

Wildlife Insights: How Camera Trap Data Can Foster Global Biodiversity Conservation

Fabiola Iannarilli¹, Ruth Oliver¹, Tanya Birch², Sara Beery³, Eric Fegraus⁴, Nicole Flores⁴, Roland Kays⁵, Jorge A. Ahumada⁴ and Walter Jetz¹

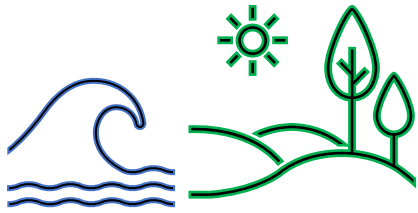
¹ Yale University, Ecology and Evolutionary Biology, New Haven, CT; ² Google, Mountain View, CA; ³ California Institute of Technology, Pasadena, CA; ⁴ Conservation International, Arlington, VA; ⁵ North Carolina Museum of Natural Sciences, Raleigh, NC

 fabiola.iannarilli@yale.edu

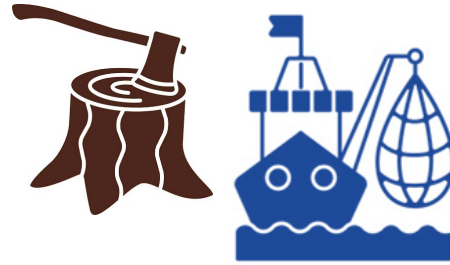
 [@Fabi_Iannarilli](https://twitter.com/Fabi_Iannarilli)



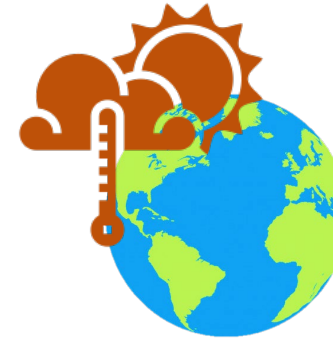
Threats to biodiversity



**Changes to land
and sea use**



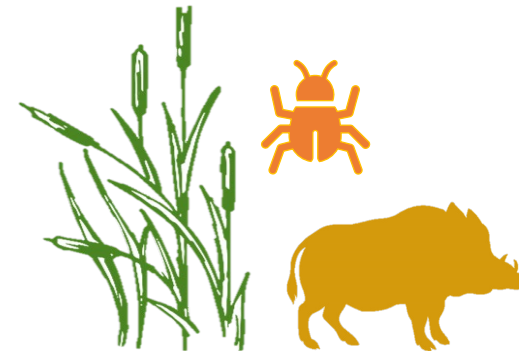
**Direct exploitation
of organisms**



Climate change

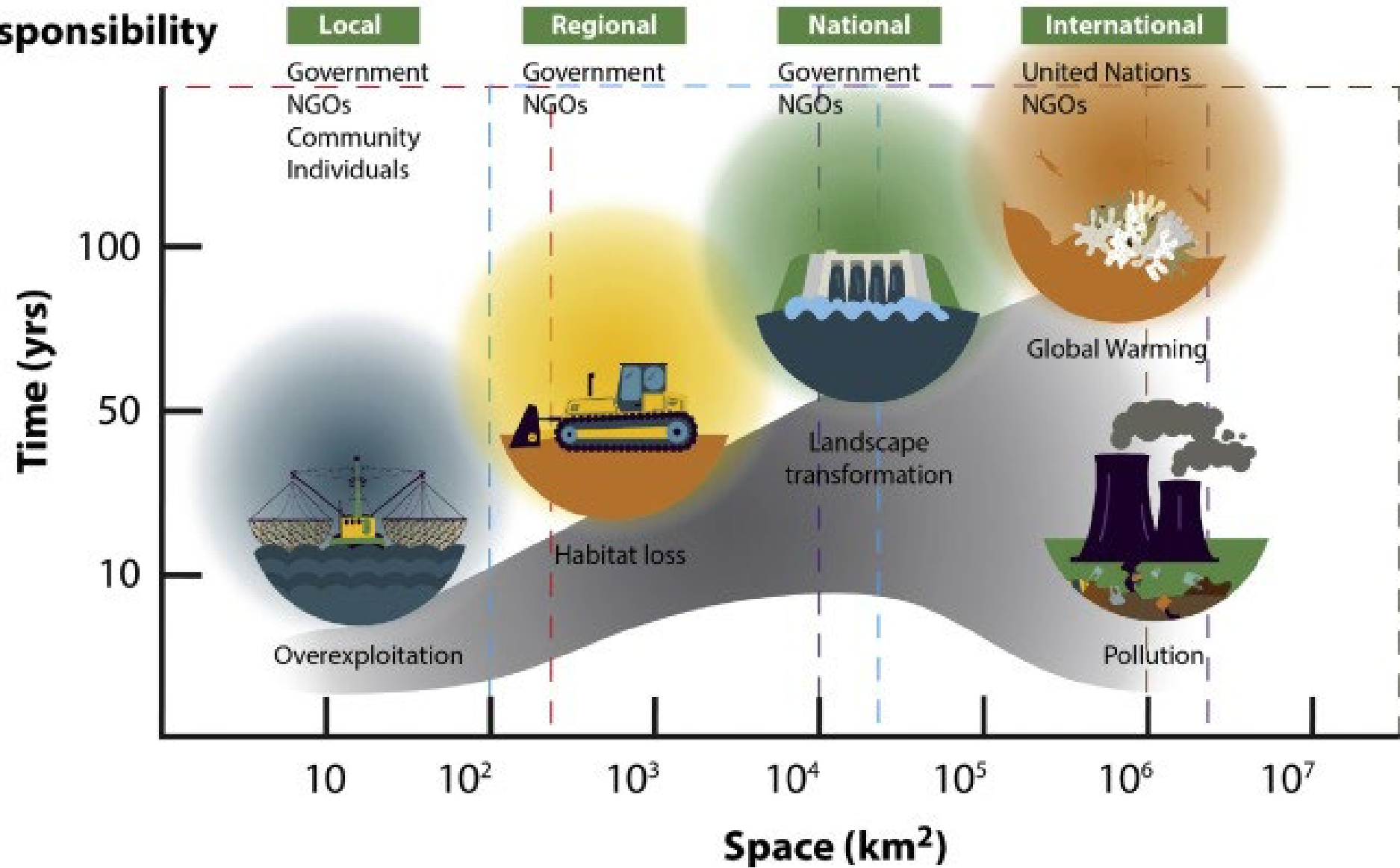


Pollution



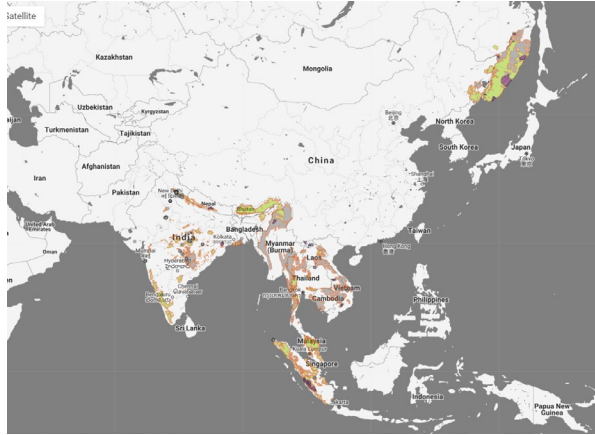
**Invasive alien
species**

Responsibility





from Interdisciplinary Center for Conservation Science

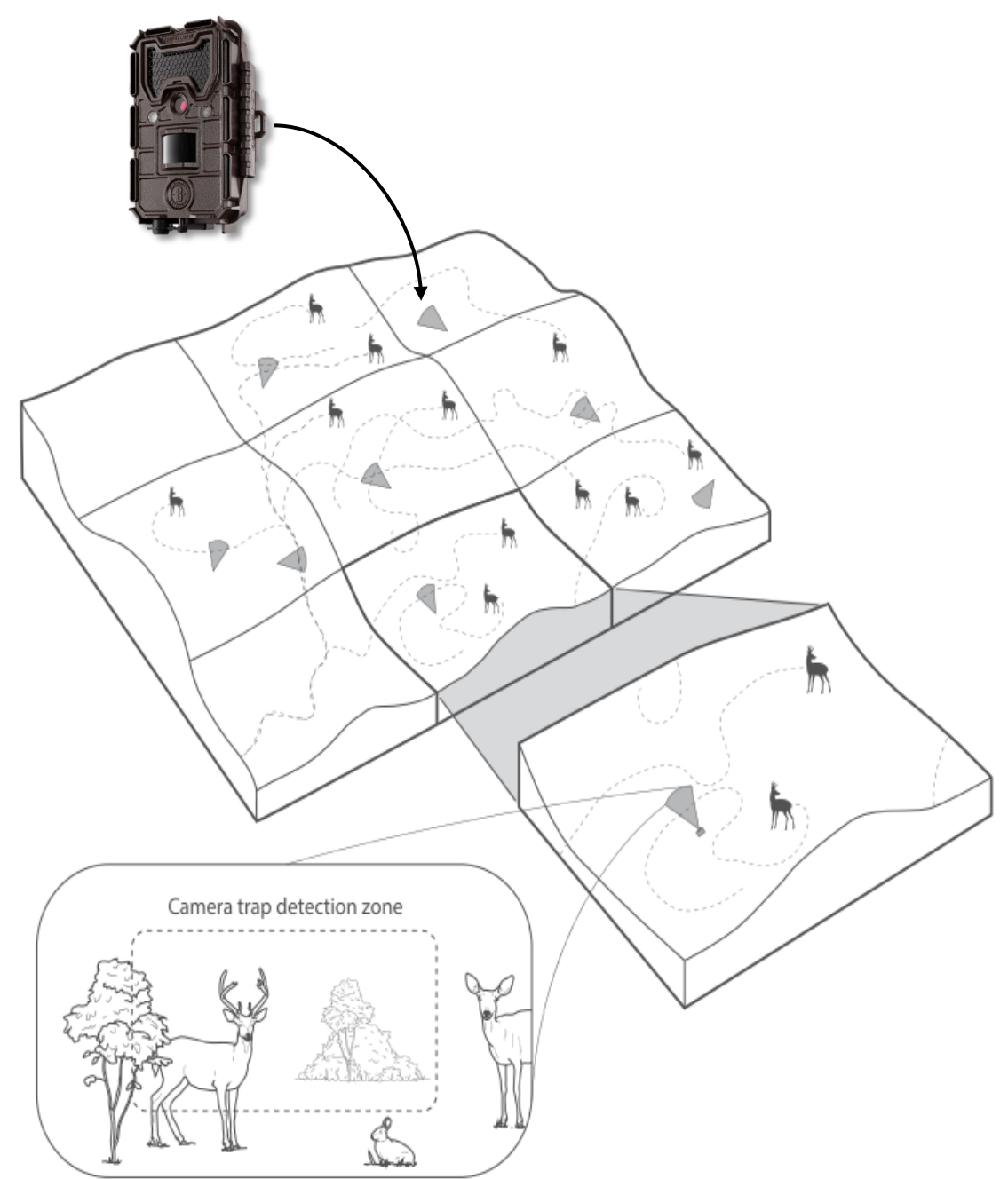


WHERE species are?

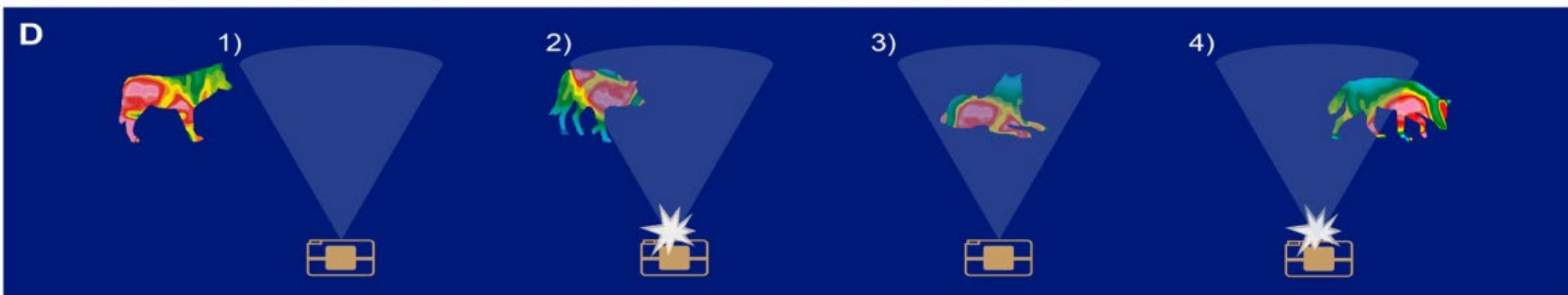
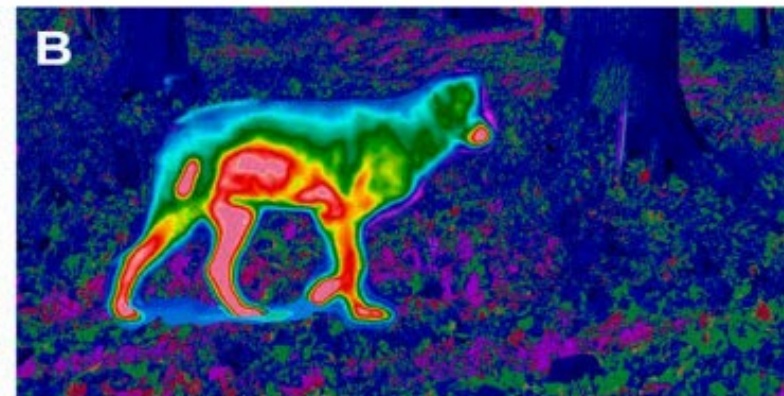
WHAT do they prefer?

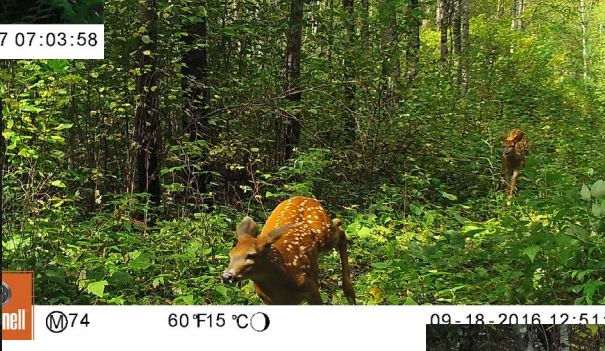
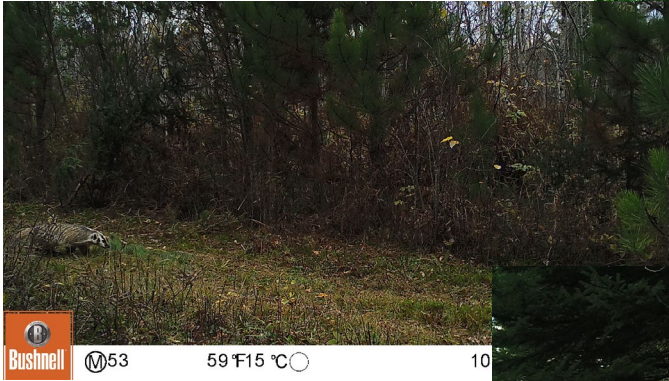
HOW well are they doing?



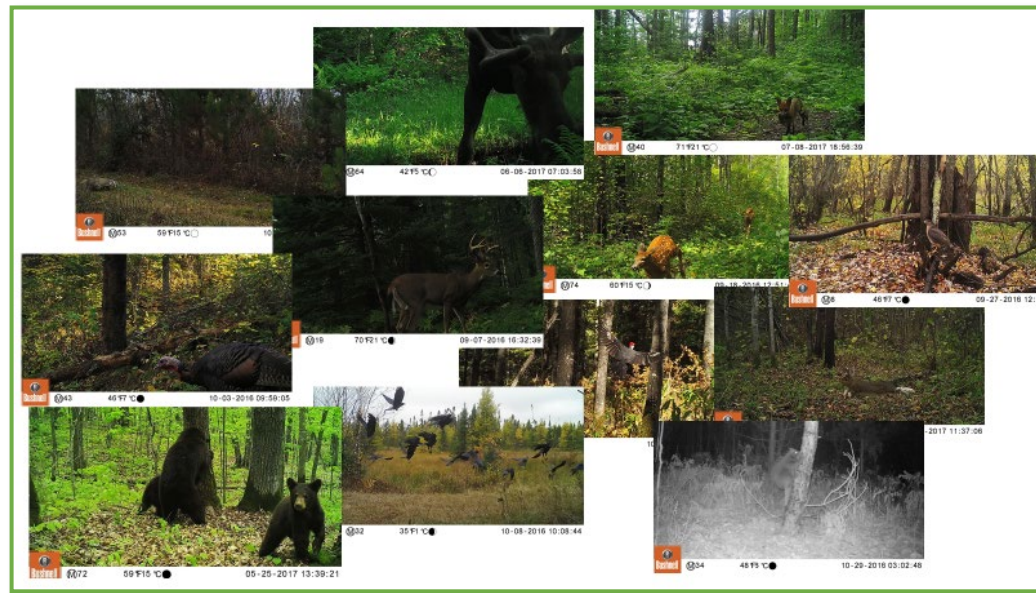


Burton et al 2015. *J. Appl. Eco.*

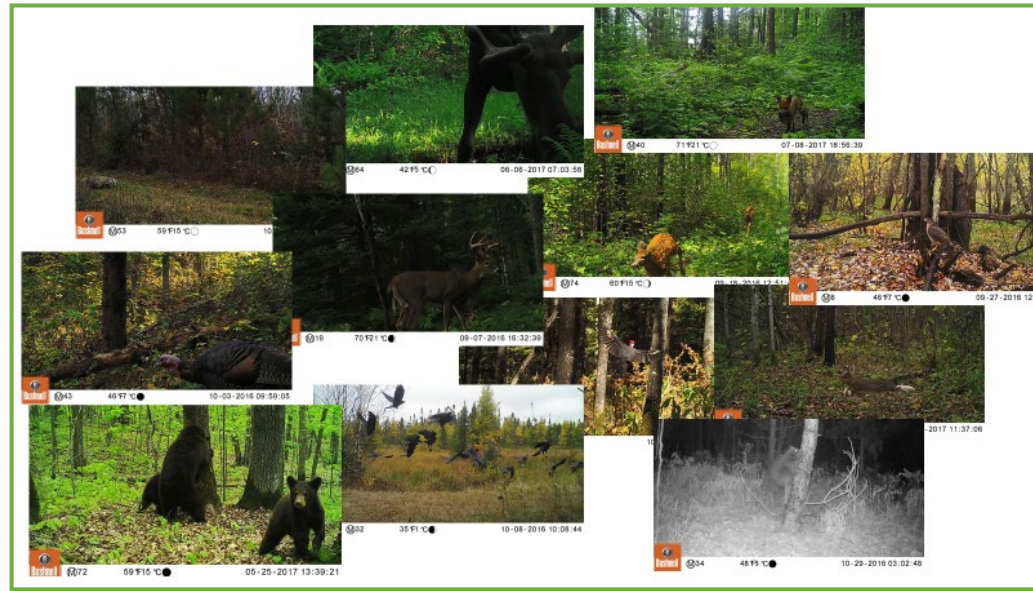




IMAGES



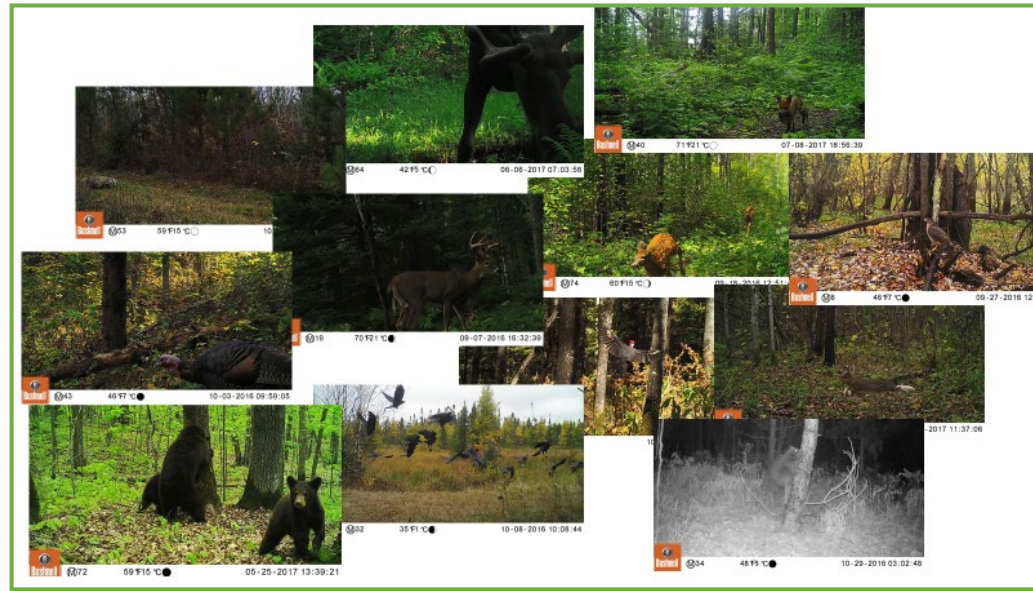
IMAGES



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5268953937	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:33
5268953938	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:35
5268953939	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:36
5268953940	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:45

DATA

IMAGES



unique_id	project_id	latitude	longitude	wi_taxon_id	photo_datetime
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5268953937	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:33
5268953938	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:35
5268953939	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:36
5268953940	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:45

DATA



RESULTS

IMAGES

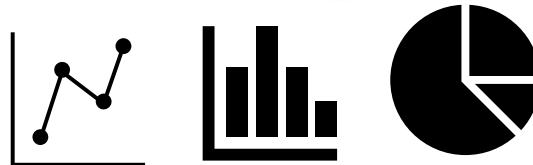


↓ 1

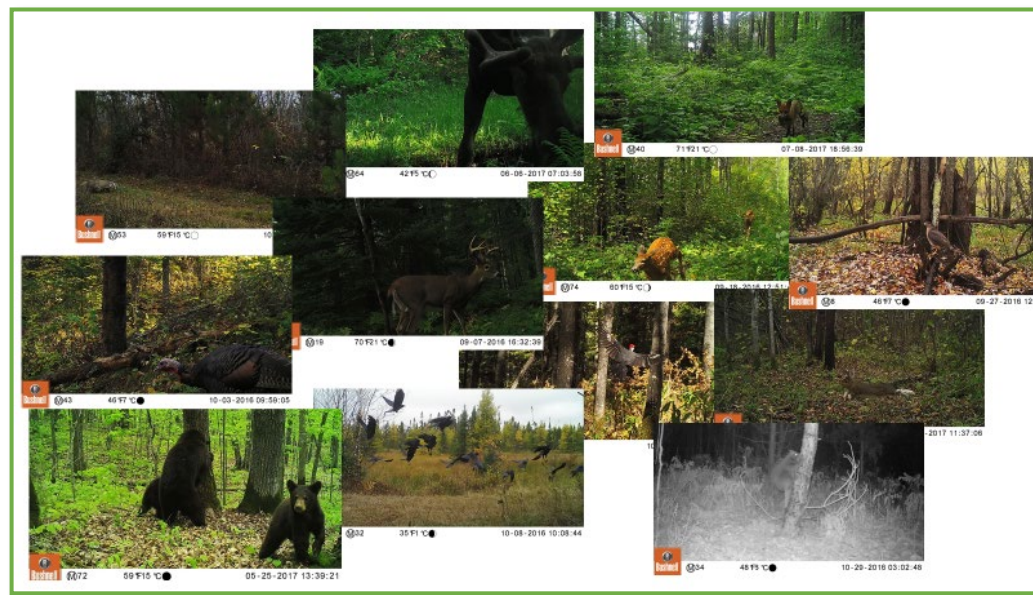
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5268953939	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:36
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DATA

↓ 2



RESULTS



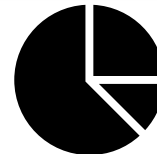
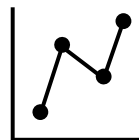
IMAGES

↓ 1 IMAGE PROCESSING

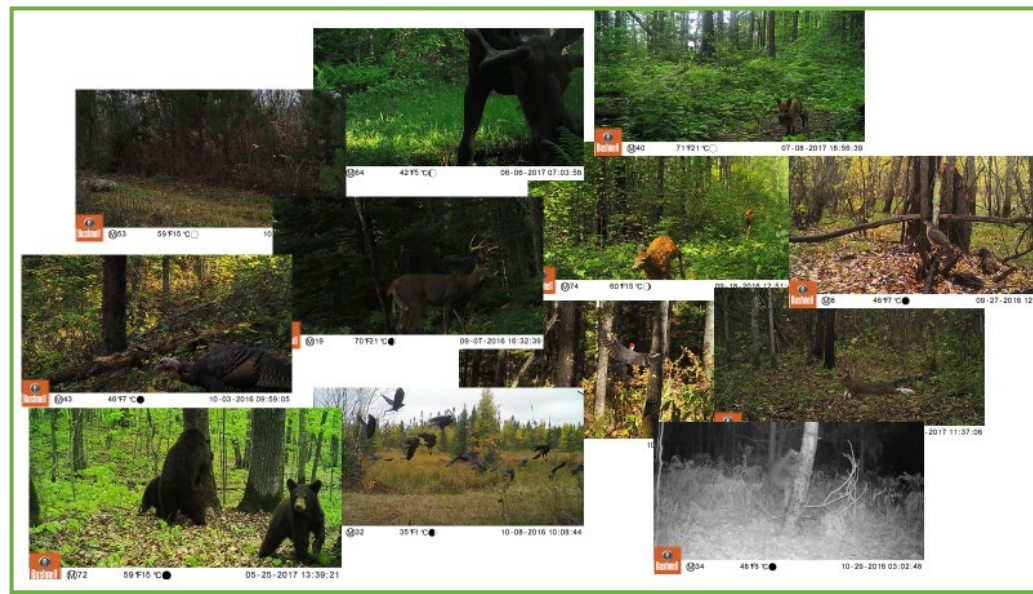
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DATA

↓ 2



RESULTS



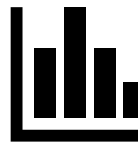
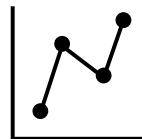
IMAGES

↓ 1 IMAGE PROCESSING

unique_id	project_id	latitude	longitude	wi_taxon_id	photo_datetime
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5268953940	2000300	4.78	-56.2	8bc77c4f-5437	2008-11-27 10:13:45

DATA

↓ 2 DATA ANALYSIS



RESULTS

WILDLIFE INSIGHTS

A platform to maximize the potential of camera trap
and other passive sensor wildlife data for the planet

©Will Burrard-Lucas / www.burrard-lucas.com



**IMAGES**

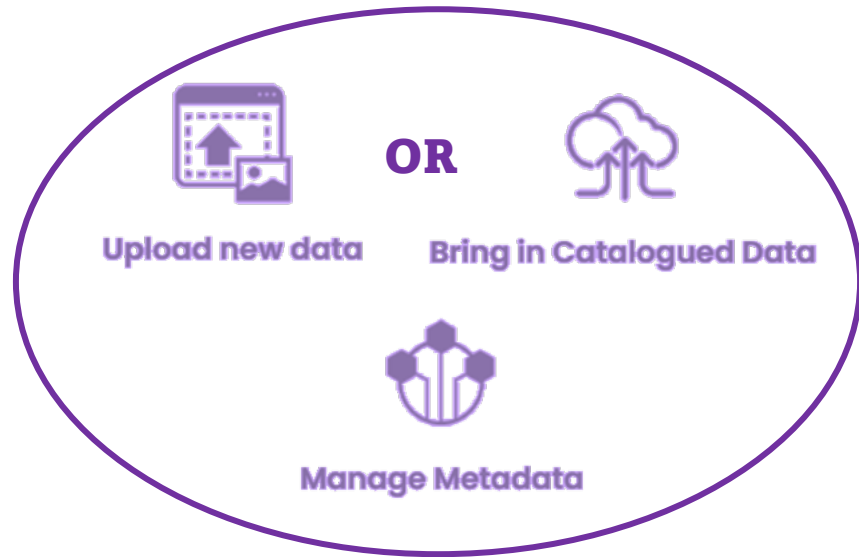
↓ **1 IMAGE PROCESSING**

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DATA

↓ **2 DATA ANALYSIS**

**RESULTS**



IMAGES

↓ **1 IMAGE PROCESSING**

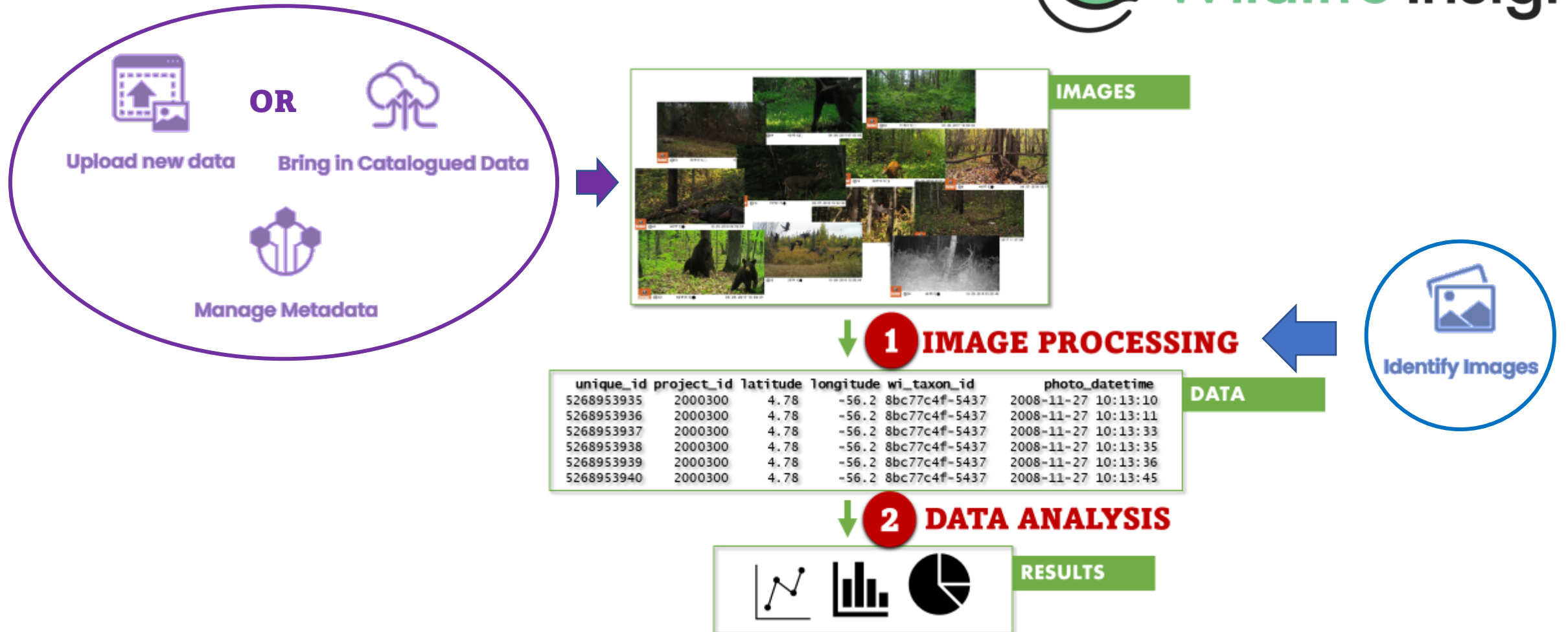
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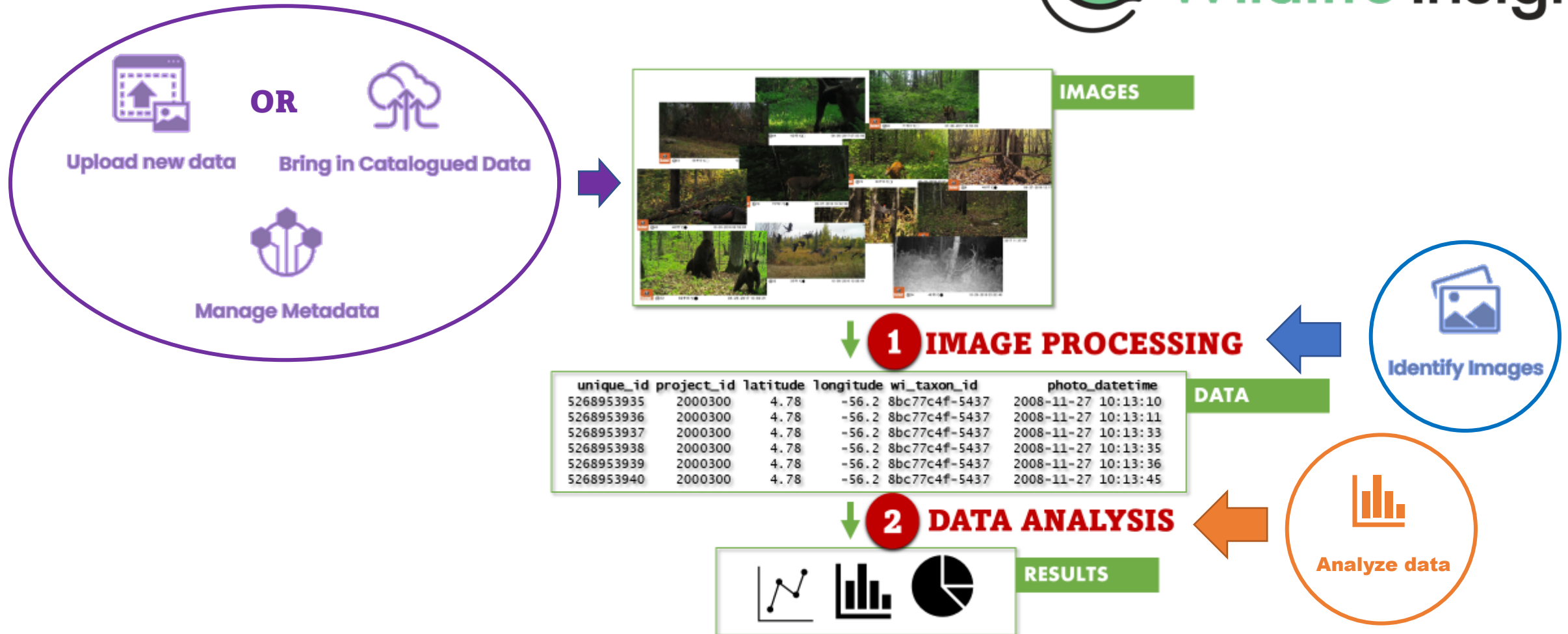
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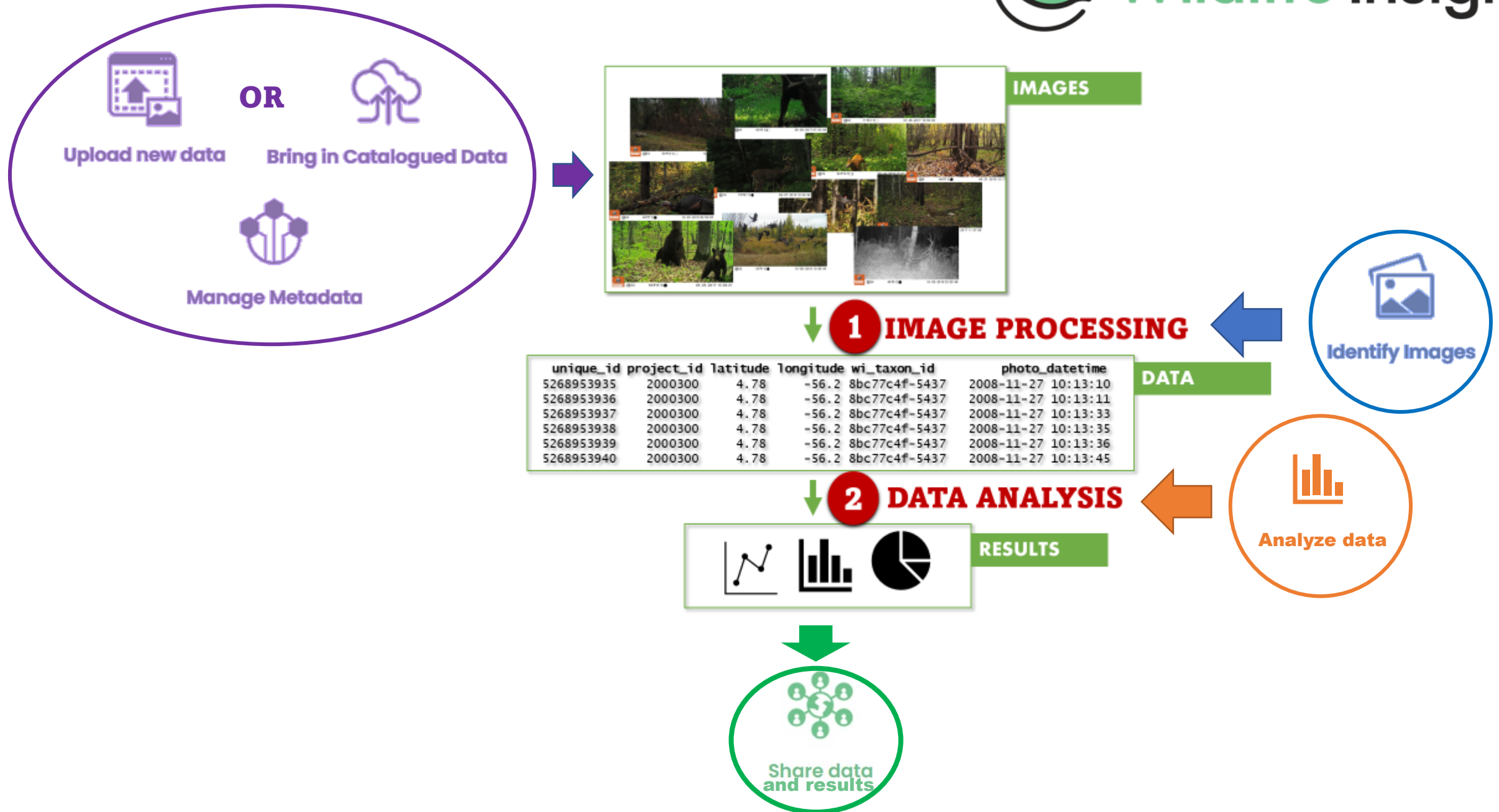
↓ **2 DATA ANALYSIS**



RESULTS







[Manage](#)[Help](#) [Taxonomy request](#) [Feature request](#) [Report a bug](#)

1

Create

All of your photos are part of a project, which in turn is part of an organization. Get started by creating them.

Create...

2

Upload

By uploading your photos, you'll get suggestions from the Computer Vision and you'll get help from your collaborators.

Upload photos

3

Identify

Accept suggestions or manually tag the animals in the photos. You can search by family, genus or species.

Identify images

4

Analyze

Get insights about where species are located, when are they seen and how much this changes over time.

Analyze

[Manage](#)[Help](#) [Taxonomy request](#) [Feature request](#) [Report a bug](#)

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By uploading your photos, you'll get suggestions from the Computer Vision and you'll get help from your collaborators.

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Accept suggestions or manually tag the animals in the photos. You can search by family, genus or species.

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Get insights about where species are located, when are they seen and how much this changes over time.

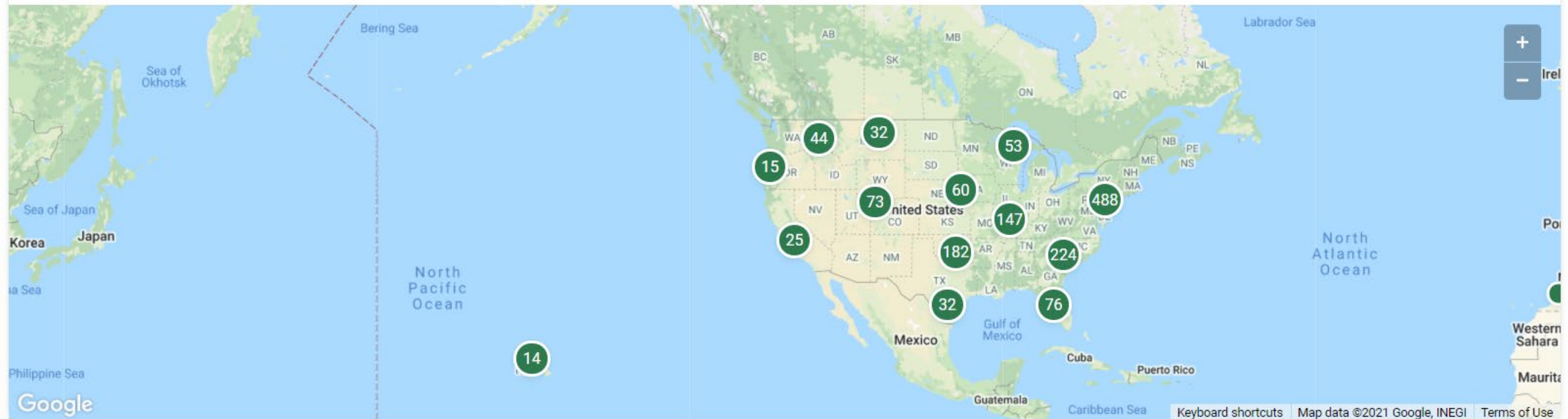
Analyze**Upload new data****OR****Bring in Catalogued Data****Manage Metadata****Identify Images****Analyze data****Share data and results**

[Manage](#) / [Snapshot](#)

Snapshot USA 2021

[Summary](#)
[Details](#)
[Identify](#)
[Catalogued](#)
[Analysis](#)
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Camera deployments



392

Species



453,517

Total sequences



154,417

Wildlife sequences



[Manage](#) / [Snapshot](#)

Snapshot USA 2021

[Summary](#) [Details](#) [Identify](#) [Catalogued](#) [Analysis](#)[Download](#)**Organization *:**

Snapshot

**ID:**

2003286

Initiative:

Snapshot Camera Surveys x



Leave empty if the field is not applicable.

Project name *:

Snapshot USA 2021

17/400 characters.

Website:

255 characters maximum.

If the project has a dedicated website, please list it here. E.g., <https://wildlifeinsights.org>**Short name *:**

Snapshot USA 2021

17/43 characters.

A short name that uniquely identifies the project. This name will be used as a display on the Explore page and within your own account.

Project type:*

Sequence

Read more about types of projects [here](#).**Project Admin *:**

Roland Kays

Project Admin Email *:

rwkay@

[Summary](#)
[Details](#)
[Identify](#) 999+
[Catalogued](#)
[Analysis](#)
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[Subprojects](#) ▼

[Camera deployments](#) ▼

[Species](#) ▼

[Status: All](#) ▼

[Photos: All](#) ▼

[Sequence: 60 sec](#)
[Date taken](#) ▼


[Grid Size](#)  
[Bulk selections](#) 

Viewing 687897 images within 448878 sequences



2012-07-04 10:44:34 PM M 1/3

20°C

CTMNU120

RECONYA

+

-

Identify

Edit photo

Metadata

Author	Computer vision
Identification date	12/11/2020 01:49:46
Class	Mammalia
Order	Carnivora
Family	Felidae
Genus	Leopardus
Species	wiedii
Count	1
Confidence	92%

Accept suggestion

Mark as blank

Edit identification



Highlight



Download



Delete

[Manage](#) / [Snapshot](#)

Snapshot USA 2021

[Summary](#)
[Details](#)
[Identify](#)

999+

[Catalogued](#)
[Analysis](#)
[Download](#)

[Subprojects](#) ▼

[Camera deployments](#) ▼

[Species](#) ▼

[Status: All](#) ▼

[Photos: All](#) ▼

[Sequence:](#)

60

[sec](#)
[Date taken](#) ▼

[Search by filename](#)

[Grid Size](#)

[Bulk selections](#) ⓘ

Viewing 832802 images within 453517 sequences



3



3



4



10



10



10



5



10



5



5



5



6



5



5



5

[Manage](#) / [Snapshot](#)

Snapshot USA 2021

[Summary](#)[Details](#)[Identify](#)[999+ Catalogued](#)[Analysis](#)[Download](#)

It seems this project doesn't have any data yet. [Check the demo of a project analysis.](#)

Analyze all the data from the identifications or [analyze by species](#).

Wildlife Picture Index

Data not calculated yet.

[Manage](#) / [Snapshot](#)

Snapshot USA 2021

[Summary](#) [Details](#) [Identify](#) 999+ [Catalogued](#) [Analysis](#)[Download](#)

It seems this project doesn't have any data yet. [Check the demo of a project](#)

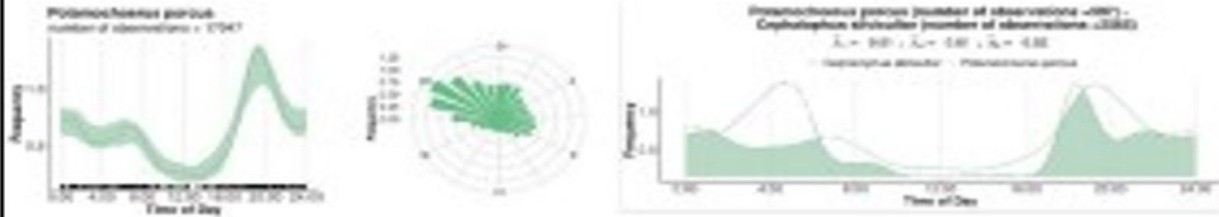
Analyze all the data from the identifications or [analyze by species](#).

Wildlife Picture Index



Data not calculated yet.

Activity patterns



packages:

- **activity**
- **overlap**



Wildlife Insights



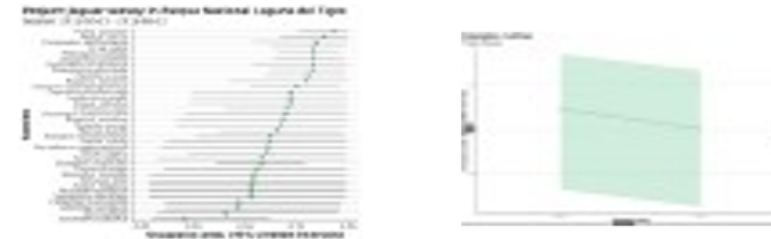
packages:

- **NIMBLE**

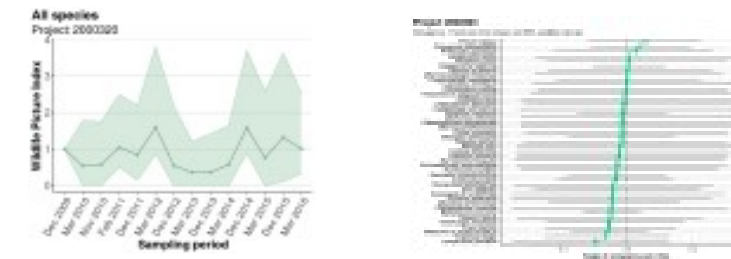
Detection rates



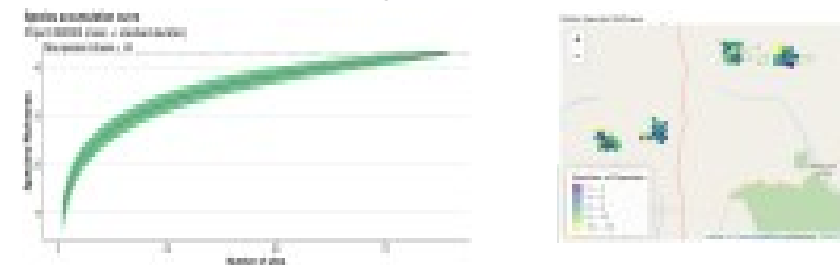
Probability of occupancy and detection



Wildlife Picture Index



SpeciesRichness



Showing **22,163,565** camera trap records taken in the whole world between 1990-01-02 and 2021-11-16.

[See filters and statistics](#)

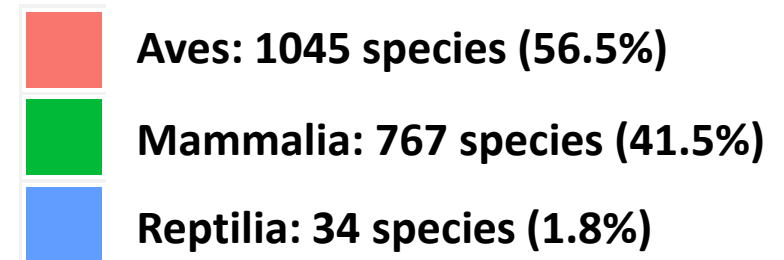
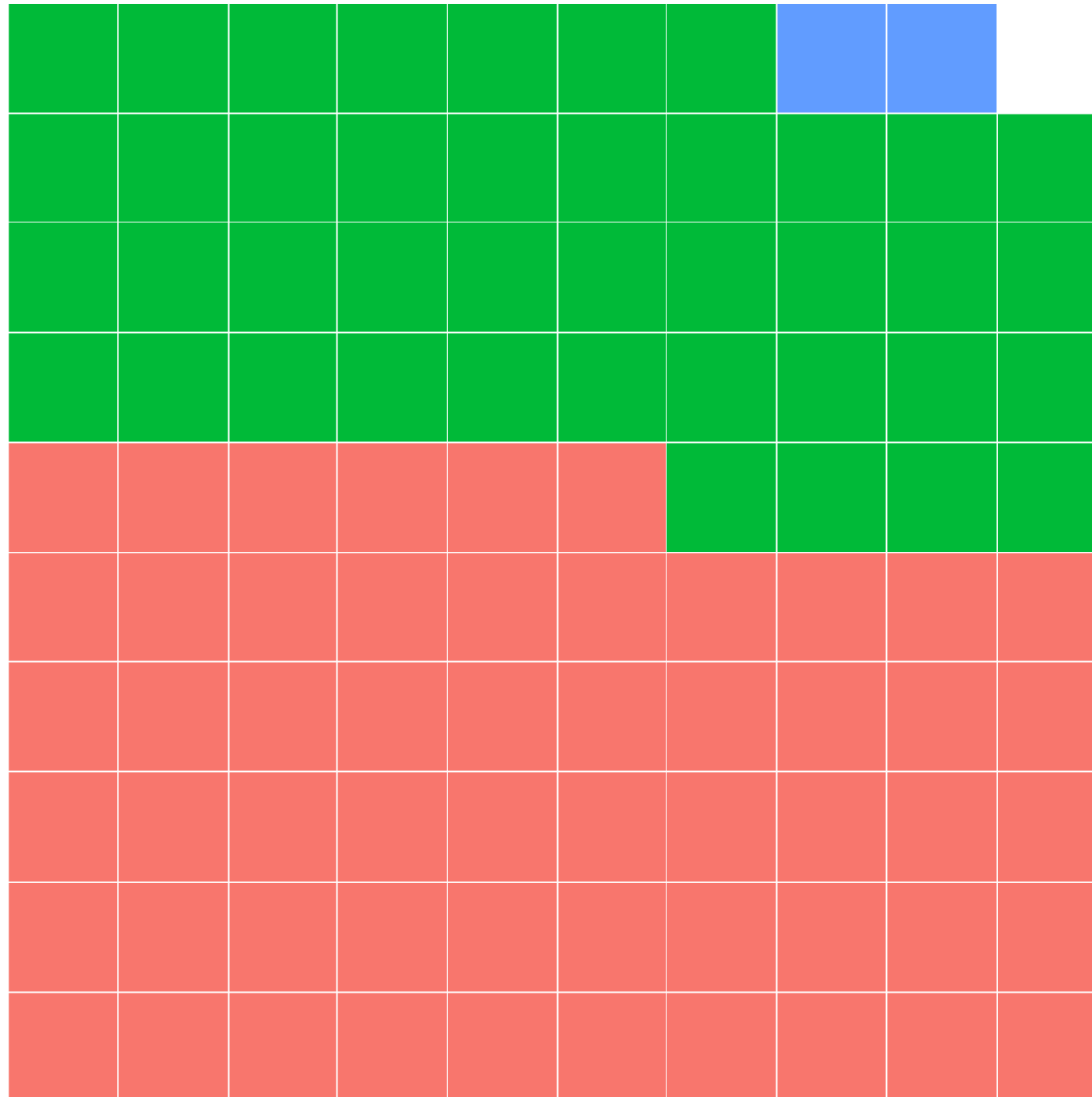


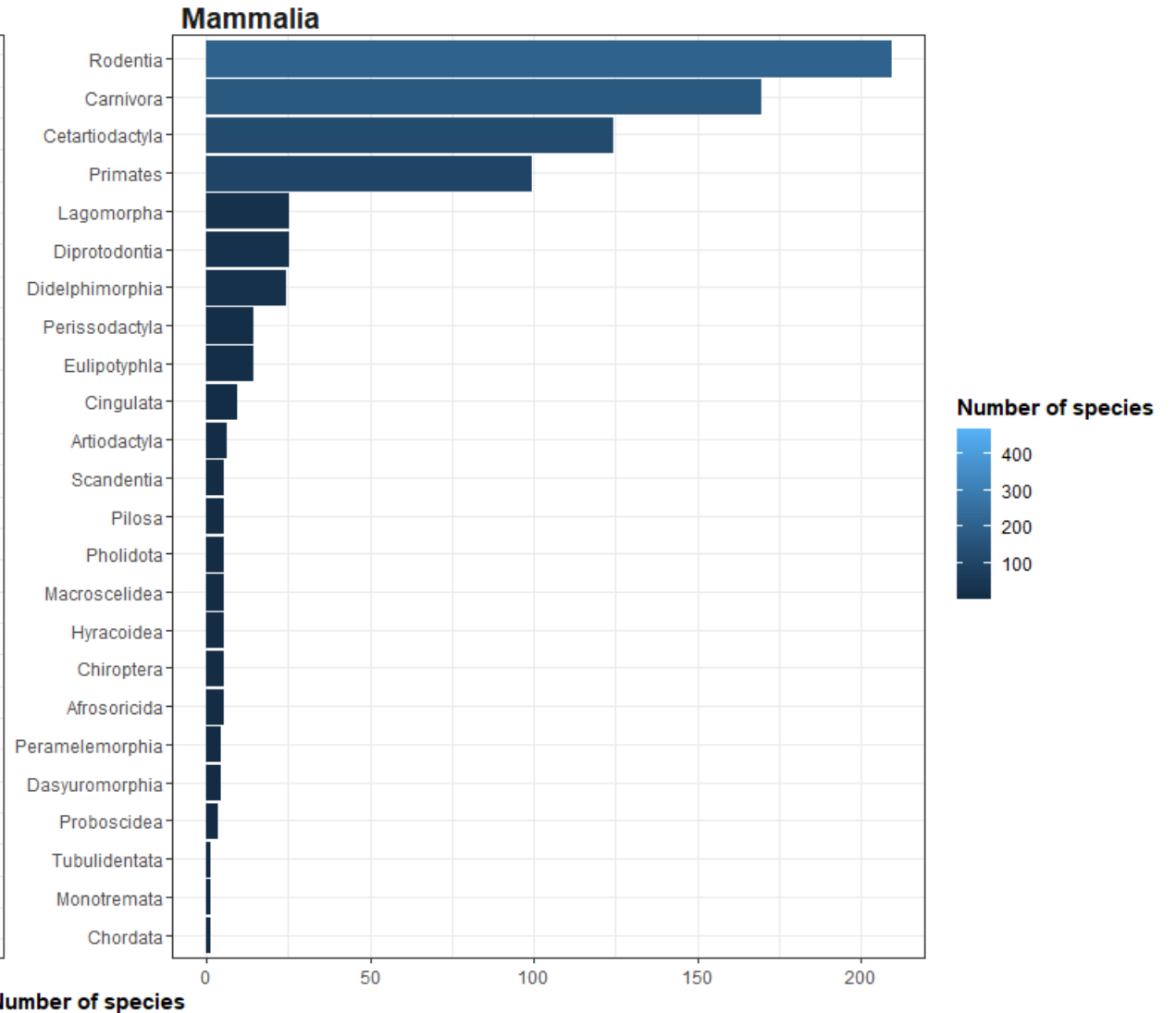
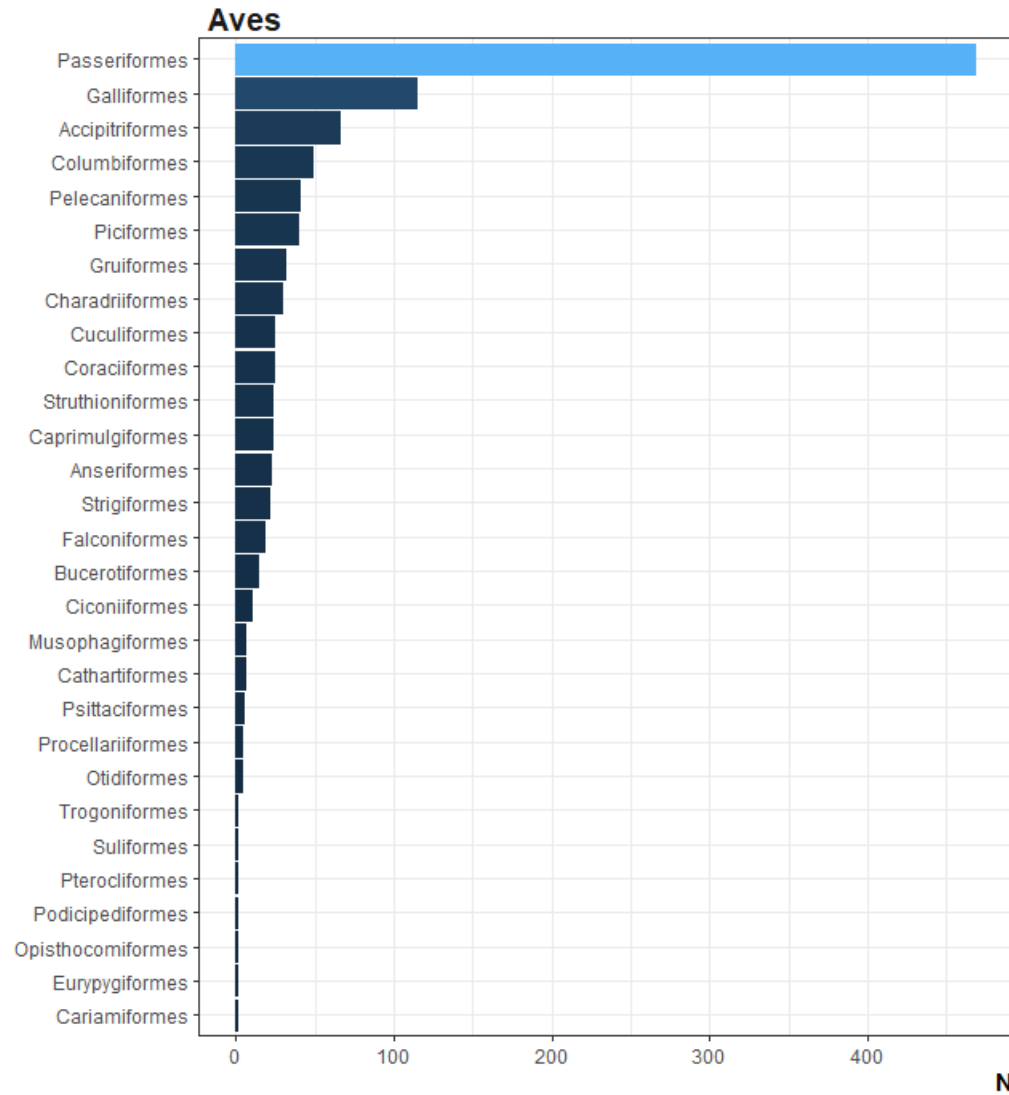
Species by Class



Wildlife Insights

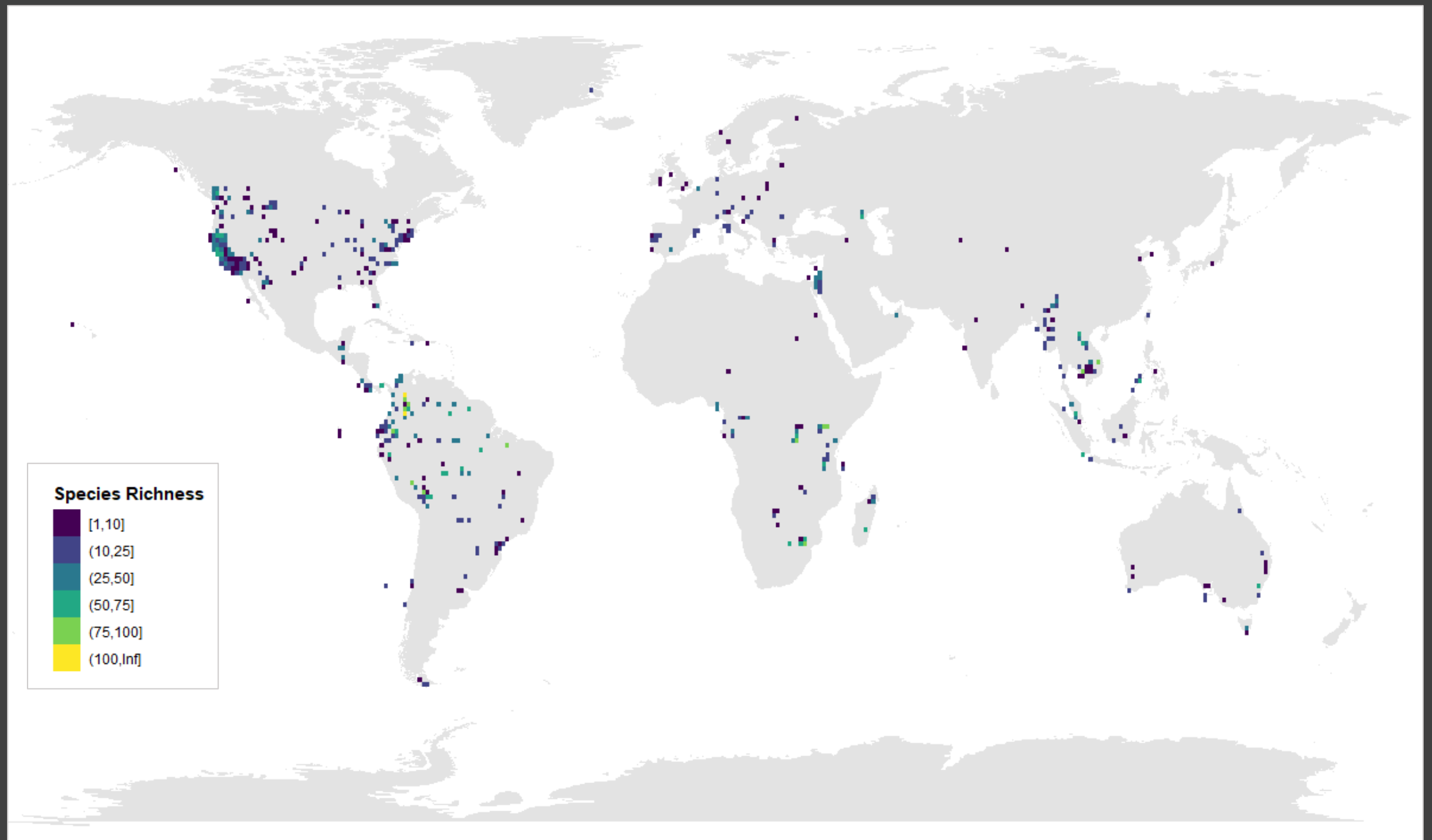
1857 species





Wildlife Insights: How Camera Trap Data Can Foster Global Biodiversity Conservation

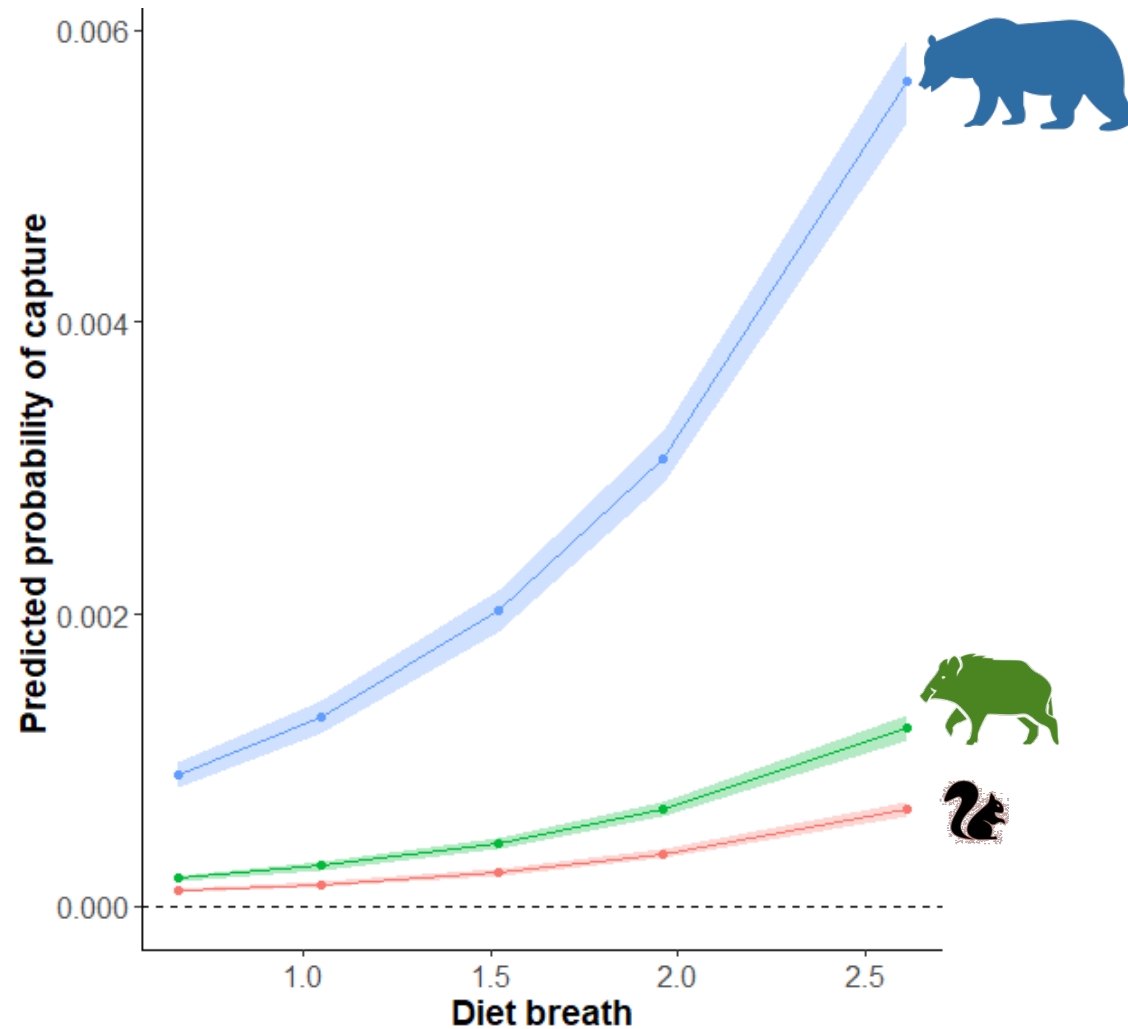




Where to camera trap?

Capturability based on traits

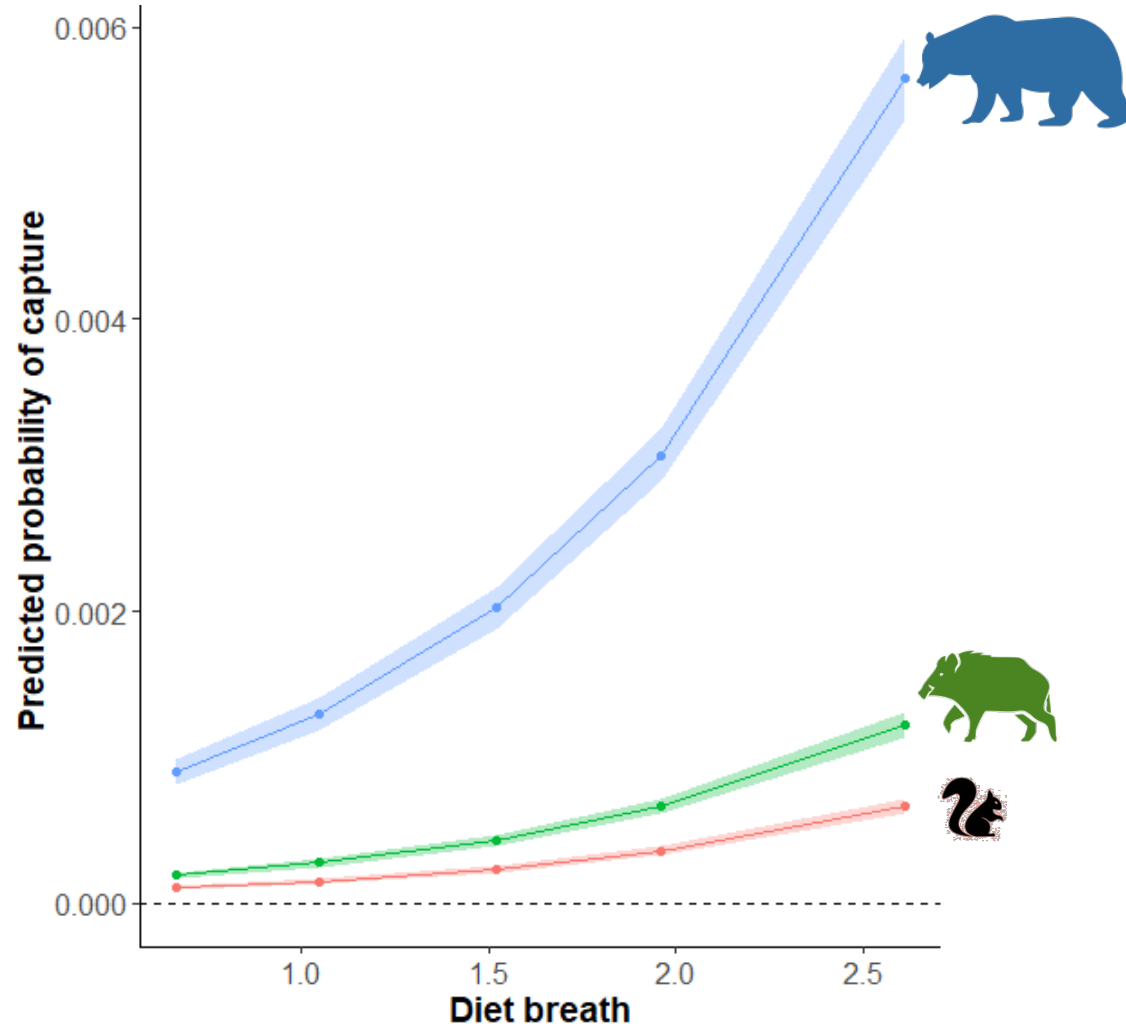
Nocturnal, ground—dwelling species



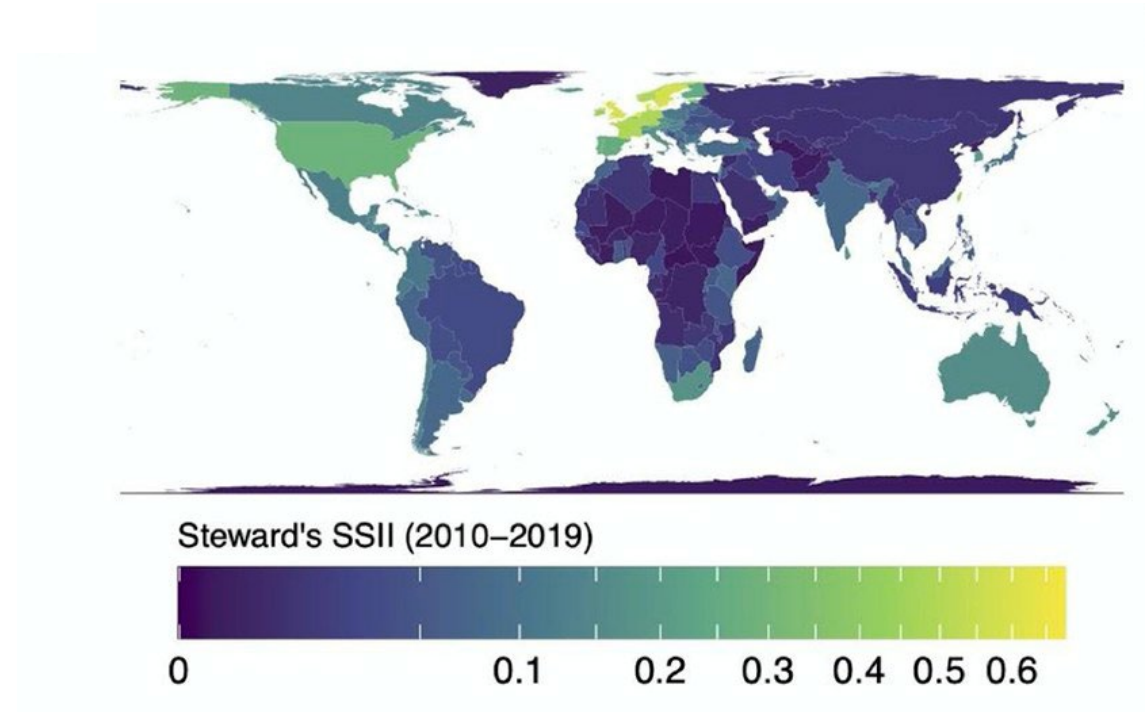
Where to camera trap?

Capturability based on traits

Nocturnal, ground—dwelling species



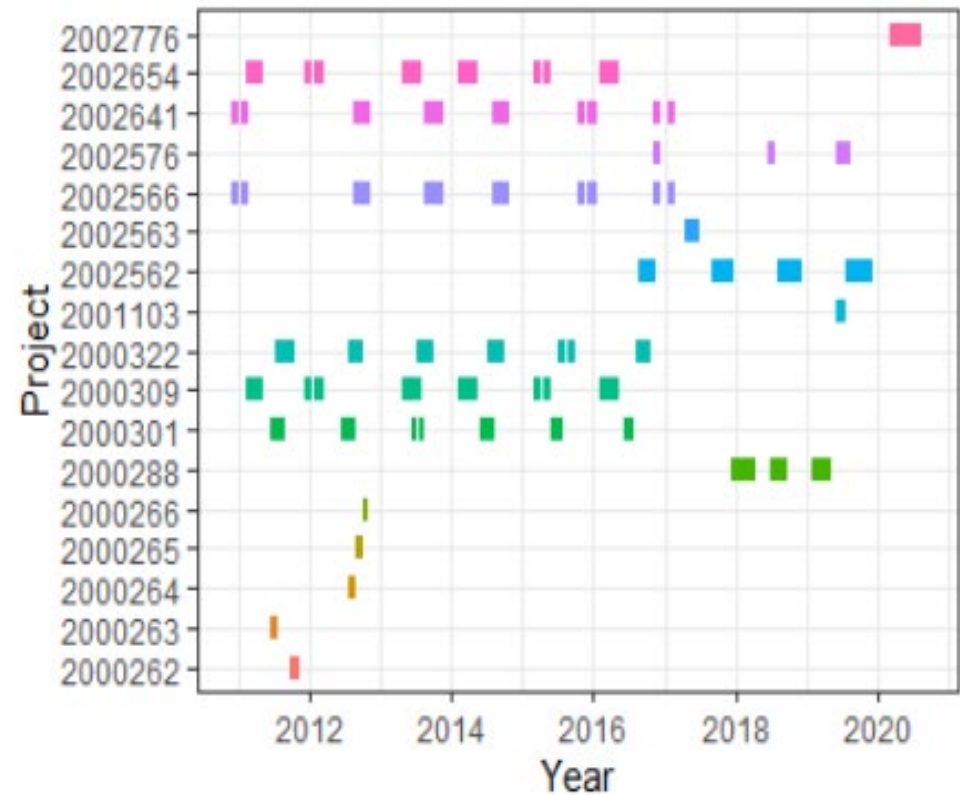
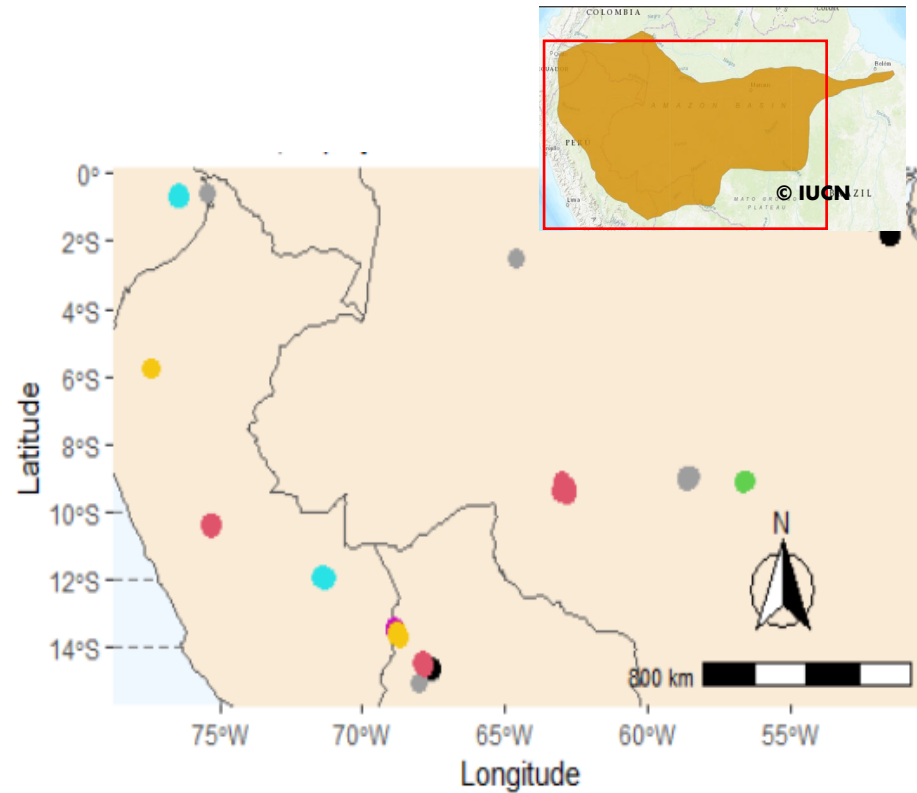
Gaps in coverage



from Oliver et al. 2021, Plos Bio

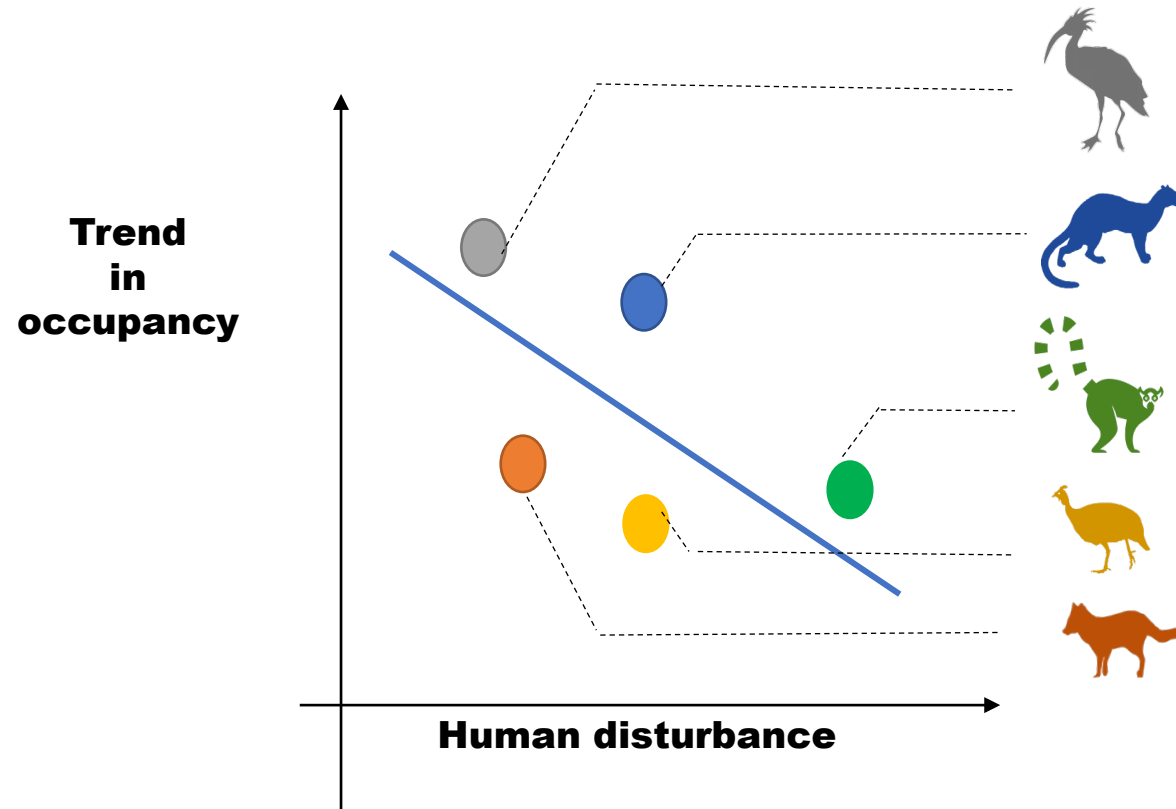
How are species doing?

Detection/nondetection data replicated in space and time



One species (*Atelocynus microtis* - Short-eared dog) ●

How are species doing?



**Which species are more sensible to human disturbance?
What are their characteristics?**

Many species •

Acknowledgements



Walter Jetz



Ruth Oliver



Tanya Birch



Sara Beery



Roland Kays



Jorge A. Ahumada



Nicole Flores



Eric Fegraus

Session: **B13A. Monday, 13 December 2021: 12:45 - 14:00 (13:20 - 13:25 CST), Convention Center, Room 252-254**