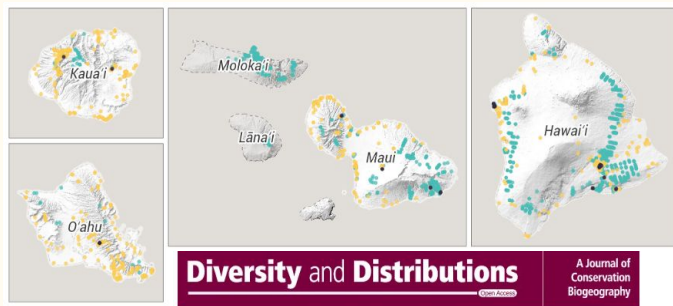


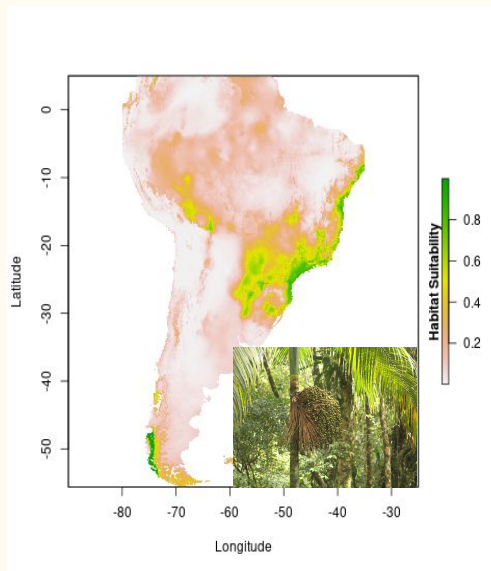
FIGURE 1 Distribution of iNat *leucocephala* and *Psidium cattleianu* Hawaii scale 1:2900000.

RESEARCH ARTICLE | [Open Access](#) | [CC BY](#)

Citizen science can complement professional invasive plant surveys and improve estimates of suitable habitat

Monica Dimson [✉](#) Lucas Berio Fortini, Morgan W. Tingley, Thomas W. Gillespie

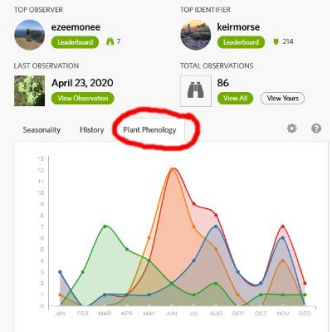
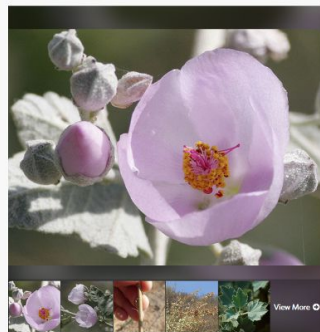
Monitoring
invasive
species
spread...



Modeling
Species'
Ranges...

...Things we
might not
expect!

Malacothamnus fasciculatus var. *nuttallii* (Nuttall's Bush-Mallow) [Flags \(0\)](#) [Filter by Place](#)

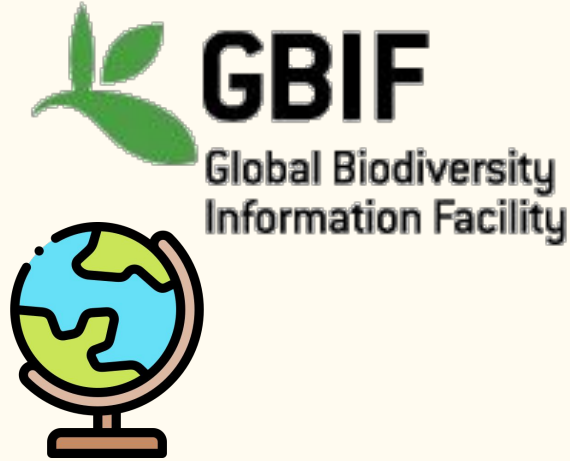


Monitoring
species
life-history
timing
(phenology)...



Cool things being observed...

Globally....



@slambert40

Recording rare winter resident birds, like these painted buntings! (January 24', December 24')



@grant226

And Locally!



@jcoogler

Potentially undescribed species recorded at Sesqui State Park! (01/03/2025)



@hflamholtz

Recording novel plant-pollinator associations (May 21')

Observation Fields & Projects



Stats

Totals

79755

Observations »

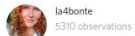
5644

Species »

5143

People »

Most Observations



la4bonte
5310 observations



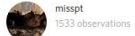
xris
4870 observations



berzou
3339 observations



laurasea
1664 observations



misspt
1533 observations

Most Species



paul127
989 species



berzou
436 species



alilandbrice
248 species



xris
228 species



laurasea
226 species

Most Observed Species



Western Honey Bee
2441 observations



Common Eastern Bumble Bee
2387 observations



Monarch
1450 observations





















Eastern Carpenter Bee
999 observations



Gulf Fritillary
997 observations

Annotations (4)

Attribute	Value	Agree	Disagree
Alive or Dead	 Alive 		
Evidence of Presence	 Organism 		
Evidence of Presence	Select 		
Life Stage	 Adult 		
Sex	 Male 		

**2024 USC Gills Creek BioBlitz**
APR 13, 2024

About Members 5

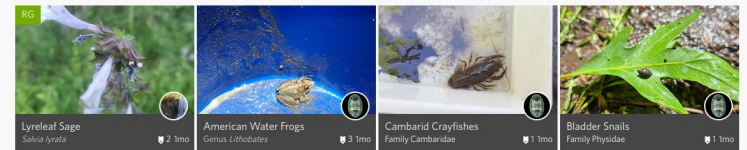
This project is to keep track of the USC Graduate Association for Biology Student's Bioblitz of the Gills Creek Watershed! We're looking to record observations from as many taxa as possible, so if it's alive feel free to add a record! Mushrooms? Daisies? Salamanders? Moths? All are great additions-just get outside in the watershed and [Read More](#)

[Your Membership](#)
[Edit Project](#) [Project Journal](#)

Overview **89** OBSERVATIONS **60** SPECIES **25** IDENTIFIERS **5** OBSERVERS [Stats](#)

Recent Observations

[View All](#)





Open Licensing

Why it matters:

- Licenses tell how you want your data used (or not)
- The Global Biodiversity Information Facility only accepts data with specific open licenses
- More open data = more accessible for science

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Citizen Science as a tool for engagement/empowerment

Increase Public Engagement

Empower local communities

Support Conservation





Started in 2016 for the first-ever
Citizen Science day.

In 2024, 691 cities
in 51 Countries
On track for **~730**
cities this year!

CITY NATURE CHALLENGE IS ORGANIZED BY

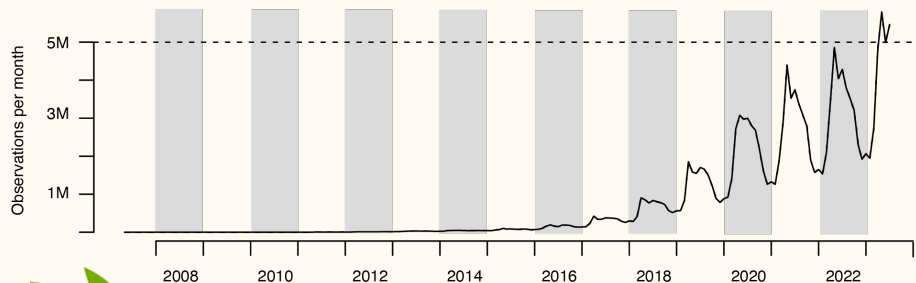


CALIFORNIA
ACADEMY OF
SCIENCES

NATURAL
HISTORY
MUSEUM
LOS ANGELES COUNTY



L.A. vs S.F.



Participating Cities



Where to Participate

COLUMBIA CITY NATURE CHALLENGE EVENTS LIST 2025 (FRI+SAT)

PEACHTREE ROCK
HERITAGE PRESERVE
WALK
10 AM - 12PM

APR
25



APR
25

USC ARBORETUM
BOTANY WALK
5:30 PM

CITIZEN SCIENCE
ADVENTURE AT SESQUI
STATE PARK!

9-11 AM

APR
26



APR
26

FORK SWAMP BOTANY
WALK WITH FRIENDS OF
CONGAREE
9:30 AM

FAMILY NATURE WALK:
CAMP DISCOVERY

10 AM

APR
26



COLUMBIA CITY NATURE CHALLENGE EVENTS LIST 2025 (SUN+MON)

SALUDA RIVERWALK
NATURE WALK
10 AM (Downstream)
11:30 AM (Upstream)

APR
27



APR
28

SALUDA SHOALS WILD
WETLANDS WALK
2-3PM

GILLS CREEK
WATERSHED WALK:
TIMBERLAN DRIVE

5:30 PM

APR
28



...WITH MORE EVENTS TO COME!

USC HERBARIUM WALK

USC ARBORETUM MOTH LIGHTING

AND MORE!



CityNature
Challenge

Columbia, SC

For the most up to date schedule, go
to www.colanaturechallenge.org

Become an iNat ambassador

Attend **one** of the iNat ambassador training sessions (Pizza provided!)



- **Opt 1:** April 15th, 12-1:30pm, Coker 403
- **Opt 2:** April 17th, 5-6:30pm, Coker 403
- **Commit to attending at least one partner event as an iNat Ambassador**
- **Make a few iNat observations while attending the event!**



CITY NATURE CHALLENGE IS ORGANIZED BY



CALIFORNIA
ACADEMY OF
SCIENCES

NATURAL
HISTORY
MUSEUM
LOS ANGELES COUNTY

Check out www.colanaturechallenge.org for more!

Follow us on IG! @colanaturechallenge



Continue the Action!

Participate in the 1st Annual Columbia City Nature Challenge!

- April **25th-28th, 2025**
- Global competition to catalogue biodiversity in our urban areas; 680 cities participated in 2024
- Make observations, attend events!
- Become an iNaturalist Ambassador

Check out www.colanaturechallenge.org for more!

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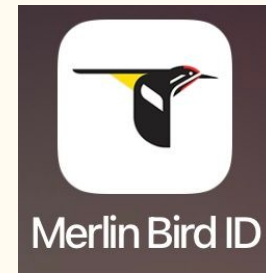
2024 Totals

2,436,844
Observations

65,682+
Species

83,528
Participants





Let's make some observations!



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Citations

Select slides and figures adapted from iNaturalist Webinar: “How your iNaturalist Data Makes a Difference for Biodiversity” (08/2024)

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