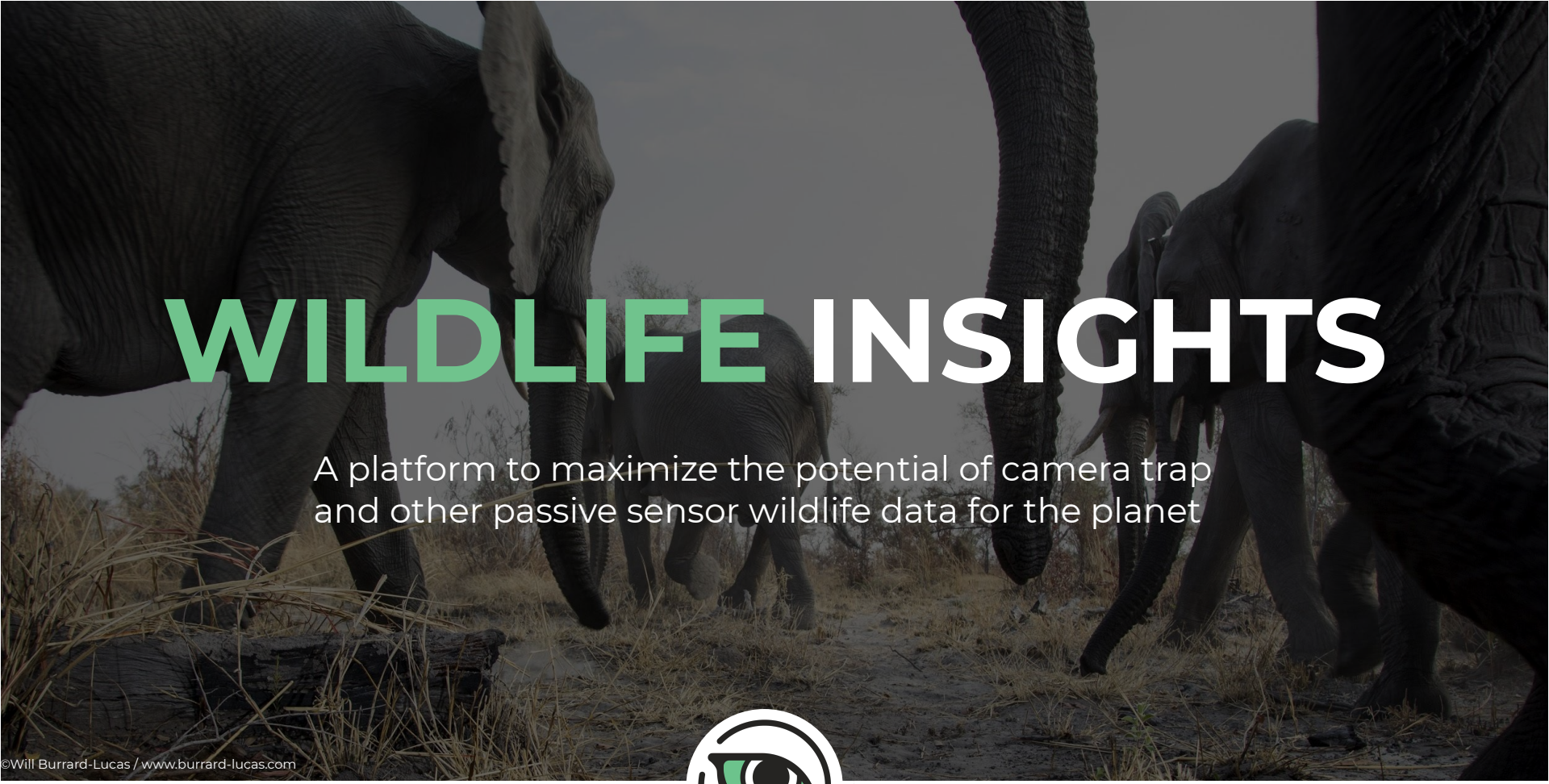


WILDLIFE INSIGHTS

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

ZSL LET'S WORK FOR WILDLIFE · Google · CONSERVATION INTERNATIONAL · Wildlife Conservation Society · NORTH CAROLINA Museum of Natural Sciences · Smithsonian · WWF · MOL MAP OF LIFE

Jorge Ahumada

Wildlife Insights Executive Director
Conservation International, Moore Center for Science

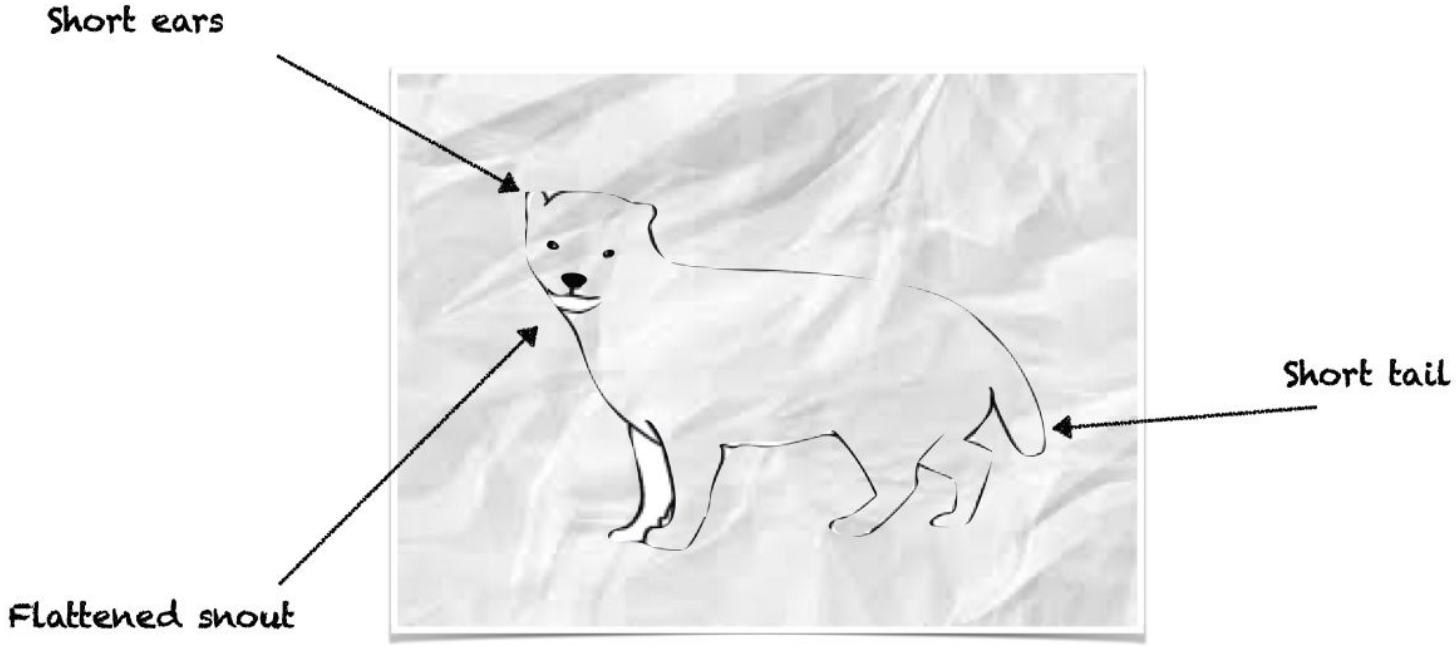
Tanya Birch

Wildlife Insights Technology Committee Chair
Google Earth Outreach, Program Manager

Jonathan Palmer

Wildlife Insights Steering Committee
Wildlife Conservation Society, Executive Director Conservation Technology


@ Google Earth


Short ears
Short tail
Flattened snout


2014-09-15 8:26:25 AM M 3/3
20°C
CCT-YAN-2-05
RECONYX
@ TEAM Network

A big challenge in wildlife conservation

Data: reliable, current, verifiable

Derive insights from data quickly

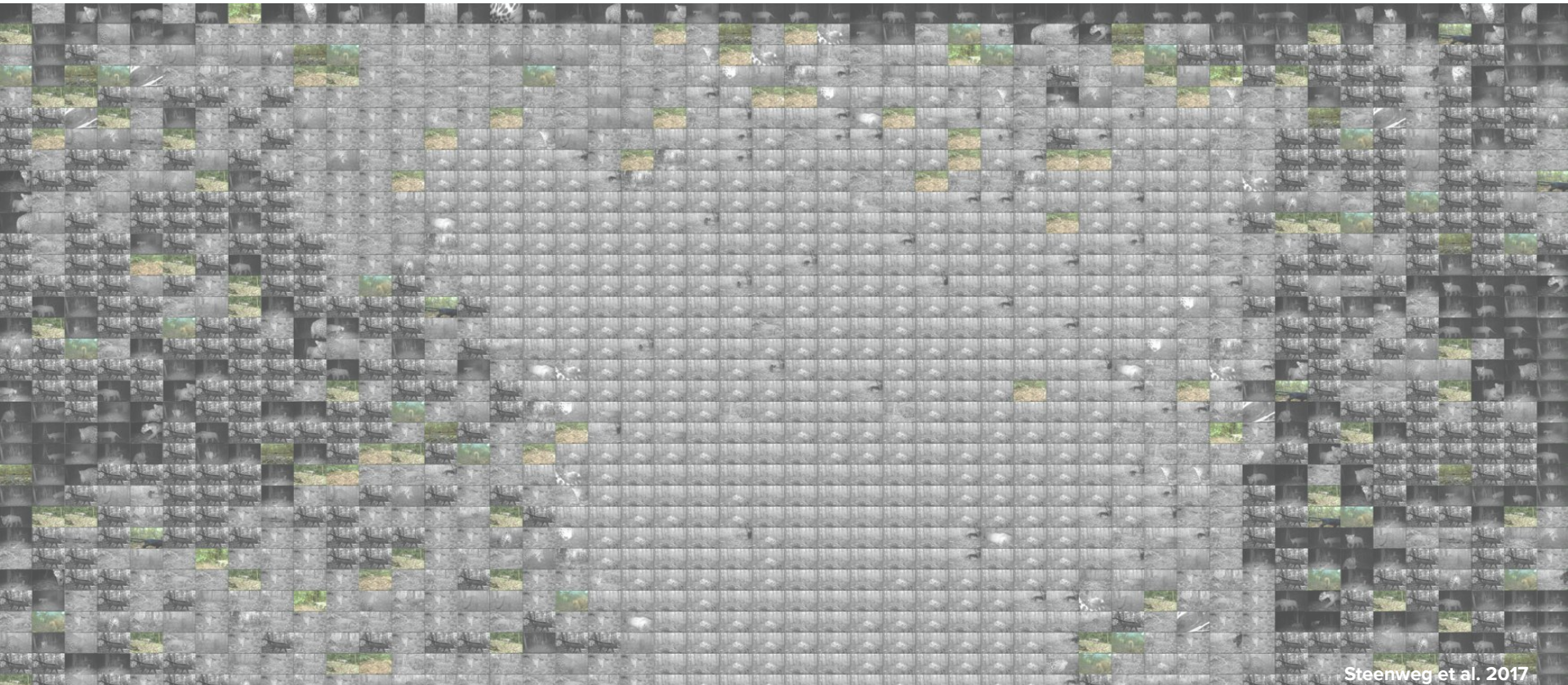
Collected by multiple organizations
and individuals around the globe

Camera traps are everywhere

1,000s of projects

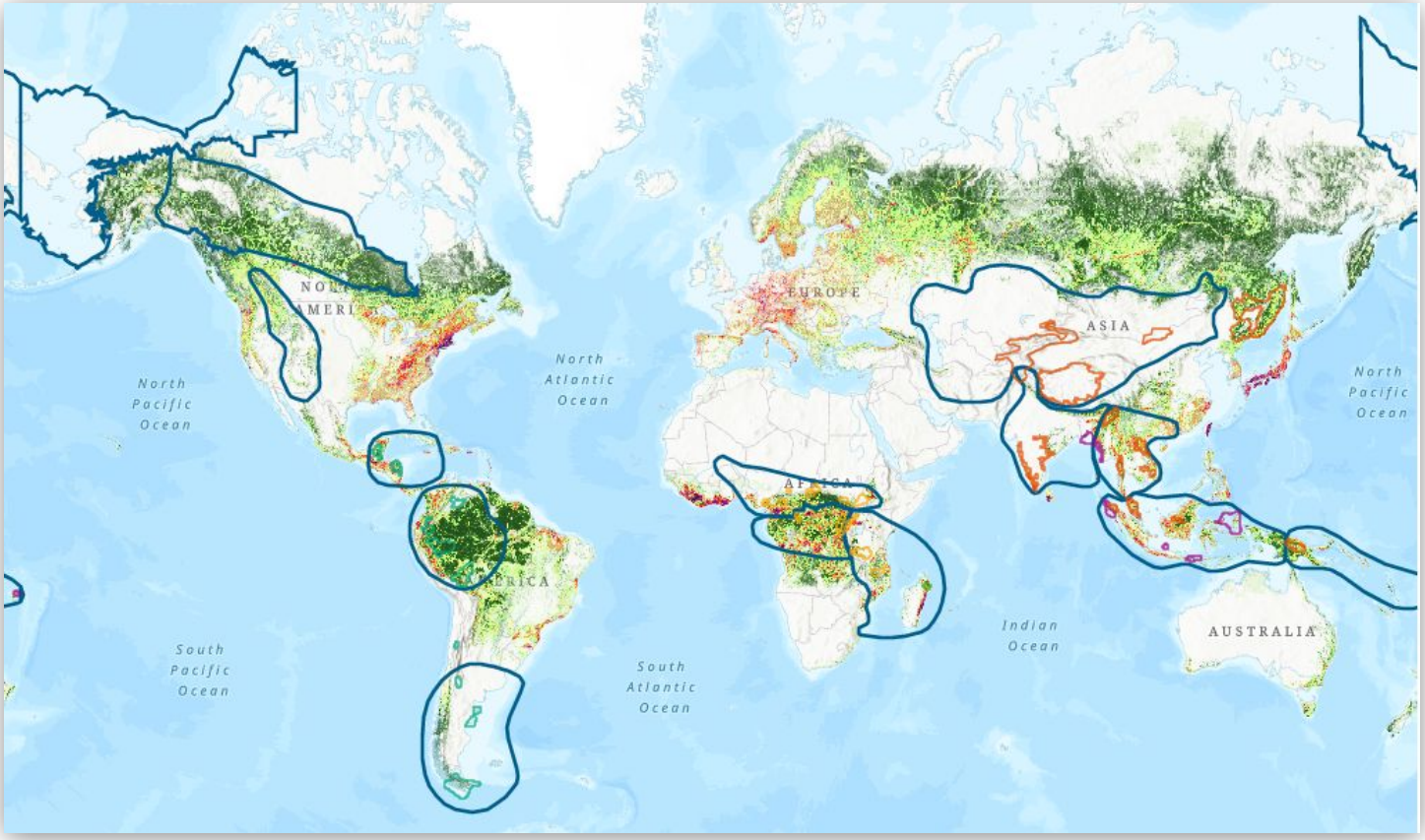
100,000s of camera traps

1,000,000s of images



Steenweg et al. 2017

WCS Background



A commitment to Solving Conservation Issues in Partnership and at Scale

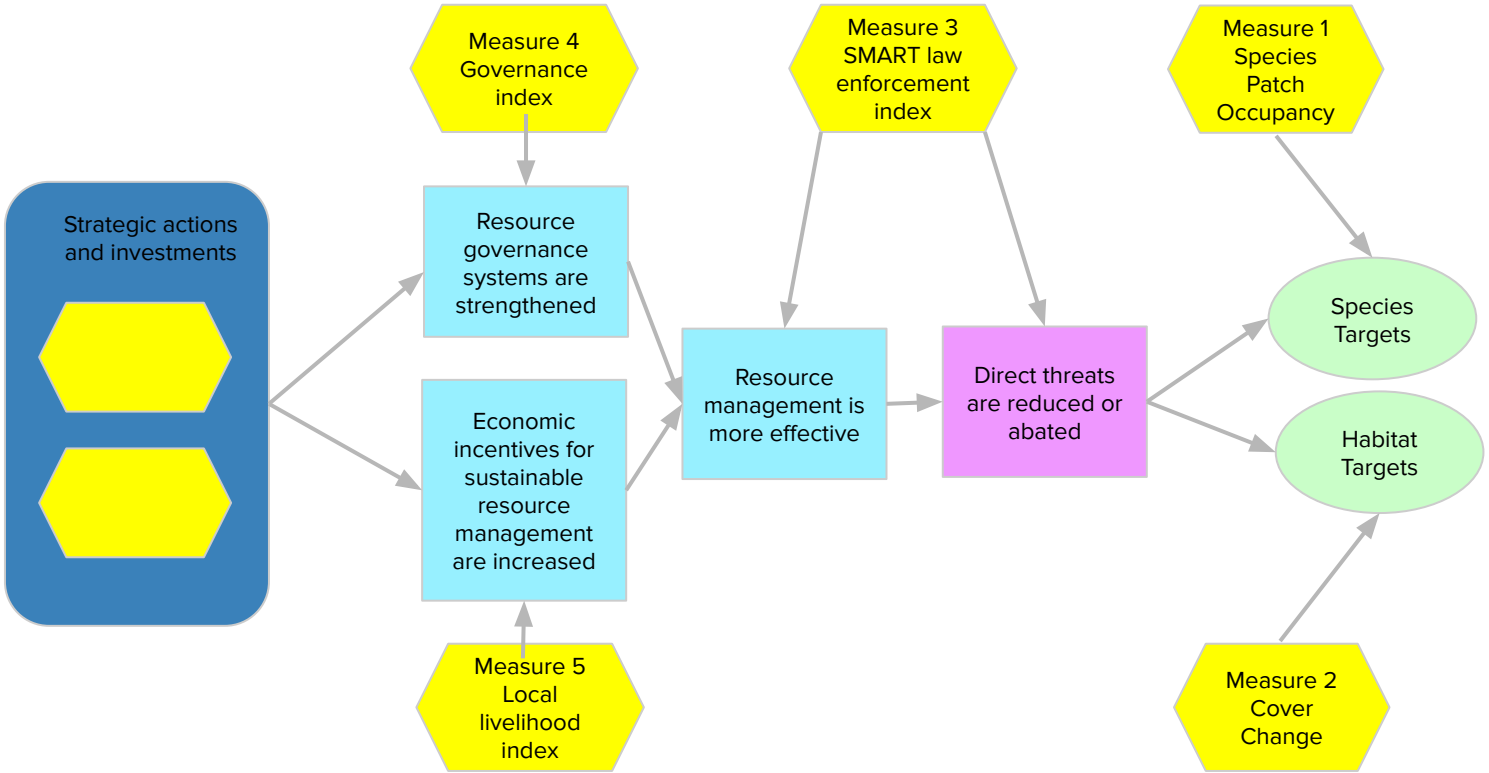
SMART

Wildlife Insights

ConSoSci

EARTHRANGER

Tying Biodiversity Monitoring to Action



WCS Camera Trap Background

3+ million catalogued images

40 - 100 mn images in the wild

≈ 1000 camera traps deployed

No standard camera trap data curation

The Potential Value of Wildlife Insights

Time saved = time doing conservation

Out of the box analytics

Integration & the bigger picture

More current population estimates

Major Barriers

1

Slow data flow

2

Data siloed and raw

3

No tools to gain insights

Ahumada, et al. 2019. *Environmental Conservation*. doi:10.1017/S0376892919000298

Solutions

1

Software 10x better, Artificial Intelligence

2

Modern platform

3

Data-driven insights

Ahumada, et al. 2019. *Environmental Conservation*. doi:10.1017/S0376892919000298


Wildlife Insights


CONSERVATION
INTERNATIONAL


NORTH
CAROLINA
Museum of
Natural Sciences


Smithsonian Institution


ZSL
LET'S WORK
FOR WILDLIFE


WCS


WWF


MOL
MAP OF LIFE


Google

Our Vision and Principles

We envision a world where wildlife populations are stable or recovering

- Data-driven actions
- Integrity
- Partnership
- Transparency
- Open access to data

Key Features

Artificial Intelligence

- 614 species trained on 8.7M images
- Identifies 79% of blank images with <2% error
- 100 common species have 80-98.6% probability of correct prediction
- Including a detector and bounding boxes in training
- Leveraging sequential information

Collaboration and Sharing

- Initiatives with personalized websites
- Public page to explore projects
- Creative Commons licenses to share data
- Endangered species safeguarded, no human images shared
- Embargo on projects
- Private data download
- Public data download with DOIs

Data input and management

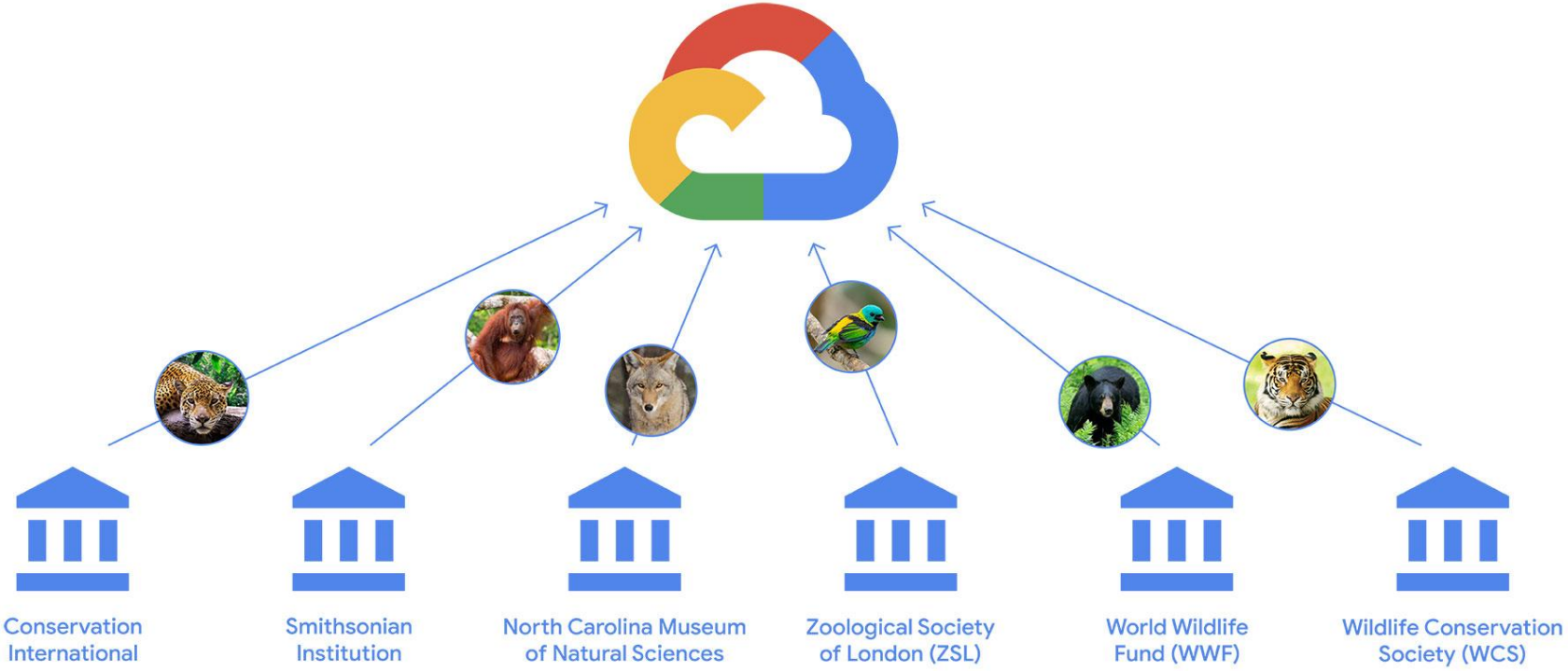
- Web-based uploads and management to review identifications
- Batch uploads for legacy data
- API
- Synced offline desktop solution

Analytics and Insights

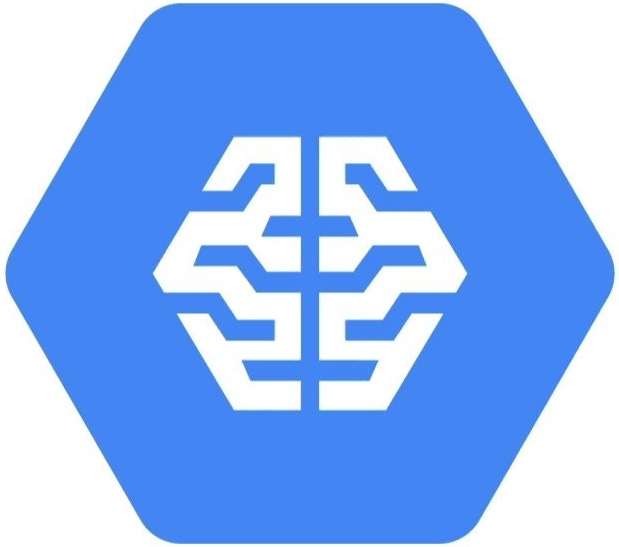
- Operational statistics
- Basic population and activity analytics
- Community wide analytics (e.g., Wildlife Picture Index)
- Automatic report generation
- Spatially explicit products

Can AI help identify animals in the wild?

Building good AI models requires lots of labelled data



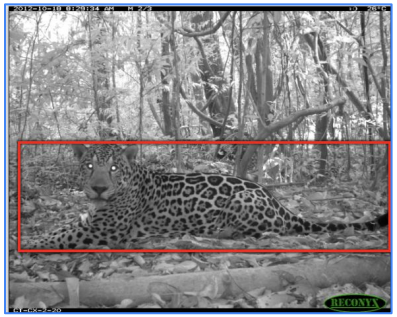
Training Deep Convolutional Neural Nets

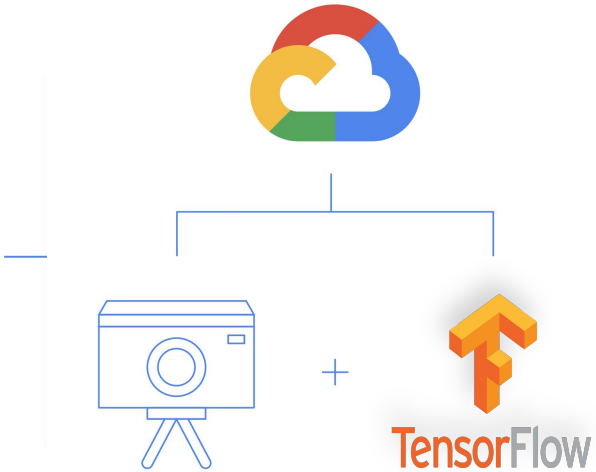


Predicting wildlife species

Wildlife Insights AI model

Predicting wildlife species identifications



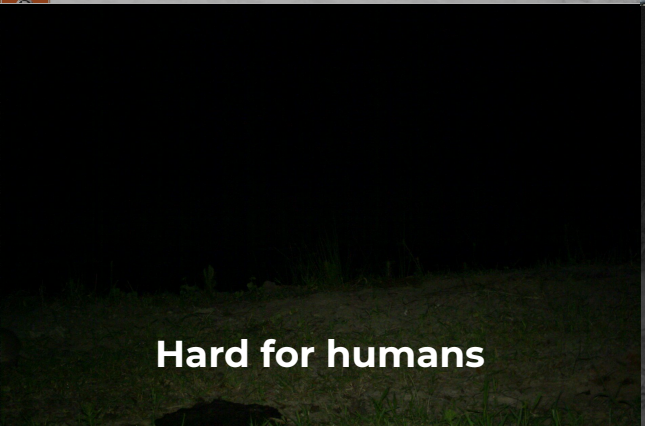


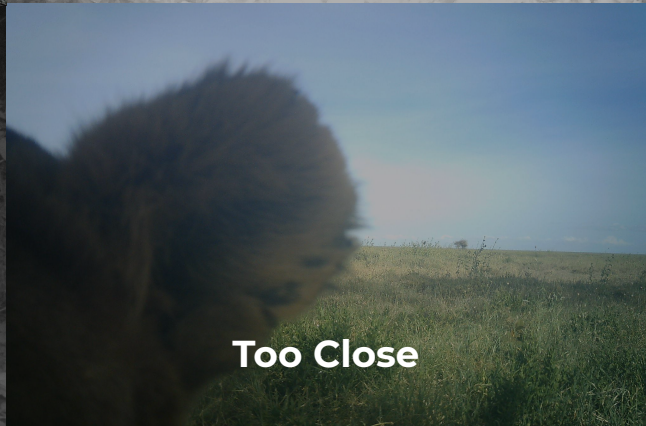
Identify and filter out blank images

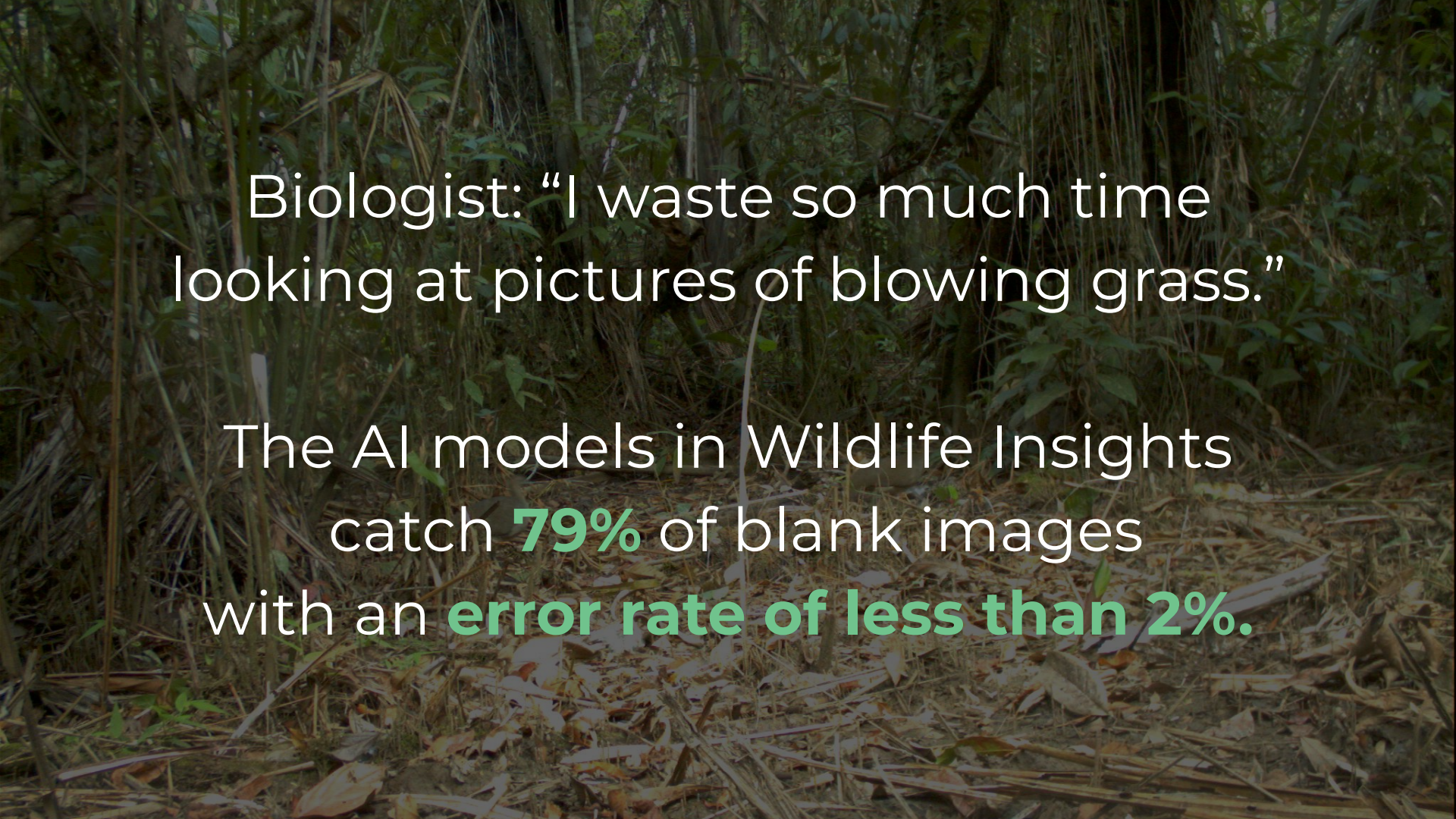
Predict species in each image


The AI model in Wildlife Insights is trained on **614 wildlife species** across **8.7M images**.

Camera traps present challenges for AI models






Biologist: “I waste so much time looking at pictures of blowing grass.”
The AI models in Wildlife Insights catch 79% of blank images with an error rate of less than 2%.

Biologist: “I don’t want to spend time looking at yet another spotted paca image.”

For ~100 species Wildlife Insights AI models are able to identify between **80% and 98.6%** correctly.

Human experts can label between 300-1000 images per hour.

A single machine can identify 18,000 images per hour, and when we parallelize across hundreds or thousands of GPUs, **AI can save biologists a lot of time**.

How is the model doing on your species of interest?

https://www.wildlifeinsights.org/about-wildlife-insights-ai

Search

Per-Class Performance

Family	Genus	Species	Common Name	# of images	% of Dataset	Precision	Recall
			blank	3757803	43.07190	98.3	78.7
bovidae	connochaetes	taurinus	common wildebeest	252987	2.89974	92.6	77.4
hominidae	homo	sapiens	human	225966	2.59002	84.8	75.2
cervidae	odocoileus	hemionus	mule deer	211995	2.42989	93.3	80.8
dasyproctidae	dasyprocta	punctata	central american agouti	200068	2.29318	90.8	64.9
suidae	sus	scrofa	wild boar	189713	2.17449	91.2	81.2

Start 1 to 6 of 620 entries

Previous Next

How will the AI models improve?

Help build accuracy on your species by **joining Wildlife Insights.**

Provide correct species IDs in Wildlife Insights so the AI models continually improve.

Wildlife Insights Beta

Manage 999+ | Explore Data | Nicole | Upload

Projects list

Manage

1 2 3 4

Create

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

Create...

Upload

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

Upload photos

Identify 999+

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

Identify images

Analyze

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

Analyze

Your projects

Search a project

A Wildlife Organization

Projects list

Manage

New project

Organization *:

A Wildlife Organization

Initiative:

Select an initiative

Leave empty if the field is not applicable.

Project name *:

Jaguar Monitoring Project

25/47 characters.

Website:

https://jaguarmonitoring.org

28/255 characters.

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

Short name:

40 characters maximum.

A short name that uniquely identifies the project dataset and relates to project code.

Abbreviation:

255 characters maximum.

If your project has an abbreviated name, please list it here

Country *:

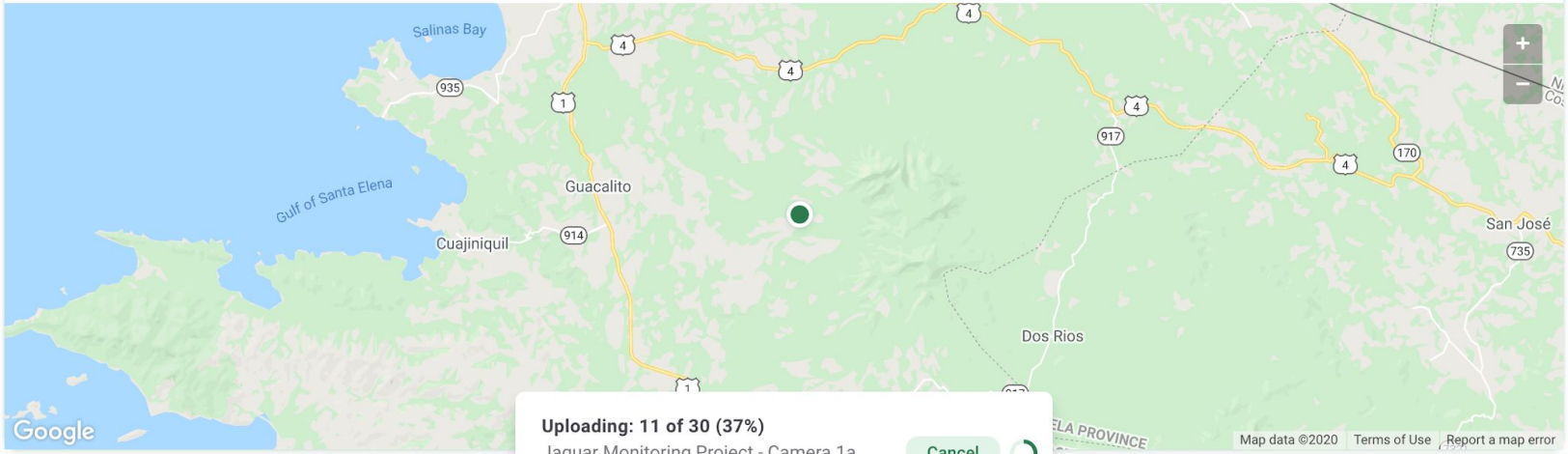
Brazil

Start date *:

End date:

Jaguar Monitoring Project

Locations



Uploading: 11 of 30 (37%)
Jaguar Monitoring Project - Camera 1a
03/06/2020
Cancel

Jaguar Monitoring Project

Identify | Edit photo | Metadata

Author	Computer vision
Identification date	04/02/2020 08:21
Common name	Giant Anteater
Confidence	98%

Accept suggestion

Mark as blank

Edit identification

Highlight Download Delete

Identify | Edit photo | Metadata

Identify this burst of photos by selecting one of the Computer vision's suggestions or add your own identification.

Common name	Red Brocket
Confidence	99%
Present in	3 photos

Mark as blank

Edit identification

Highlight Download Delete

Identify | Edit photo | Metadata

Brightness

Contrast

Saturation

Presets

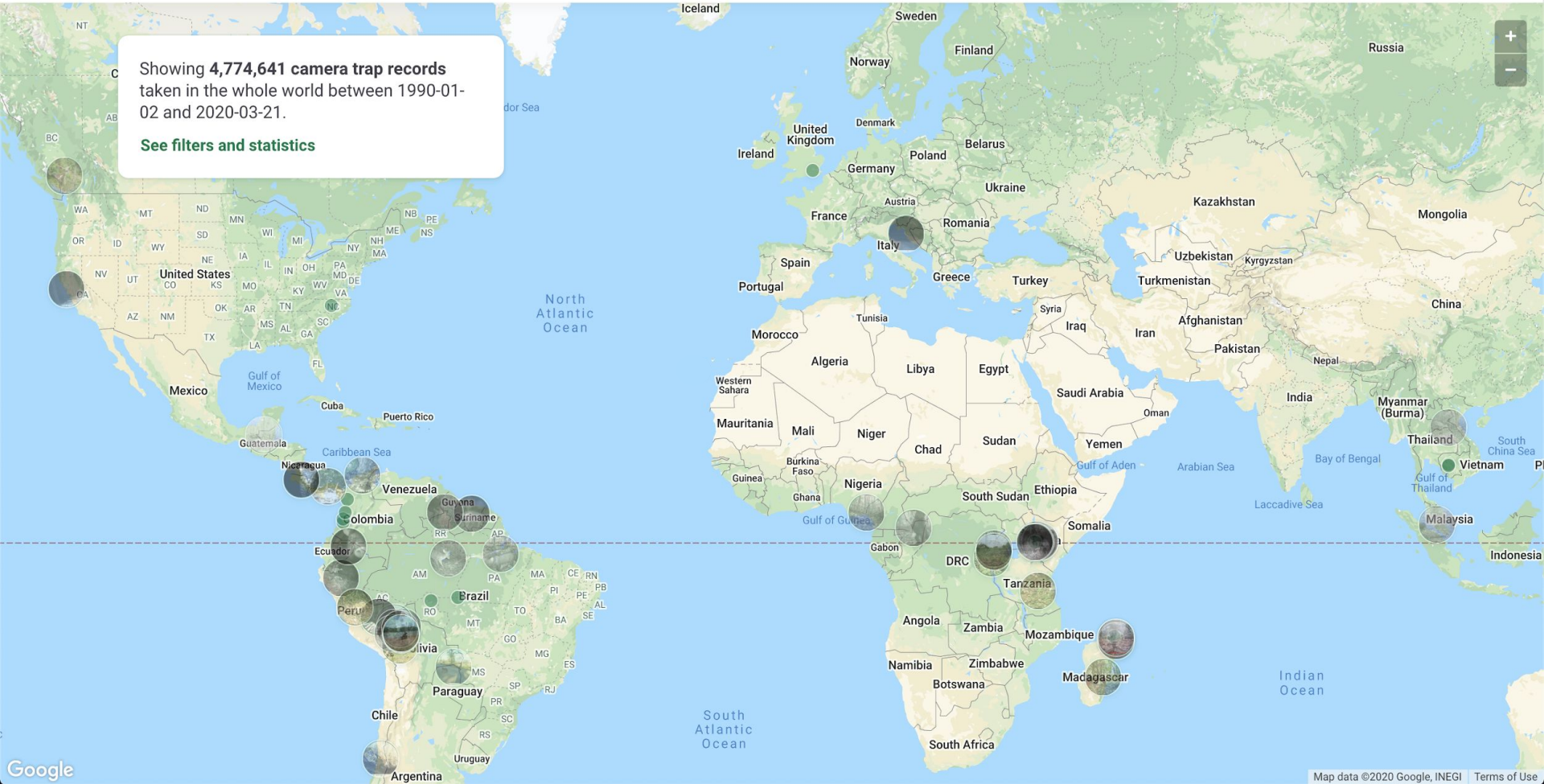
Original

High contrast

Brighter

Darker

Highlight Download Delete


Showing **4,774,641 camera trap records** taken in the whole world between 1990-01-02 and 2020-03-21.
See filters and statistics
Iceland
Sweden
Finland
Norway
Russia
Ireland
United Kingdom
Denmark
Belarus
Poland
Germany
Ukraine
Kazakhstan
Mongolia
France
Austria
Romania
Italy
Spain
Portugal
Greece
Turkey
Uzbekistan
Kyrgyzstan
Turkmenistan
China
Syria
Iraq
Iran
Afghanistan
Pakistan
Nepal
India
Myanmar (Burma)
Thailand
Vietnam
Malaysia
Indonesia
Tunisia
Morocco
Algeria
Libya
Egypt
Western Sahara
Saudi Arabia
Oman
Yemen
Mauritania
Mali
Niger
Chad
Sudan
Burkina Faso
Guinea
Nigeria
Ghana
Gulf of Guinea
South Sudan
Ethiopia
Somalia
Gabon
DRC
Tanzania
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Botswana
Madagascar
South Africa
North Atlantic Ocean
Gulf of Mexico
Mexico
Cuba
Puerto Rico
Guatemala
Nicaragua
Caribbean Sea
Venezuela
Colombia
Guyana
Suriname
Ecuador
Peru
Brazil
Bolivia
Paraguay
Chile
Argentina
Uruguay
South Atlantic Ocean
Gulf of Aden
Arabian Sea
Bay of Bengal
Laccadive Sea
Gulf of Thailand
South China Sea
Indian Ocean
United States
Google
Map data ©2020 Google, INEGI
Terms of Use

Download all data

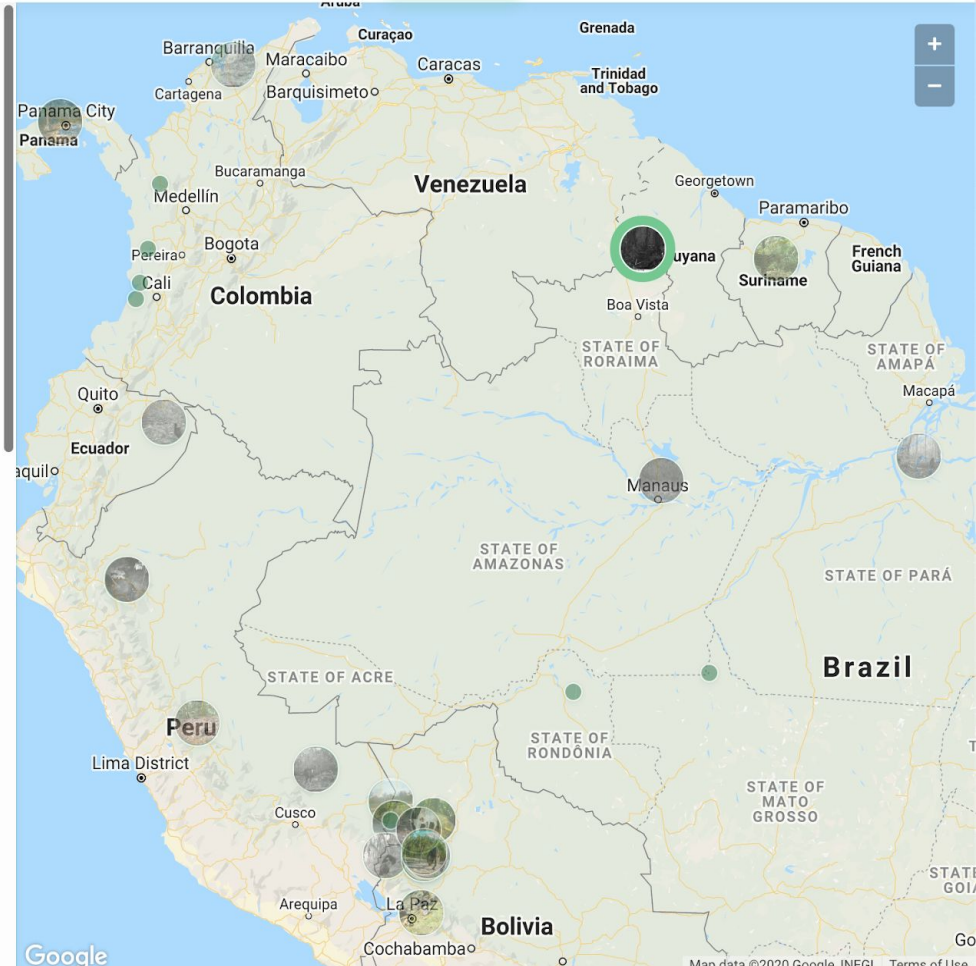
Showing **4,774,641 camera trap records**
of any species
in the whole world
taken between 1990-01-02
and 2020-03-21
and part of any project

848 Species	4,774,641 Total images
3,005 Cameras	8,245 Camera deployments

All camera trap records

Uei-tepui

ICMBio/CENAP



38
Species

2,494
Total images

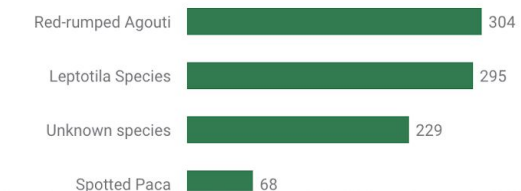
1
Cameras

24
Camera deployments

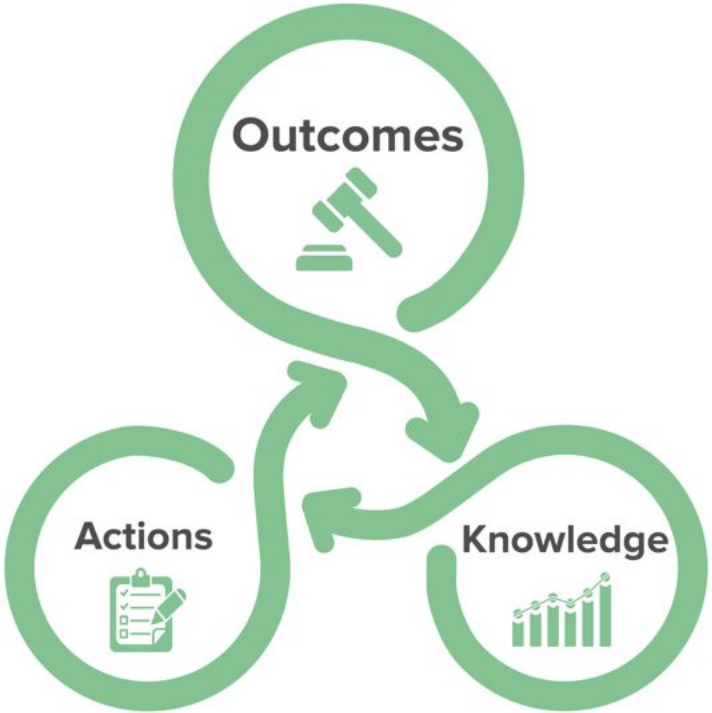
1,417
Wildlife images

Identified species

Count of images per species



But software is not enough



Case Studies

Instituto Chico Mendes de Conservacao da Biodiversidade (ICMBio)

Brazil

Instituto Alexander von Humboldt

Colombia

Instituto Chico Mendes de Conservacao da Biodiversidade (ICMBio)

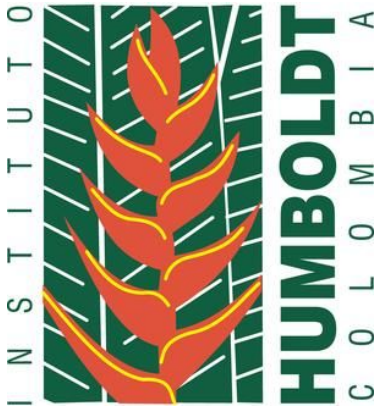
Brazil

- Central role in providing/advising biodiversity knowledge in the country
- Contributing to national biodiversity reports to the CBD
- Ongoing monitoring of PAs within ARPA
- Adopted camera trap protocol from TEAM in 2016
- Started contributing data to WI last year

ICMBio Dashboard Demo

LINK

- In charge of managing and streamlining biodiversity data for the national government
- Collecting camera trap data across several sites in the country
- Involved in citizen science efforts and organizing the first national "camera trapping month" across the whole country
- Started contributing data to WI last year



Instituto Alexander von Humboldt Colombia

Instituto Humboldt Dashboard Demo

LINK


Woodland caribou
Captured on 19/08/2018
Captured on 21/
Est. Population 22839
Living Area 116 mi²
Data projection by WWF
Wild Life
Ruby Mountain
Largehorn Peak
3D
1980
2019
2045

Future Roadmap

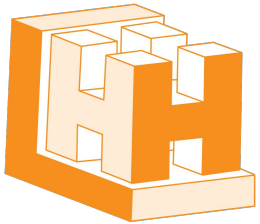
	Users	Images	Species trained	Global Analytics	
2020	1000	20M	900	2	Basic analytics Desktop solution Publications
2021	3000	80M	1200	4	Advanced analytics Video support Automated reports Zooniverse integration
2022	6000	200M	1500	6	Video, acoustic support Interactive learning dashboard Mobile app

By 2025

Catalyze evidence-based wildlife management in 2,000 of the world's largest protected areas through real-time data on wildlife distribution and abundance.

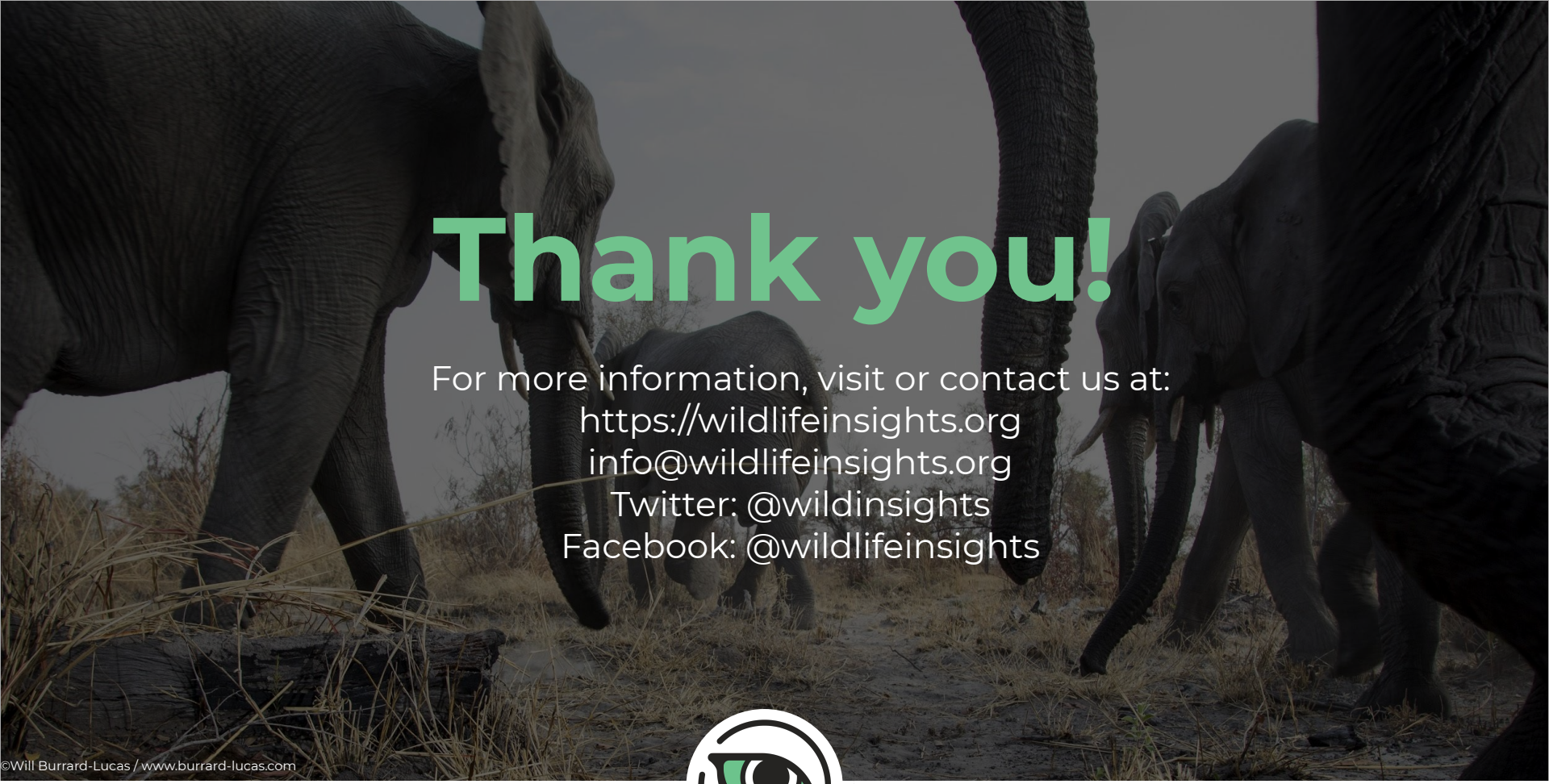
Supporters

GORDON AND BETTY MOORE FOUNDATION



LYDA HILL

Google



Thank you!

For more information, visit or contact us at:
https://wildlifeinsights.org
info@wildlifeinsights.org
Twitter: @wildinsights
Facebook: @wildlifeinsights

ZSL LET'S WORK FOR WILDLIFE · Google · CONSERVATION INTERNATIONAL · Wildlife Conservation Society · North Carolina Museum of Natural Sciences · Smithsonian · WWF · MOL MAP OF LIFE