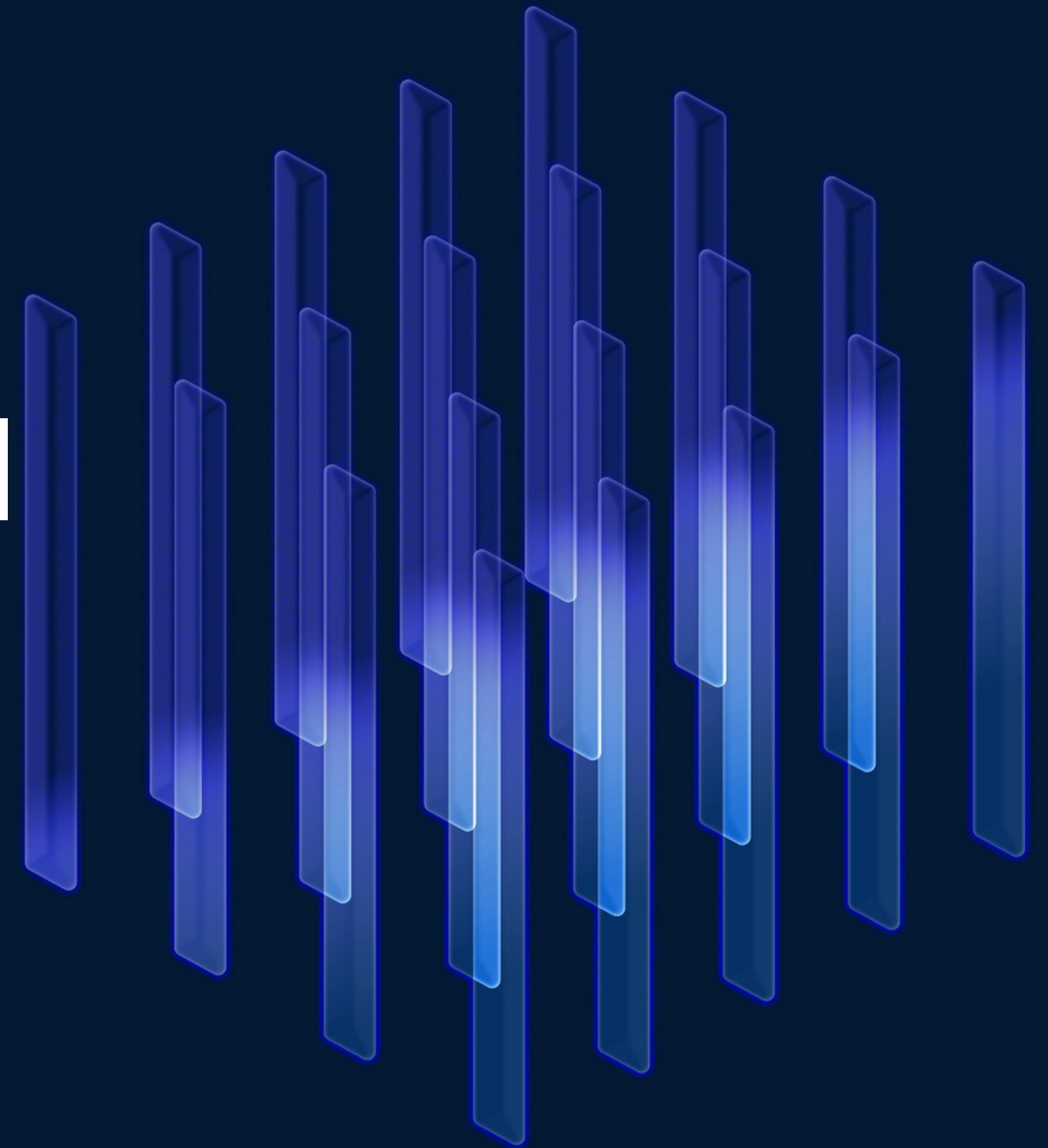




Building Scalable Infrastructure for Ecological Modelling and Wildlife Monitoring in Australia

Renuka Sharma / 21-Oct-2025



Acknowledgement of Country



We would like to acknowledge the Traditional Owners of the lands on which we are meeting today, the Turrbal and Jagera people.

We also acknowledge the Traditional Owners of the lands on which we have travelled from and where we conduct our research.

We acknowledge the continuing connection to their culture and pay our respects to their Elders past and present.



Building Scalable Infrastructure for Ecological Modelling using...



It started with a USB...

The EcoCommons Team



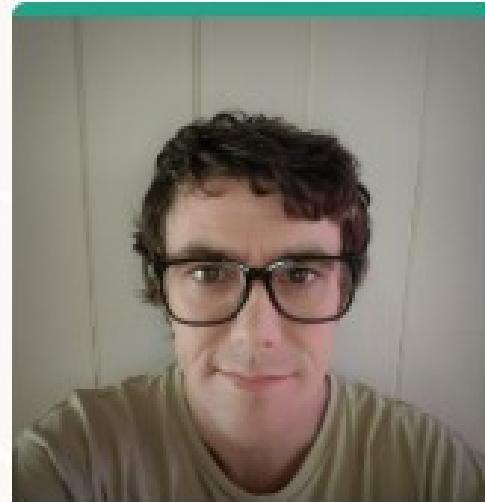
Dr Jenna Wraith

Program Manager &
Principal Data
Scientist



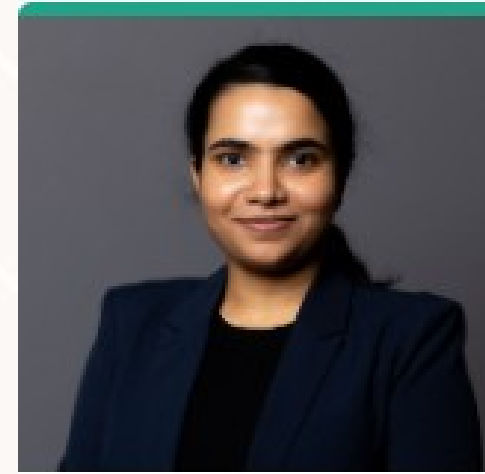
Abhimanyu Raj Singh

Data Ecologist



Dr Ryan Newis

Data Scientist
(Ecological
Modelling)



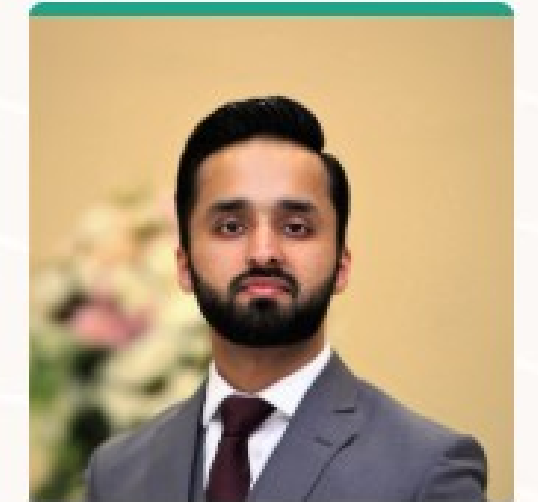
Dr Renuka Sharma

Data Scientist
(Computer Vision &
Ecology)



Xiang Zhao

Software Developer &
R Specialist



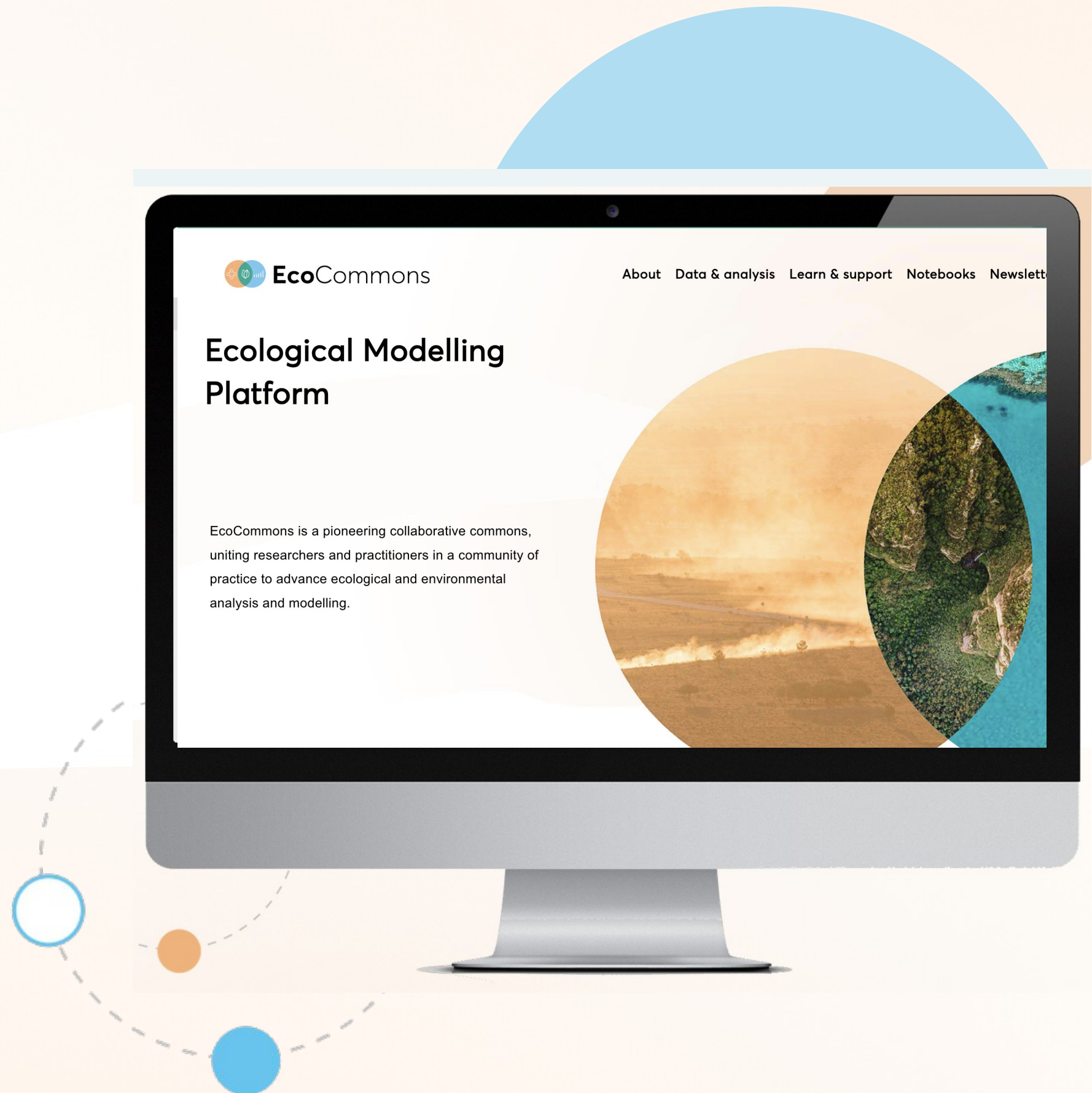
Nauman Khattak

Software Engineer

And now, it's...



- Free & open-source
- Cloud-based platform
- Built on R and Python
- Access to trusted data
- Tools for modelling & analysis
- Point-and-click or R code





Key Features of EcoCommons



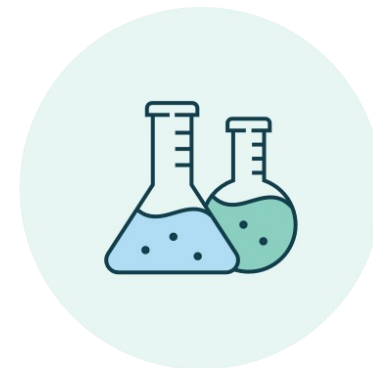
Thousands of data-sets in one place



Easy data wrangling



Trusted models & algorithms



Jupyter notebooks



Cloud-based computing storage



FAIR scientific workflows and results



High impact quality results

EcoCommons Community

EcoCommons Australia is a joint initiative of the Australian and Queensland Governments and is supported by the Australian Research Data Commons (ARDC). The ARDC is funded by NCRIS.

Our partners & collaborators



Building Scalable Infrastructure for Wildlife
Monitoring using...

Wildlife Observatory of Australia (WildObs)

First National Infrastructure for Automated Wildlife Image Analysis

Dr Renuka Sharma, Dr Jenna Wraith, Daraka Hewa Vithanage, Jo Morris, Dr Matthew Luskin, Dr Renee Piccolo, Dr Zachary Amir, Muhammad Yasir



The WildObs team



Sustainable Futures

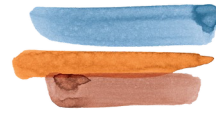
Dr Renuka Sharma,
Data Scientist (Computer Vision and Ecology),
QCIF
r.sharma@qcif.edu.au



ARDC is enabled by NCRIS



tern
Ecosystem Research Infrastructure

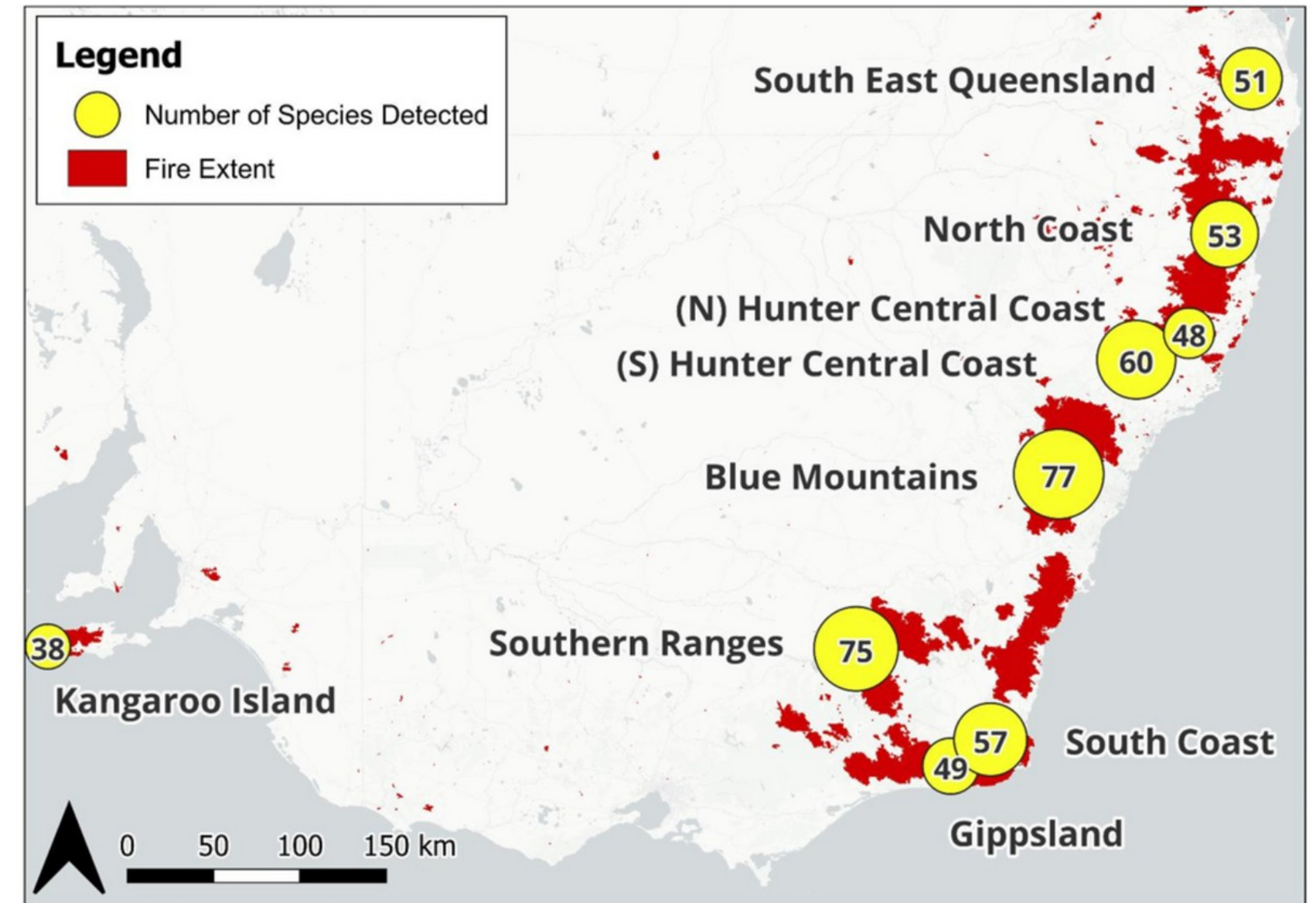


Bush Heritage Australia



Impact Case Study: Eyes on Recovery

- Launched by WWF-Australia & Google in response to the 2019–2020 bushfires
 - All images catalogued in Wildlife Insights
 - 1,023 camera sites across 9 landscapes
 - Over 240,000 trap nights
 - >8 million images → 475,000 independent detections
- WildObs lead the analysis
 - Species accumulation curves per landscape
 - Single-season occupancy models
 - Occupancy trends corrected for imperfect detection
 - The final report included detailed results for 26 species:
 - 11 priority native species
 - 4 invasive species
 - 11 common species



Highlighting key management actions & many lessons learned



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Article | [Open access](#) | Published: 13 November 2024

Biodiversity impacts of the 2019–2020 Australian megafires

[Don A. Driscoll](#), [Kristina J. Macdonald](#), [Rebecca K. Gibson](#), [Tim S. Doherty](#), [Dale G. Nimmo](#), [Rachael H. Nolan](#), [Euan G. Ritchie](#), [Grant J. Williamson](#), [Geoffrey W. Heard](#), [Elizabeth M. Tasker](#), [Rohan Bilney](#)

Lessons Learned from Eyes on Recovery

- Exposed major gaps in data access and availability
- Revealed how limited data sharing hinders coordinated responses
- Showed the value of scalable, standardised analytics for landscape-level insight
- Highlighted the importance of data standards and data sharing agreements for future reusability
- Models in wildlife insights didn't work well for Australian species

Demonstrated the need for national infrastructure to store, access, and analyse camera data



Learn more about Eyes on Recovery here

The challenge

**Australia is a
global leader
in wildlife
cameras**



Cameras Are Everywhere, But
Data Stays Trapped

**Lack
resources to
manage,
analyse and
share data**



Manual image processing
Offline storage, inconsistent formats
Lack of access to advanced analytics

**Need the data
for better
conservation,
management
and research**



Long term species trends & monitoring
Contributing data to TXS and government
reporting

WildObs: A National Commons for Wildlife Camera Data

WildObs is revolutionising wildlife monitoring across Australia by providing a scalable, integrated system that supports biodiversity conservation and research.



Who is WildObs for



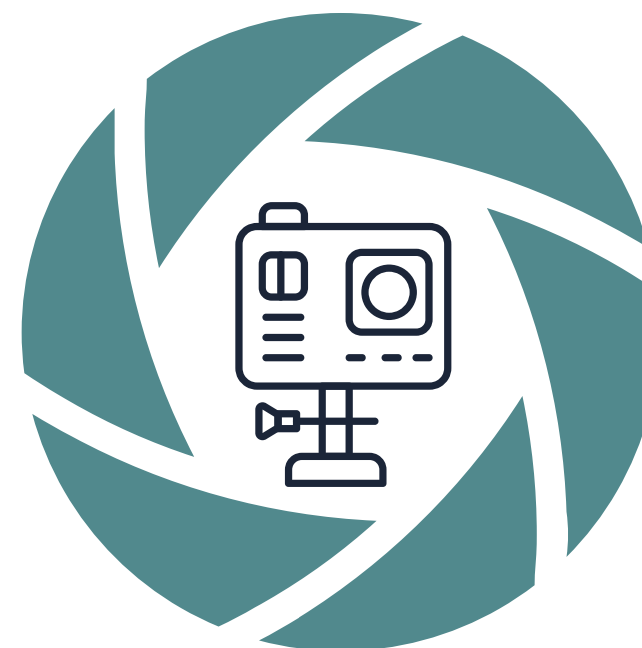
Environmental
Organisations



Government



Researchers

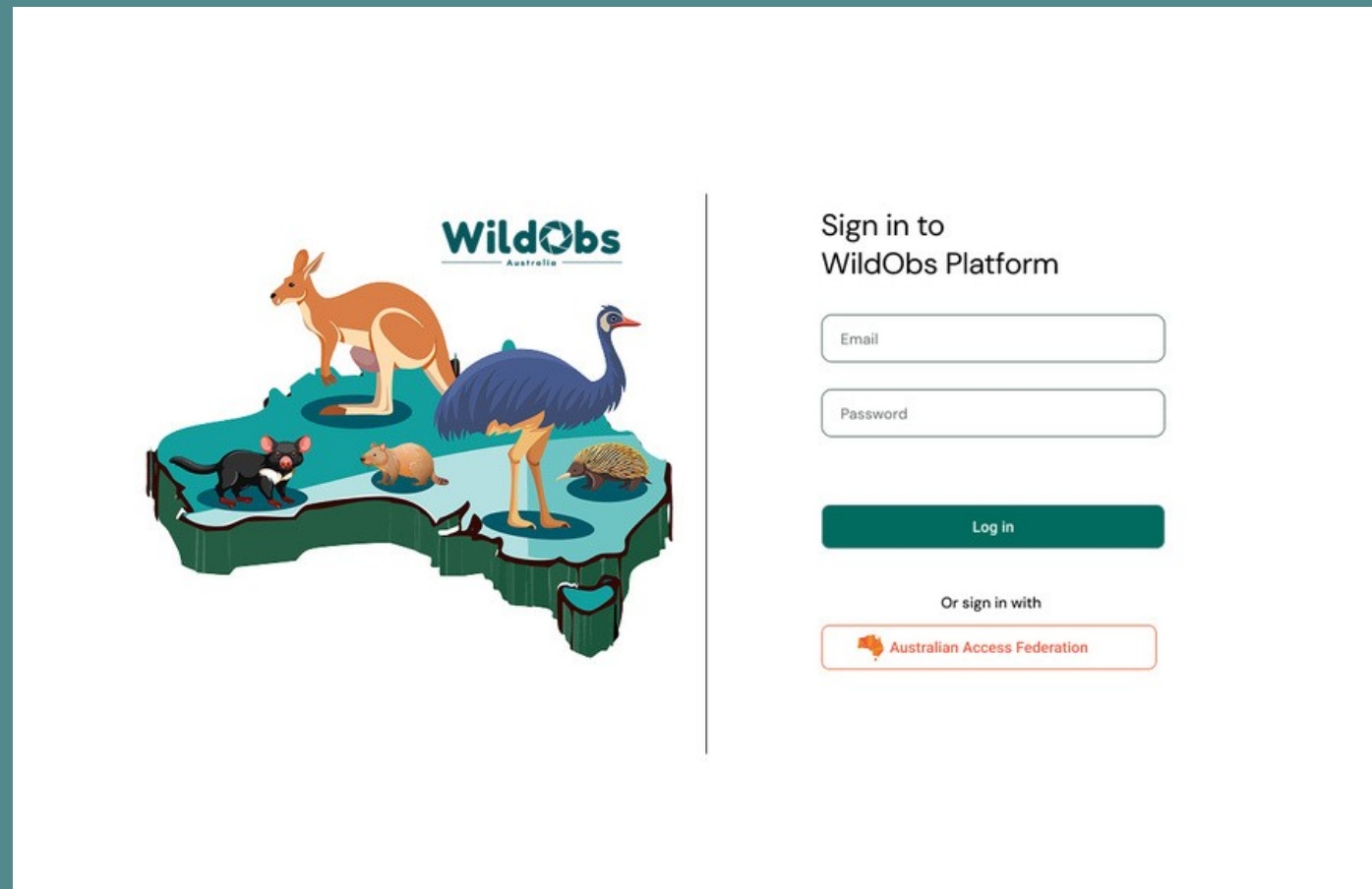


NGOs

WildObs will be freely available for users to efficiently analyse and share biodiversity data, tackling challenges like inconsistent formats and complex processing requirements.

How will it work

wildobs.org.au



The screenshot shows the main dashboard of WildObs Australia. At the top left is the WildObs Australia logo. To its right is the text 'Wildlife Observatory of Australia' and 'Australia's national platform for processing and sharing wildlife camera data', with a 'Learn More' button. On the far right is a user profile icon labeled 'Hi User'. Below the header are four main service cards: 'Image Management Platform' (powered by Agouti.eu), 'Tagged Image Repository' (powered by Atlas of Living Australia), 'Data standardisation & camera database', and a 'Help' button. To the right of these cards are two data visualizations: a map of Australia showing camera deployment density and a pie chart showing species distribution. The map legend shows deployment counts from 0 to 1433-1916. The pie chart lists species groups with their respective counts and percentages.

Species Group	Percentage	Count
Diprotodontia	52.5%	331,830
Carnivora	2.6%	16,690
Passeriformes	2.9%	18,037
Artiodactyla	3.3%	20,900
Rodentia	4.1%	25,626
Peramelemorphia	5.6%	35,285
Casuariformes	5.7%	36,113
Lagomorpha	8.8%	55,693
Galliformes	9.3%	58,537
Other birds	1.8%	11,880
Dasyuromorphia	1.4%	8,730
Monotremata	1.1%	7,134
Other mammals	0.8%	5,246

Projects: 10
Deployments: 1922
Images: 12,256,478
Species: 58

Number of camera deployments:
0
1-30
30-92
92-199
199-345
345-472
472-636
636-798
798-1039
1039-1433
1433-1916

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WildObs Australia

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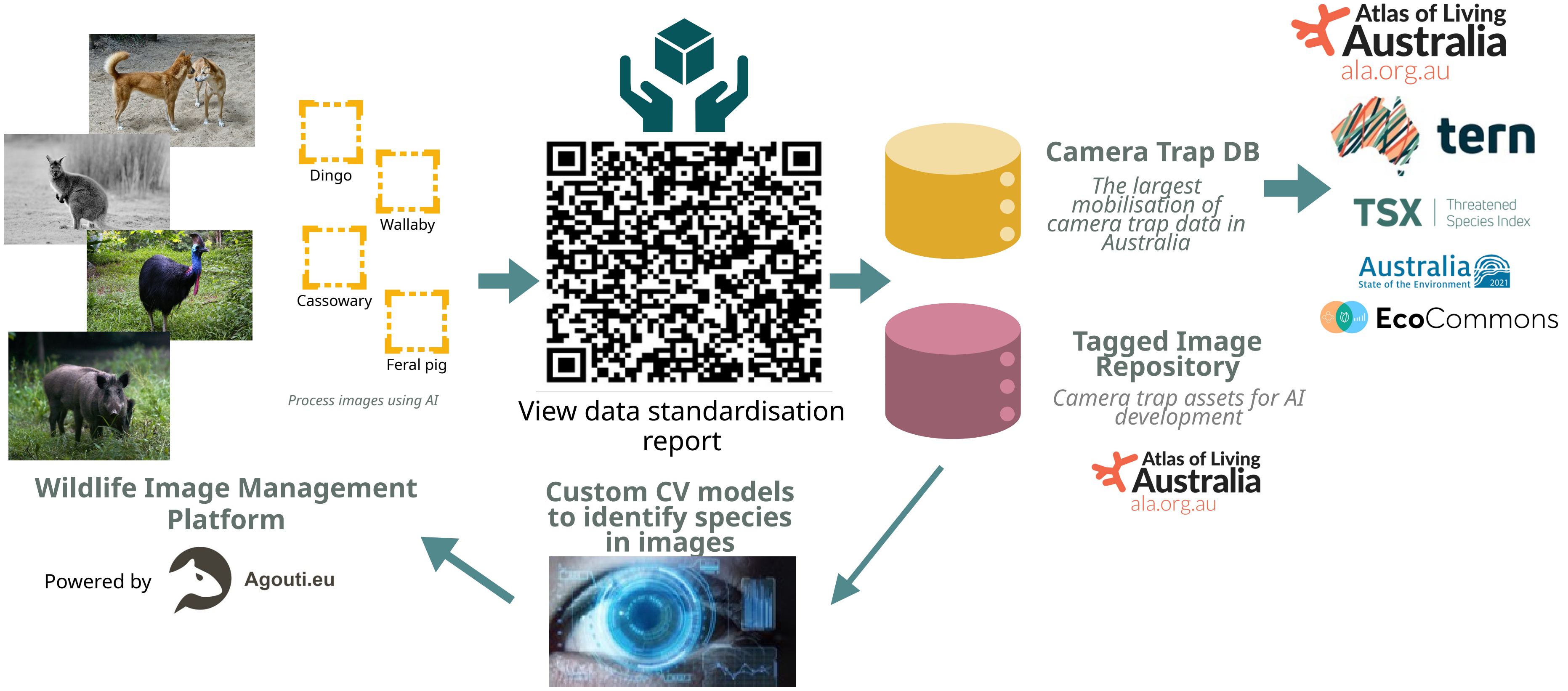
Our partners



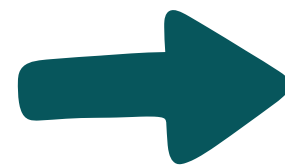
Quick Links

- [Image Management Platform](#)
- [Data Standardisation & Camera Database](#)
- [Tagged Image Repository](#)
- [Contact us](#)
- [Private Policy](#)

WildObs Infrastructure



Tagged image repository for model training



A screenshot of the Atlas of Living Australia website. The top navigation bar includes "Home", "Data partners", and "WildObs". The main content area is titled "WildObs" and includes a "Description" section with text about the WildObs initiative, a "Data access" section with links for "View records", "Download usage stats", and "Alert me about new records", and a "Location" section with a link to "Visit the data provider's website".

A screenshot of the WildObs occurrence records page. It shows a search bar with "29,820 records returned of 29,820 for Data provider: WildObs". Below the search bar are tabs for "Records", "Map", "Charts", and "Record images". A section titled "Images from occurrence records" displays four small images of forest scenes, with labels "Aves" and "Mammalia" below them. The bottom of the image shows labels for "Heteromyas cinereifrons" and "Canis dingo".

A screenshot of the GBIF dataset page for "Camera trap surveys in Queensland's Wet Tropics 2022-2023". The page is titled "OCCURRENCE DATASET | REGISTERED JUNE 5, 2025". It includes a "Published by WildObs" badge and a "DATASET" tab. The main text describes the data collection by Zachary Amir and the Ecological Cascades Lab at the University of Queensland. A "WildObs" badge is also present, along with publication and metadata dates, and a "Licence: CC BY 4.0" notice.



What is the Wildlife Image Management Platform?

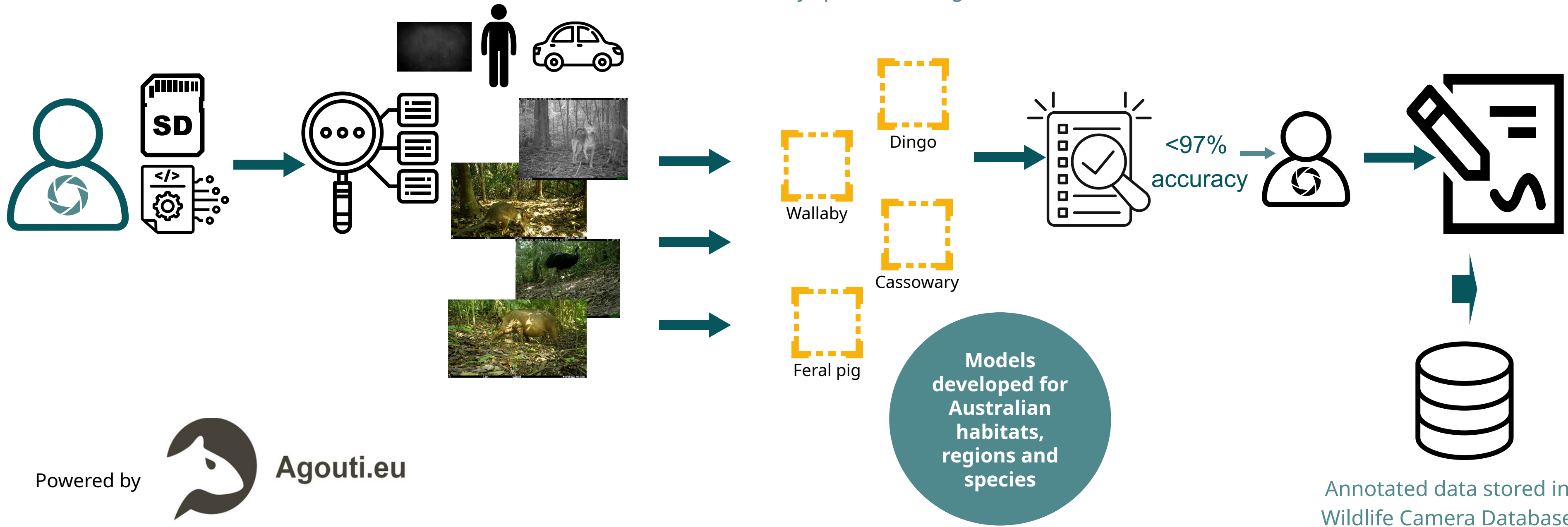
Users upload wildlife camera data and select terms of data use

MegaDectector: image classified into wildlife, human, blank, or vehicle

For wildlife images, computer vision models identify species in image

Human validation if AI accuracy/precision <97%

Data is annotated

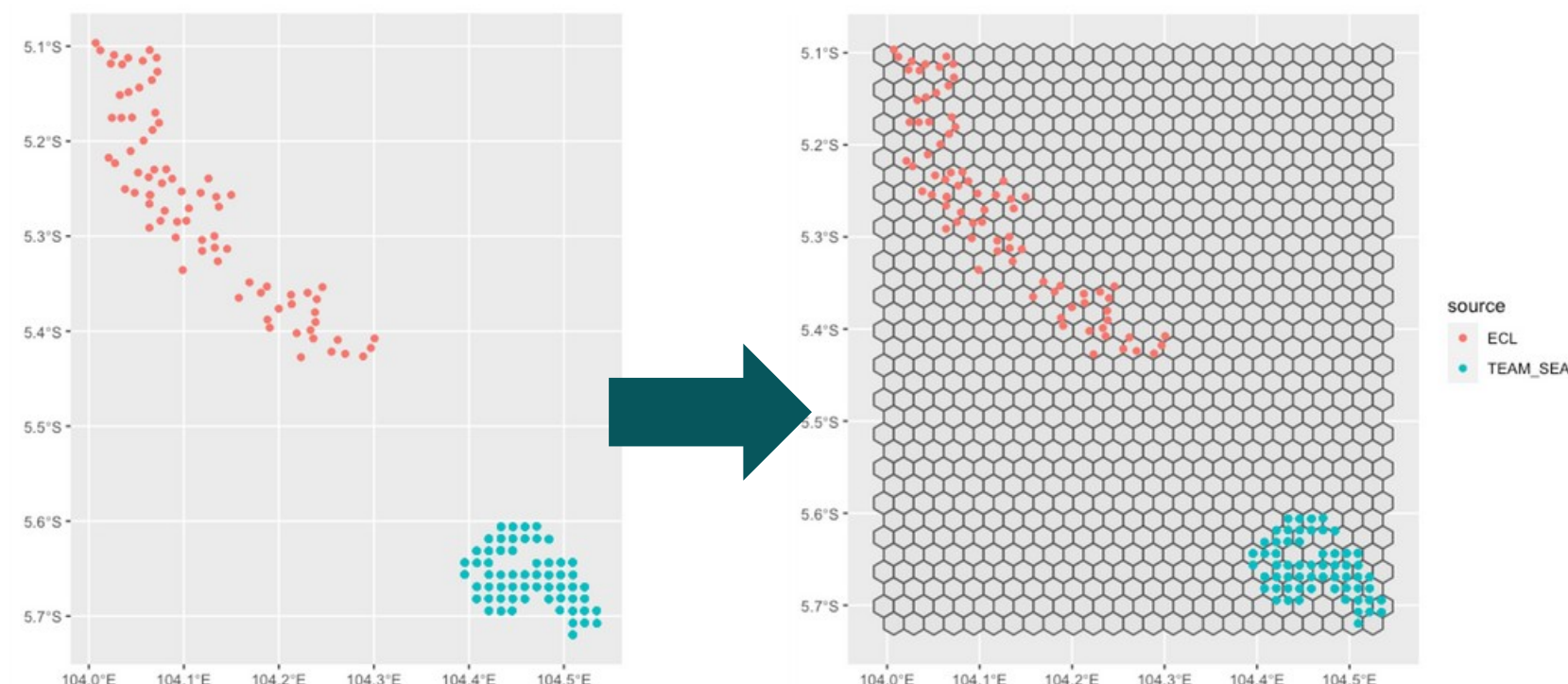


WildObs R package for standardisation & analysis



A suite of R tools for data standardisation & analysis

- Standardisation example functions
 - `apply_schema_types()`
 - `survey_and_deployment_generator()`
- Analysis
 - `resample_covariates_and_observations()`
 - `matrix_generator()`



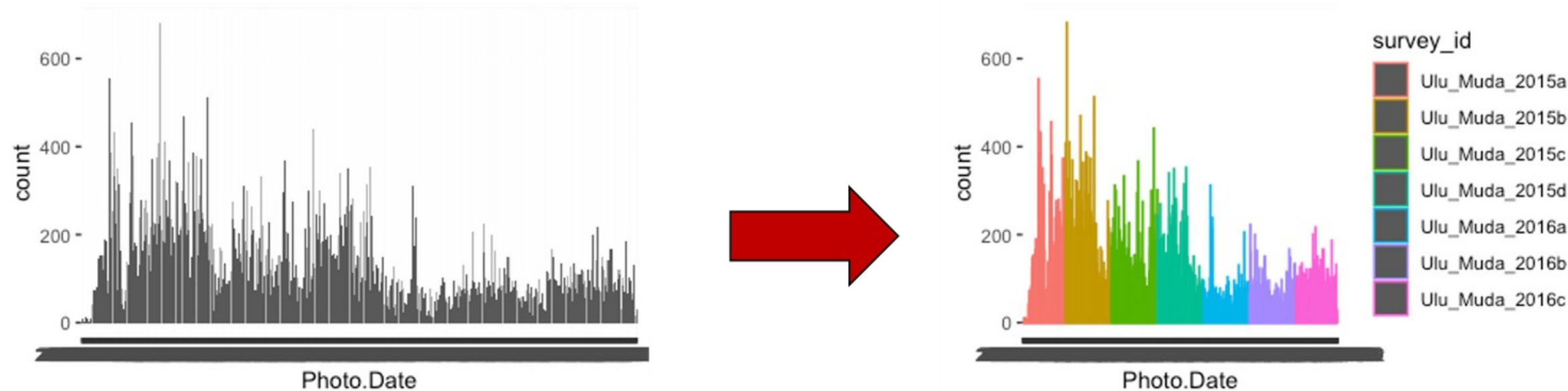
```
R: Determine Single-Season Sampling Efforts from Camera Trap... - Find in Topic
survey_and_deployment_generator (WildObsR) R Documentation

Determine Single-Season Sampling Efforts from Camera Trap Images

Description
This function analyzes date/time information from camera trap images to identify spatially and temporally discrete sampling efforts. The function updates the input data with new survey and deployment IDs by analyzing spatial and temporal patterns in camera detections. Users can specify the maximum duration of a survey and the maximum gap between detections before a new survey is triggered. This is useful for organizing images into surveys and deployments for further analysis.

Usage
survey_and_deployment_generator(
  caps,
  deps,
  cam_long = 20,
  max_dur = 100,
  szn_filter = TRUE,
  cam_filter = TRUE
)

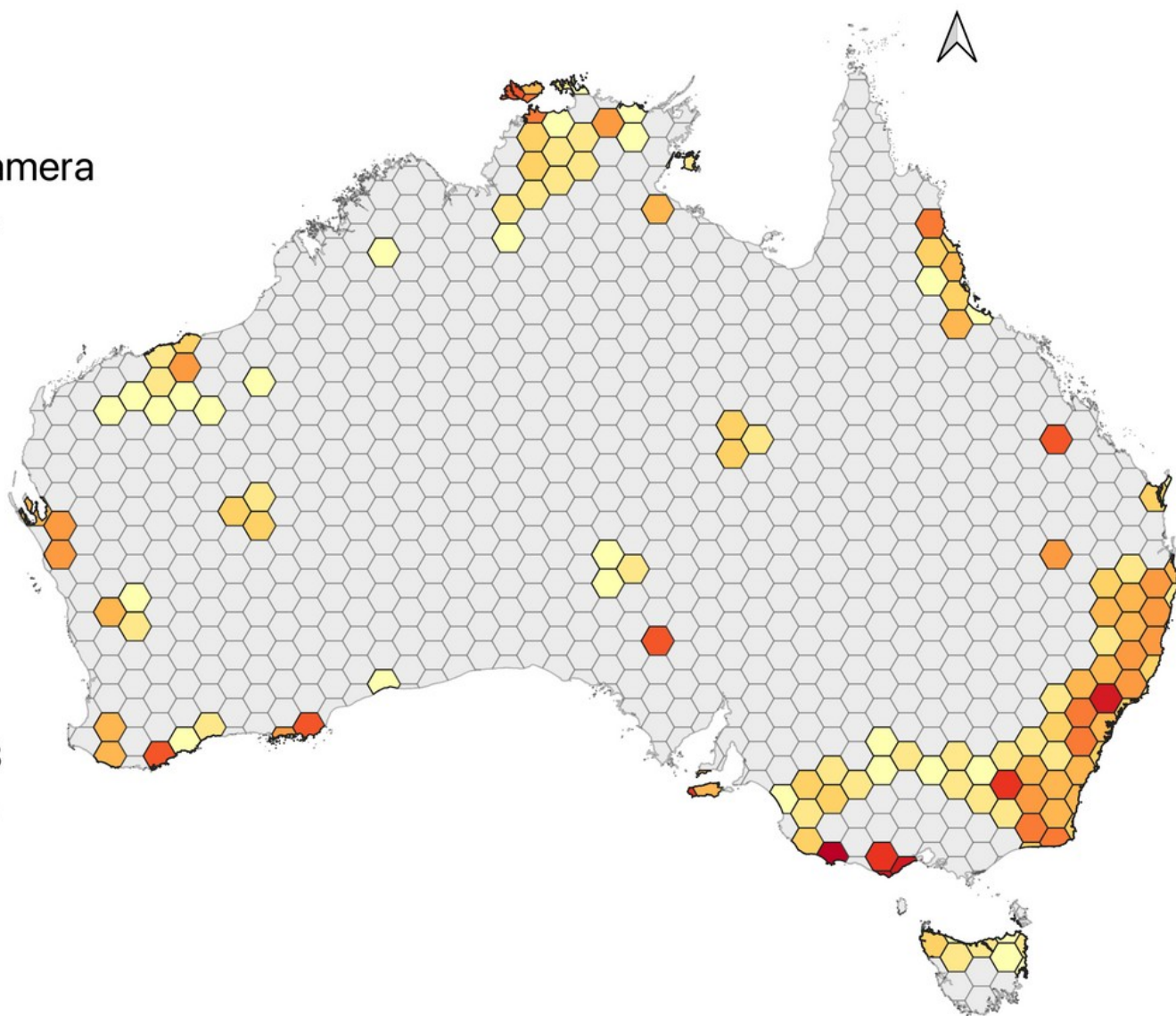
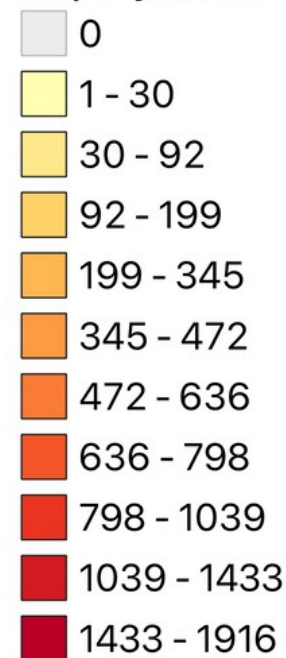
Arguments
caps      A data frame of camera trap observations that contains date/time information for each image. It must include columns named eventStart, deploymentID, dataSource, and locationName.
deps      A data frame of camera deployments that contains location information for each camera deployment. It must include columns named deploymentID and locationName.
cam_long  A numeric value (in days) representing the maximum gap between detections before a new survey is started. Defaults to 20 days.
max_dur   A numeric value (in days) representing the maximum duration a survey can last before starting a new one. Defaults to 100 days.
```



Cleaned and curated analysis-ready data downloaded directly to your computer!

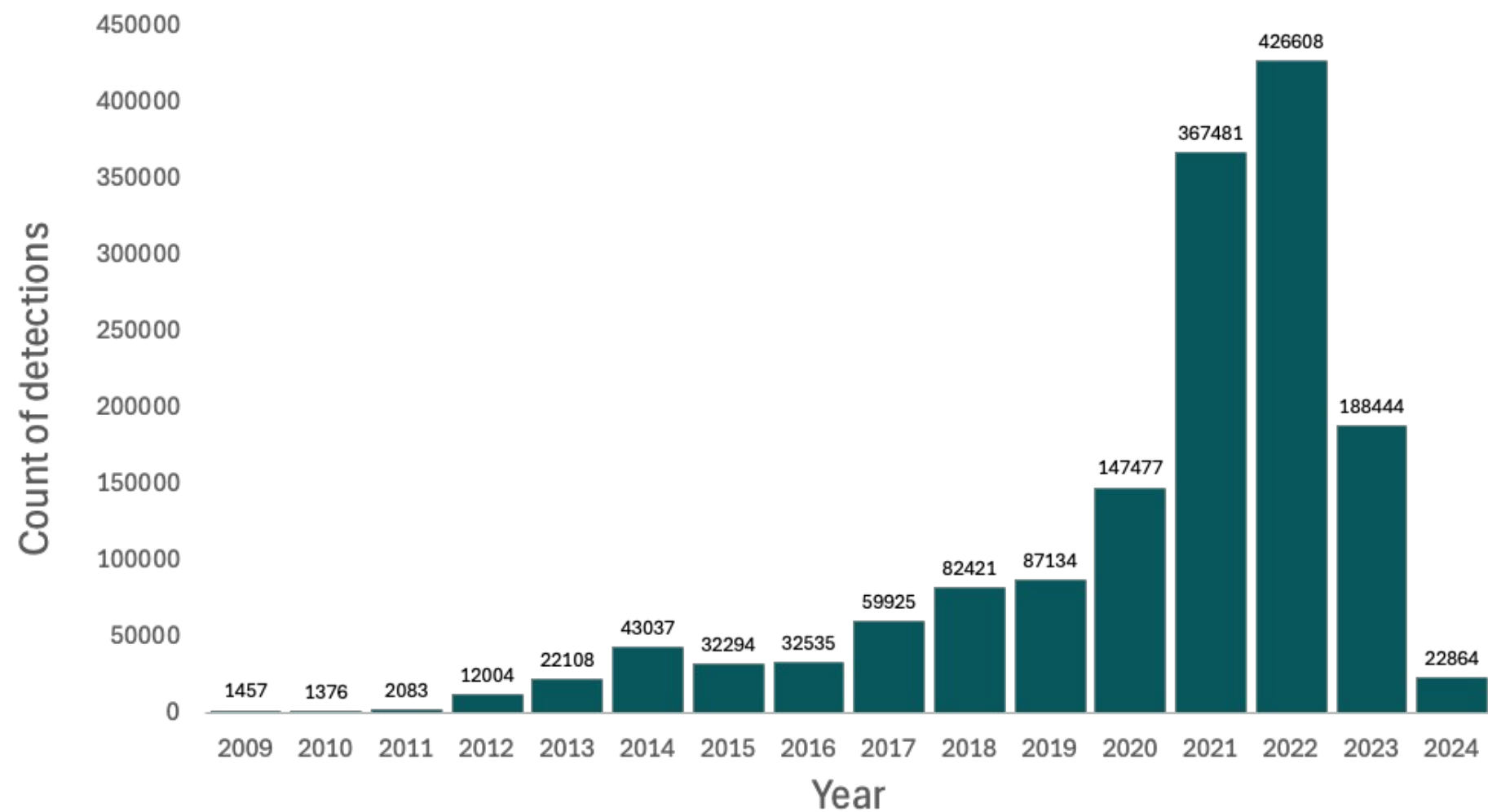
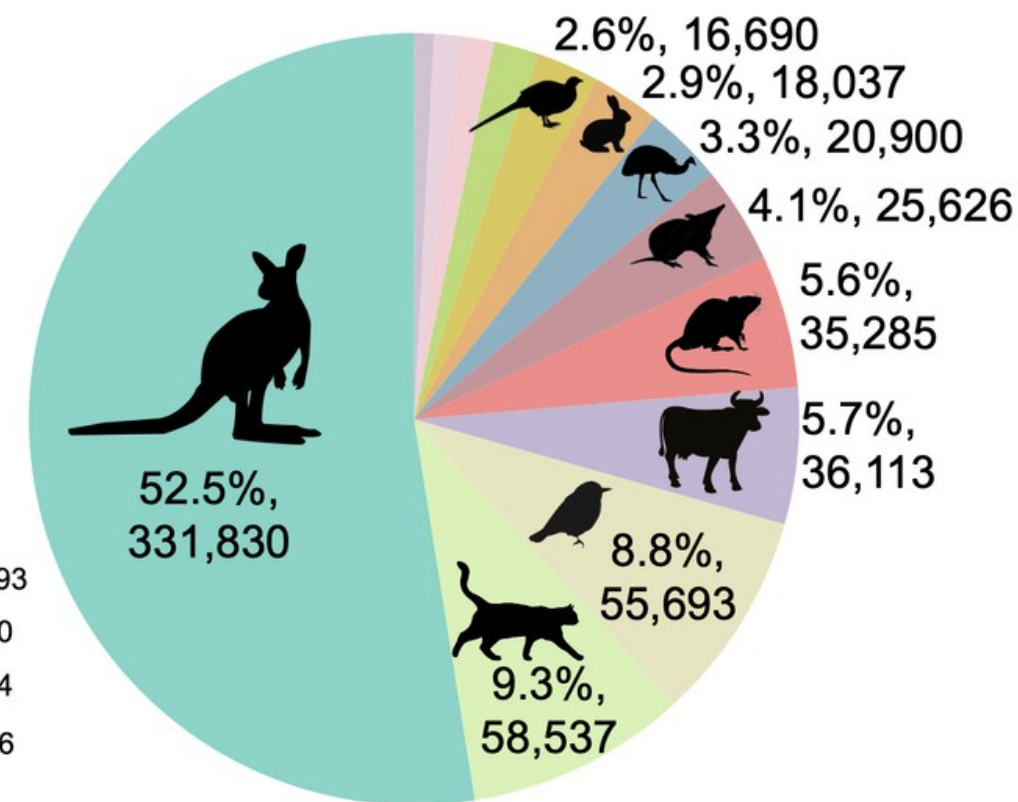
Our growing dataset

Number of camera deployments



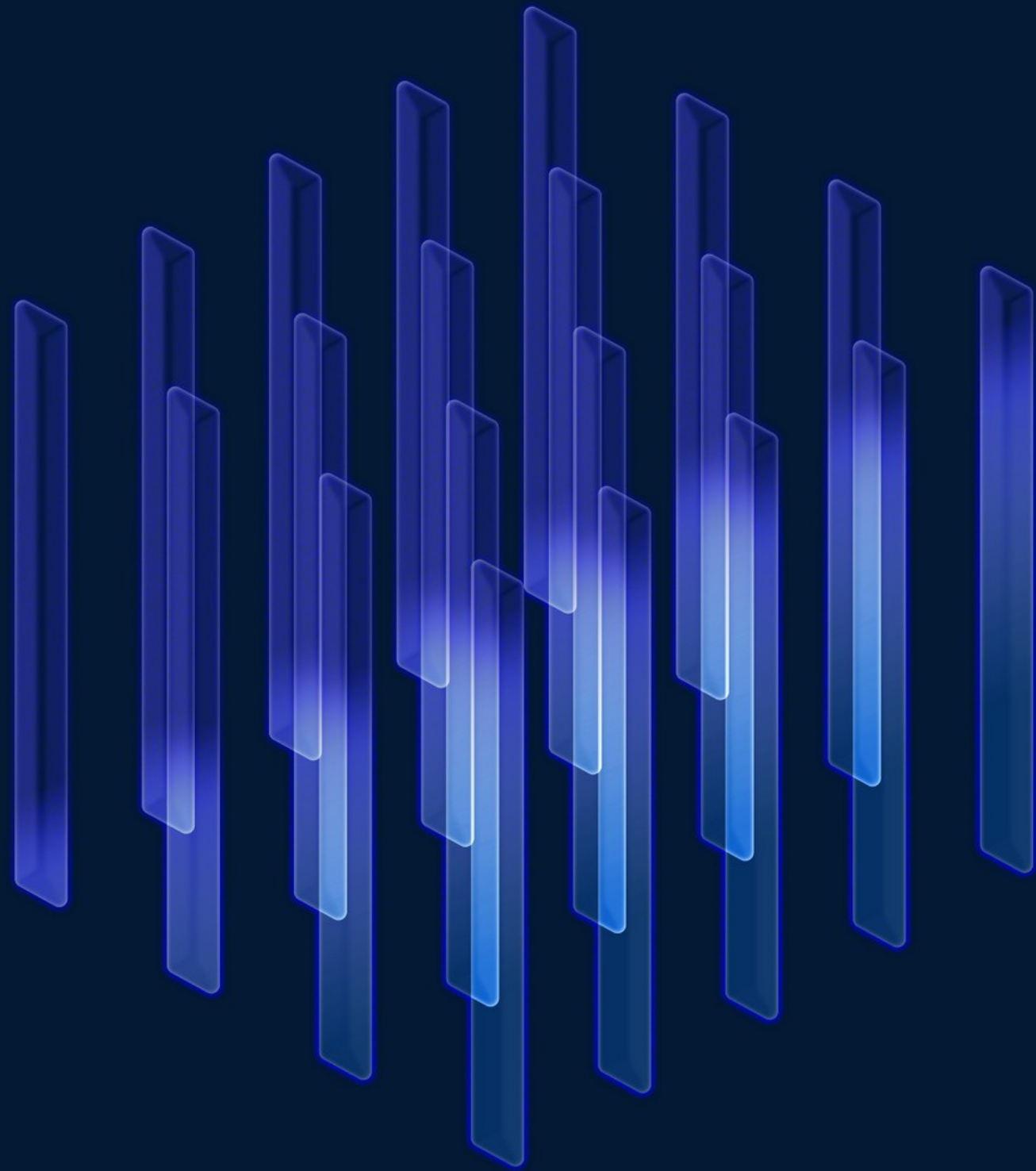
Please get in touch to contribute!

Diprotodontia
Carnivora
Passeriformes
Artiodactyla
Rodentia
Peramelemorphia
Casuariiformes
Lagomorpha
Galliformes
Other birds
Dasyuromorphia
Monotremata
Other mammals



WildObs thanks its partners & collaborators





Thank you!

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 0000-0001-8046-4427

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