Human Wildlife Conflict

Iain Cameron

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MOTIVATION

- Scottish startup founded in 2020 to develop AI for wildlife and environmental monitoring
- Initial focus on replacing helicopter counts of Red Deer in Scotland
- ESA supported extending this work to animal census in Africa
- This has led to a new ESA funded project mapping risks of human-wildlife conflict

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CHALLENGES FOR AMIMAL CENSUS AT SCALE

- Regular census is vital for understanding health of populations
- Helicopter counts widely used, but expensive and can be risky
- Satellite imagery has potential, but there are limitations:
  - Max resolution ~30cm
  - Small image footprints (e.g. 20km swath)
  - Expensive
  - Manual counts very time consuming
  - AI algorithms need quality training data

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EOLAS

AI for Habitat Monitoring and Animal Census

Overview

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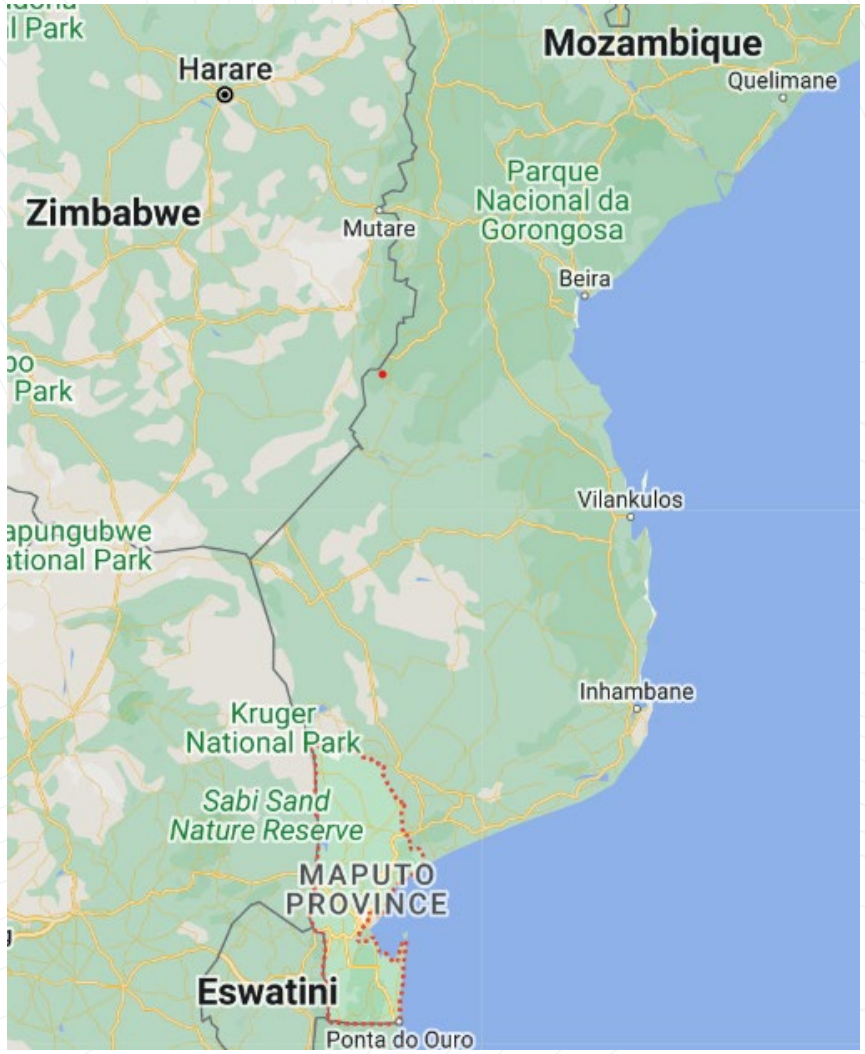
EOLAS

AI4AC

- Funded through the ESA EO Science for Society funding call
- Investigated environmental and biodiversity factors within the Maputo National Park in Mozambique
- Project developed satellite imagery and machine learning pipelines for:
  - Census of large, land herbivores (elephants, giraffes, zebras, etc).
  - Habitat classification
  - Habitat fire risk assessment



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PEACE PARKS™ FOUNDATION

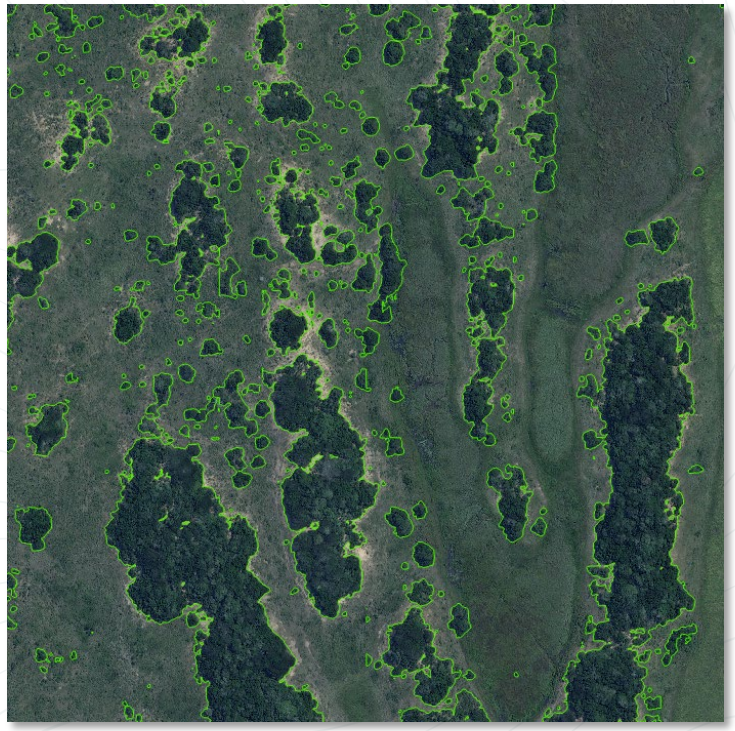
USER REQUIREMENTS

- Key learnings from Peace Parks:
  - Sophisticated monitoring, GIS and data management in place
  - Attempts made to have rangers collect and share data, but struggling with uptake.
  - Human wildlife conflict, particularly with elephants, a key concern
    - Elephants damage crops
    - Frequently killed by villagers or poached

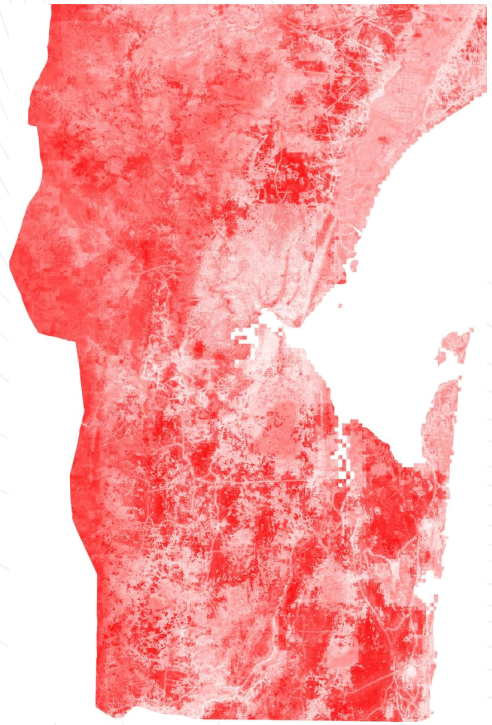
DEMONSTRATION SERVICES

Animal detection using convolutional deep learning algorithm

Brush mapping using semantic segmentation



Monthly fire risk using random forest classifier



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EOLAS
Project Mali Elephants
Overview
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Project Mali Elephants

- Small project commissioned project by Wild foundation
- Aim to conduct elephant census to understand the impact of poaching on the previously tracked groups.
- Mopti region chosen as elephant patterns well understood

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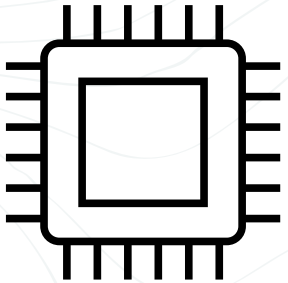
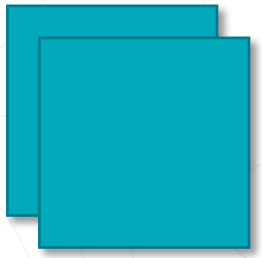
EXPANDING ELEPHANT DETECTION ALGORITHM TO MALI

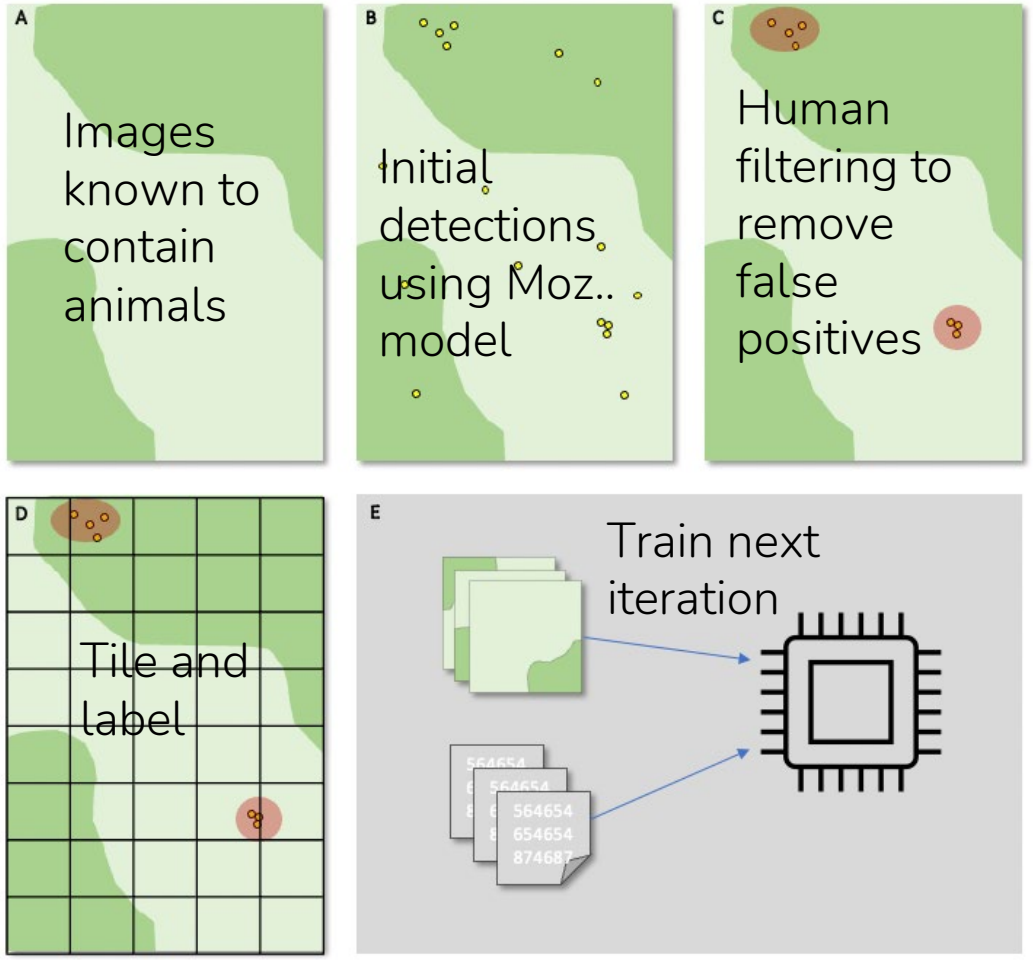
Model trained on Mozambique



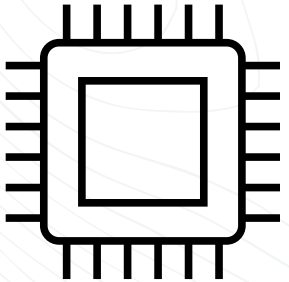
Subset of images from Mali



Iterative training data collection



Model expanded to Mali



Run over whole image dataset

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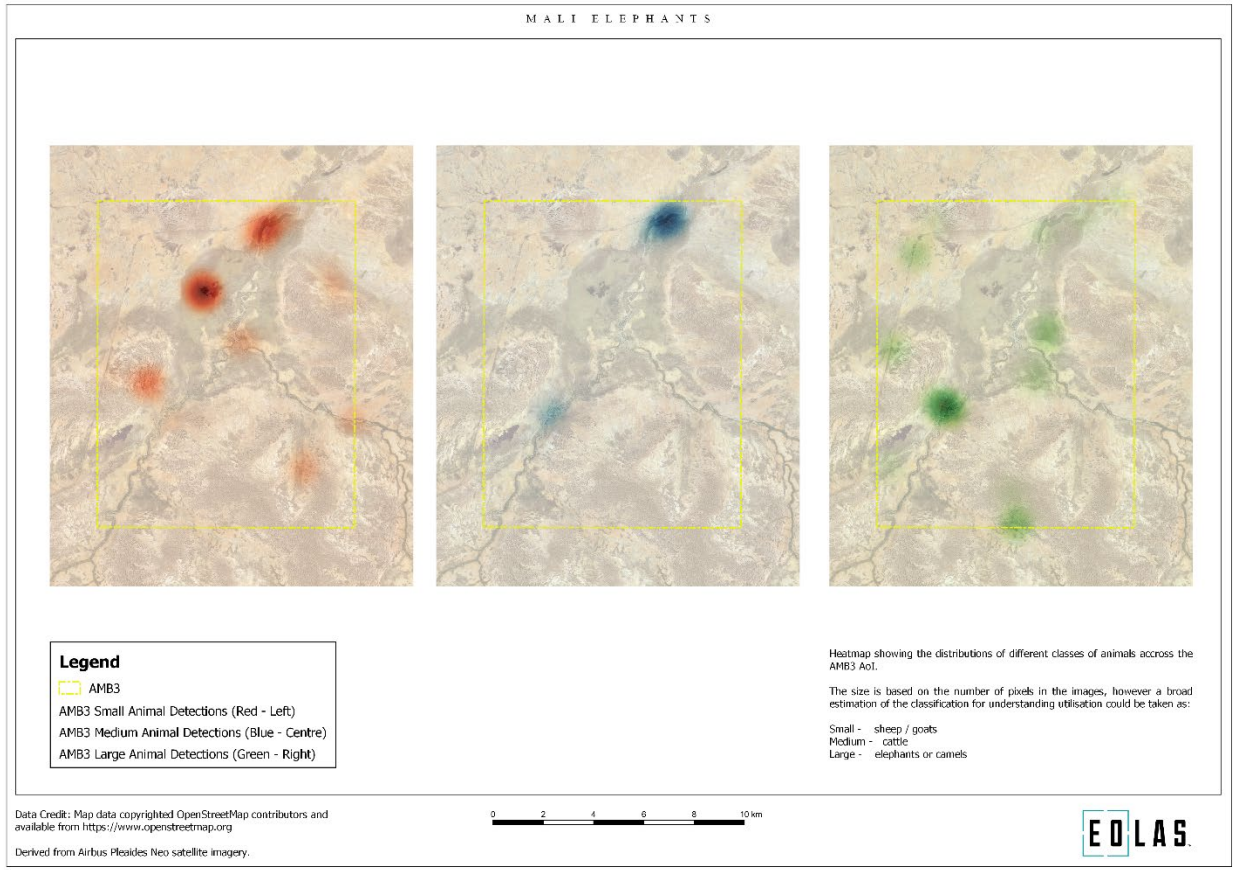
OUTPUTS

Elephant detections

Animal Heatmaps



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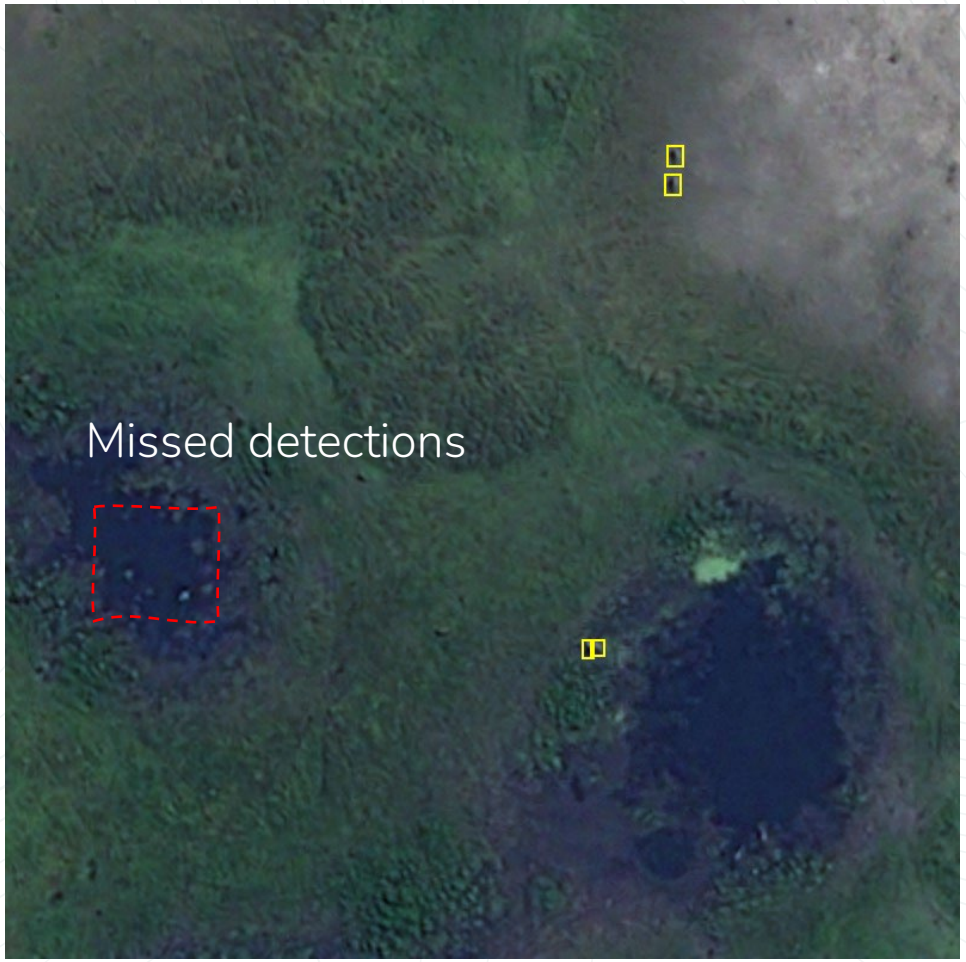
LIMITATIONS

- Analysis found poor correlation between AI detections and ground survey counts.
- Why?
  - Data collected during dry season with satellite overpass times centred around midday
  - Animals were often taking cover under vegetation or sheltering in water
  - Animals in open had sun overhead reducing strength of shadows




EOLAS
Human Wildlife Conflict
Overview
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Project overview

- ESA funded project (Apr 2024 - May 2025)
- Aim:
  - Develop a data portal for managing human wildlife conflict (HWC) at landscape scale
  - Bring together our distinct AI / analytics pipelines into a smarter whole
- Objectives:
  - Create datasets that map HWC risk factors for the study area
  - Create a combined HWC risk layer
  - Create a portal that provides risk layer and datasets for conservation managers

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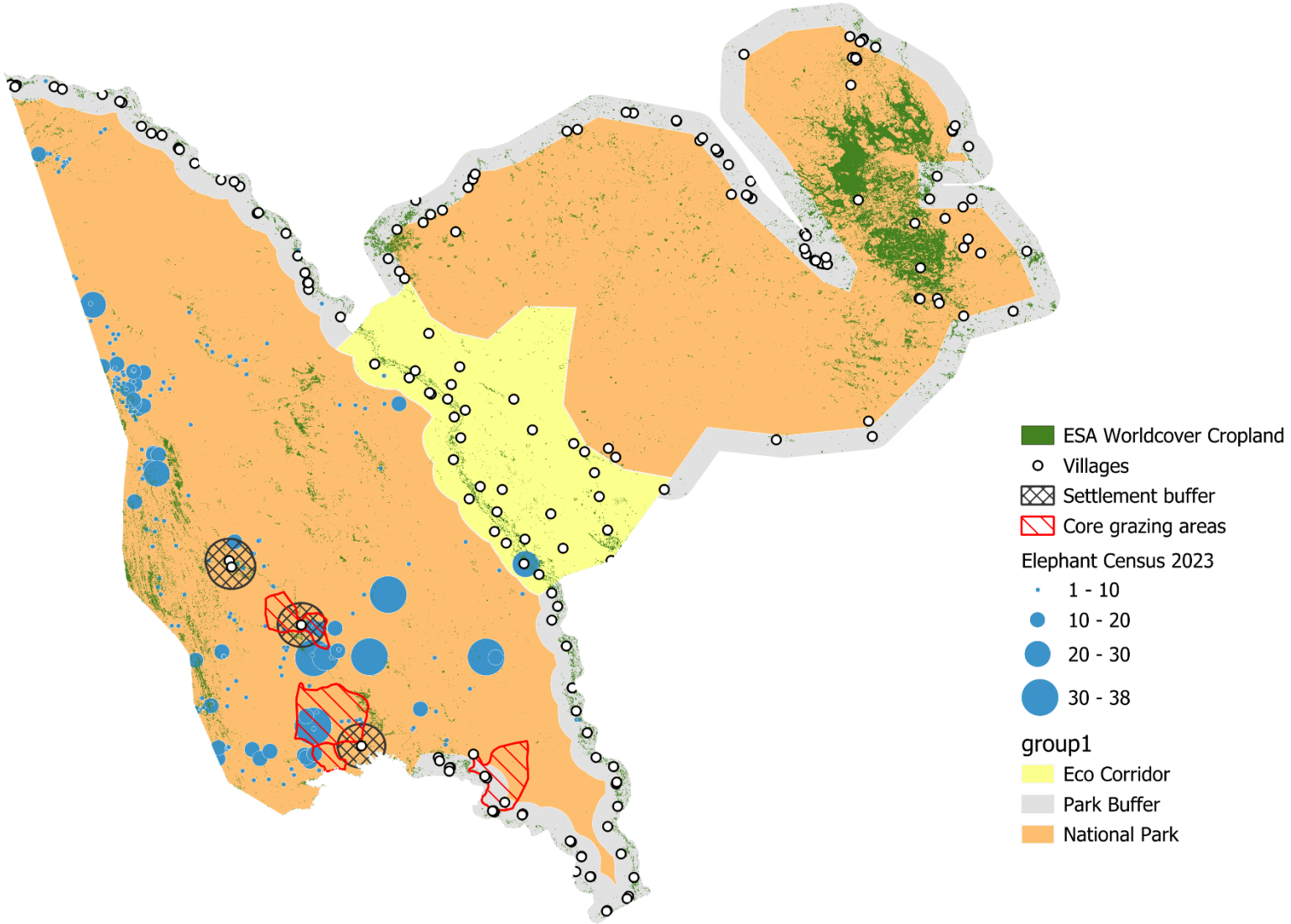
EXISTING DATA

- Peace Parks have data on human activity and animal census within parks
- Wildlife corridor less well mapped
- Elephant collar data also available
- Seasonality is a key driver of animal movement



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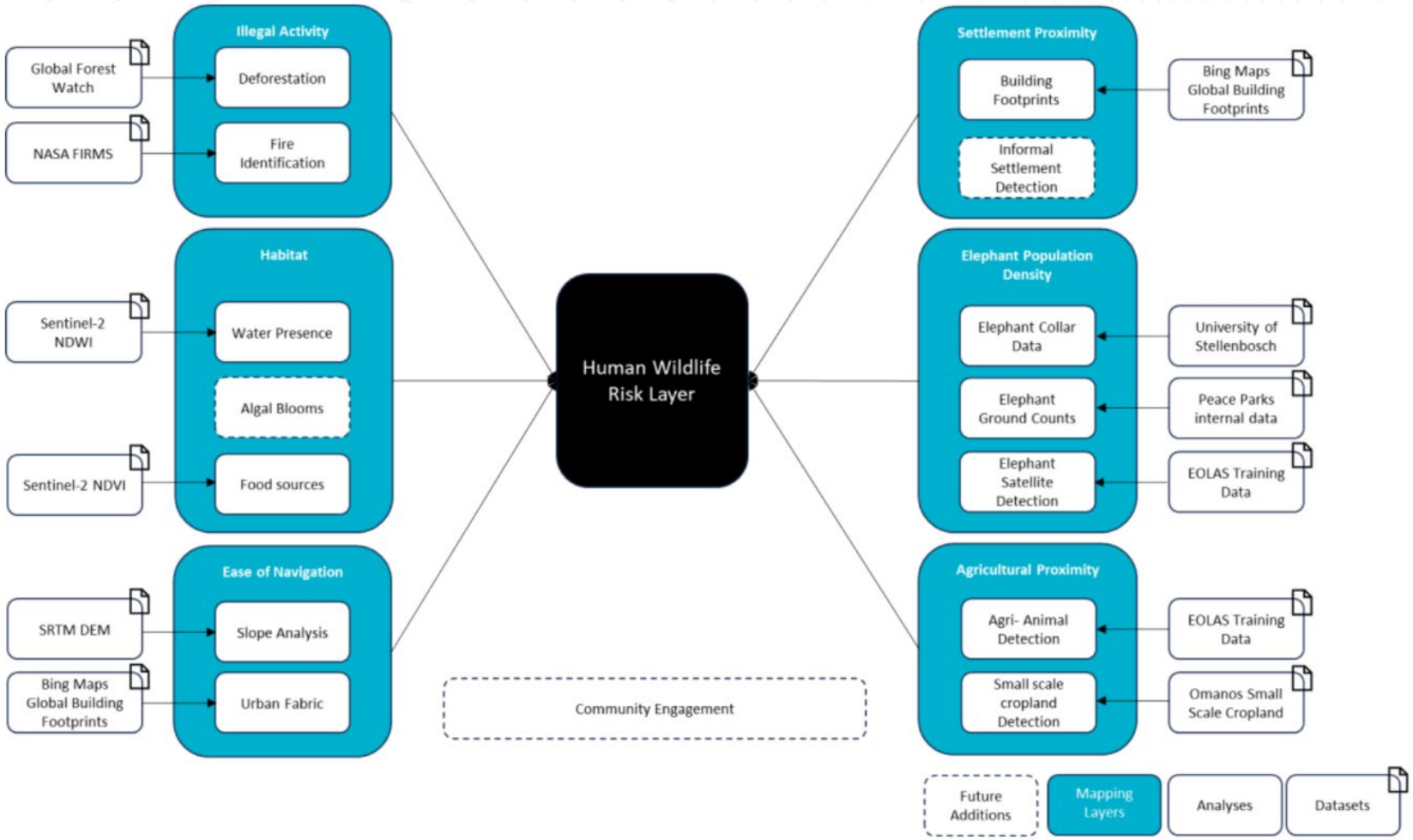
Human Wildlife Conflict Risk Layer



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USER REQUIREMENTS

- Two main types of use envisioned:
  - Support rangers to plan monitoring activities day to day
  - Help land managers understand and plan new interventions such as planning watering, resettlement, fences and livestock management
- Risk layers must reflect seasonality, we need to characterise risks in dry and wet season as dryer = higher risk of conflict
- Interactive risk weighting would allow for data exploration
- Animals don’t spend long in highest risk areas of the corridor, so detection as they move through will be difficult
- Multiple methods of data delivery needed- web portal for wider dissemination and data layers for PPF GIS team to support field teams


EOLAS
Where Next for EOLAS?
Overview
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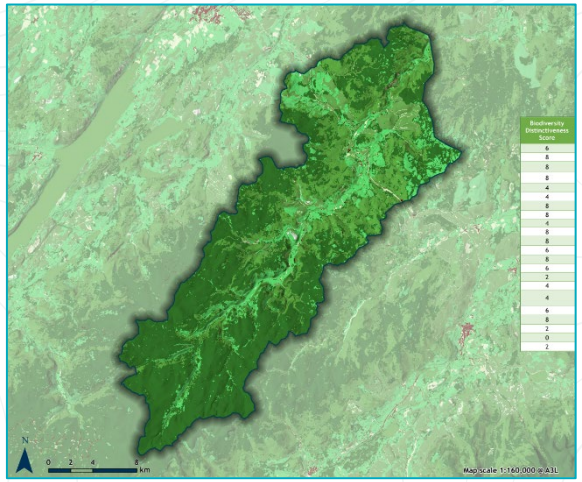
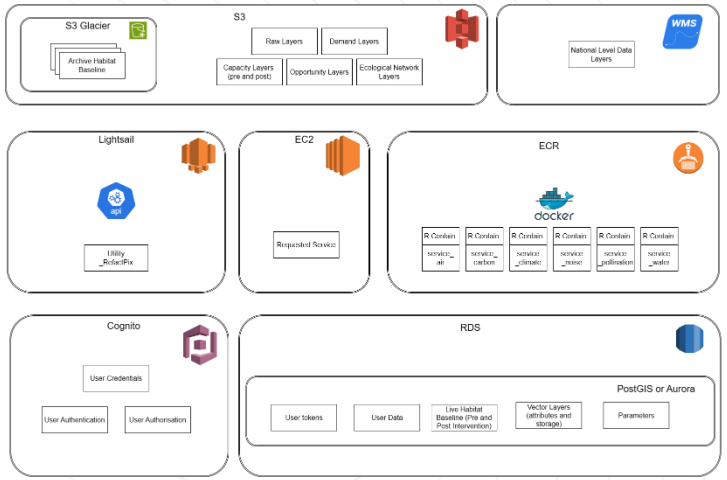
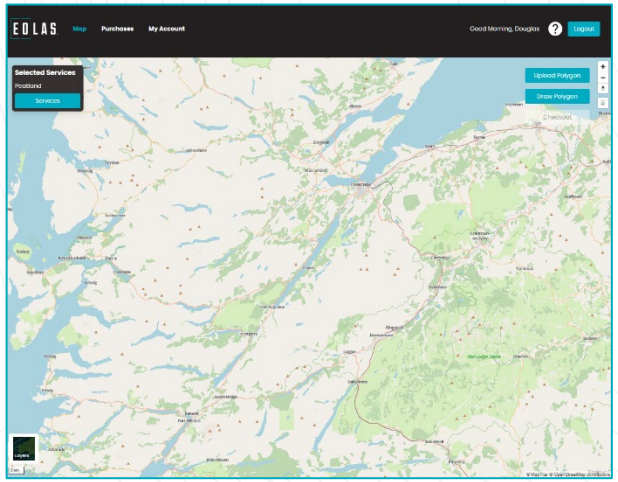
EOLAS

EXPANDING OUR OFFER







GEOSPATIAL CONSULTANCY

Provision of customer bespoke mapping for their particular problem and area.

BESPOKE GEOSPATIAL PLATFORMS

Full build services for bespoke geospatial platforms.

THEIA AUTOMATED MAPPING

Creation of a toolkit of automated mapping functions available through Theia.

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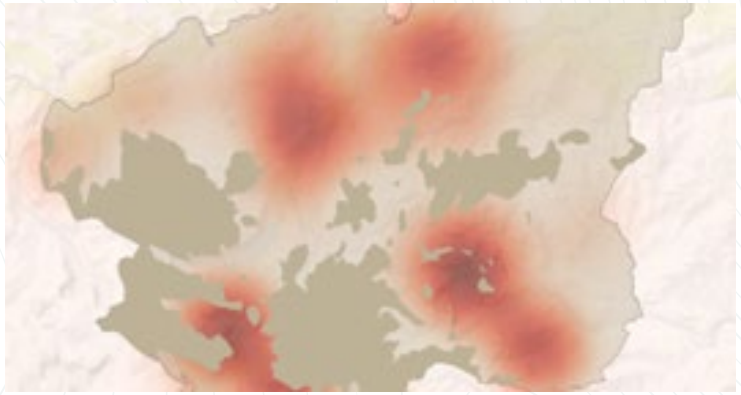
EOLAS

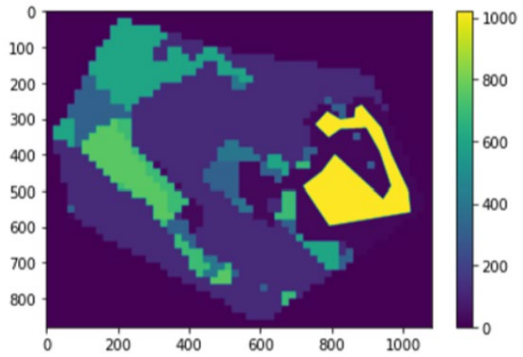
DEVELOPING NEW SERVICES

NATURAL CAPITAL ASSESMENT

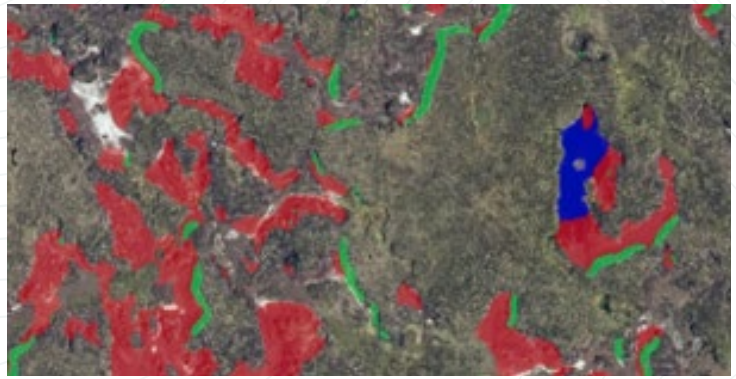
RISK ANALYSIS



BIODIVERSITY NET GAIN



PEATLAND CONDITION MAPPING



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THANK YOU FOR LISTENING

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