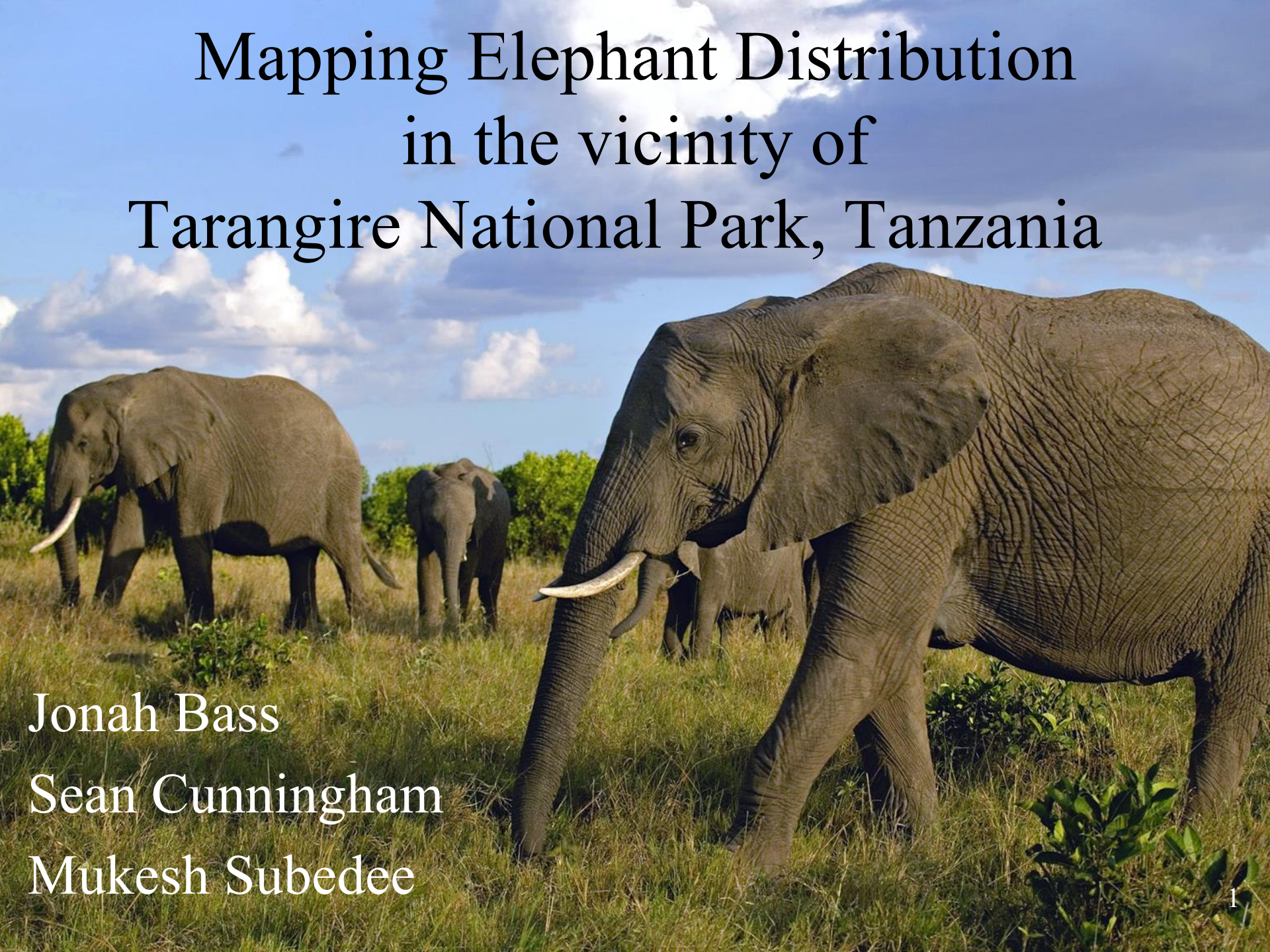
Mapping Elephant Distribution in the vicinity of Tarangire National Park, Tanzania



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- Introduction
- Research Objectives
- Methods
- Results
- Conclusions
- Future Research

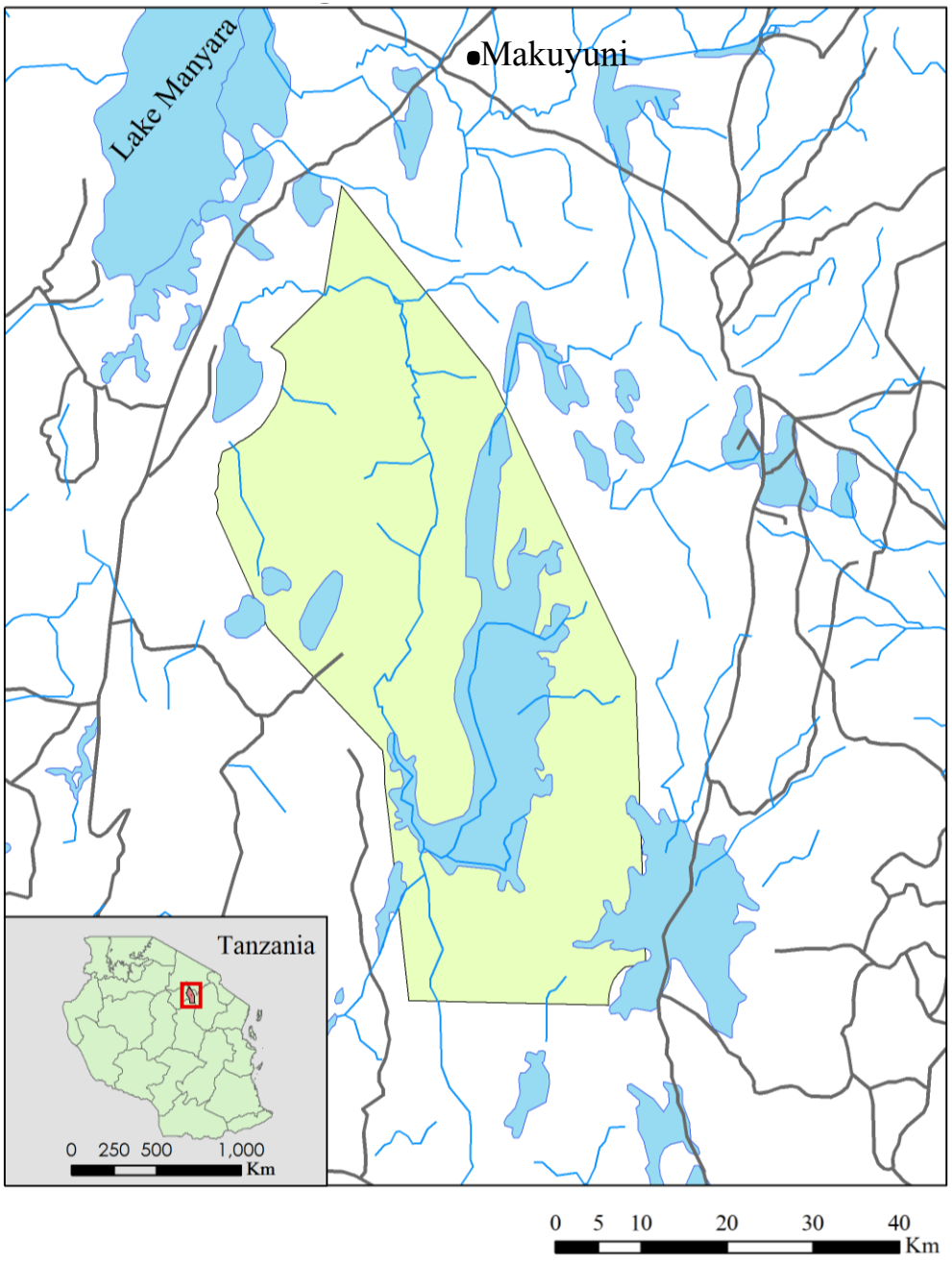
Tarangire National Park

- Wildlife migrate on seasonal basis
- Approximately 40 villages surround park boundary
- Maasai people are shifting economic activity from pastoral to agriculture
- North of the park has seen increased agriculture

Elephants in Tarangire National Park

- Elephants are labeled as a Priority 1 species by WCS for studying and conservation
- Rapid increase in agricultural activity has threatened migration routes.
- Loss of five of the nine main migration routes in Tarangire, and a two corridors have been degraded

Study Area



- The park covers an area of 2,850 sq. km
- Extends from Tanzania-Kenya border in the north to the Massai Steppe in the south
- Ecosystem is diverse, but is populated mainly by Acacia woodlands
- Wildlife in Tarangire migrate on a seasonal basis

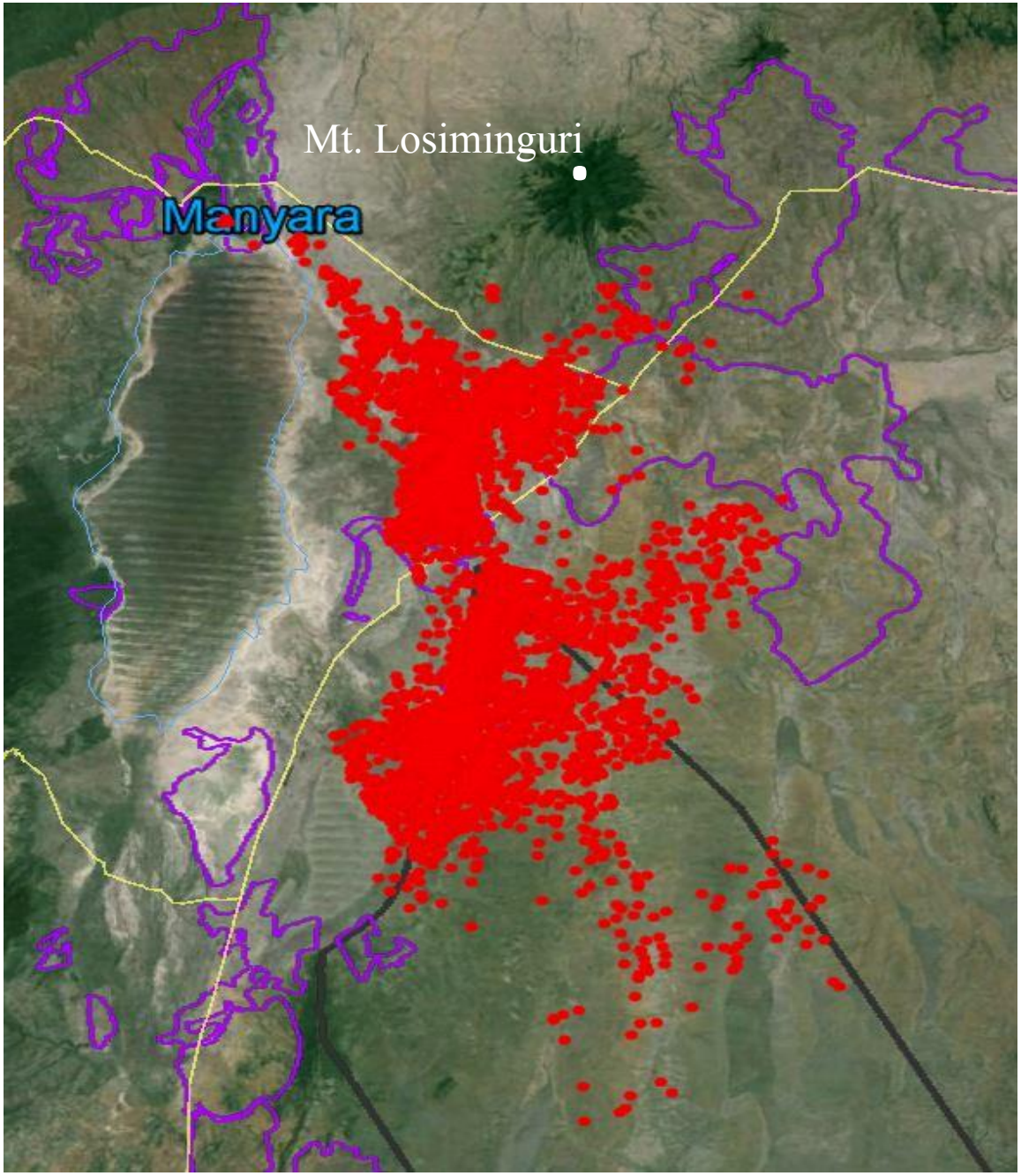
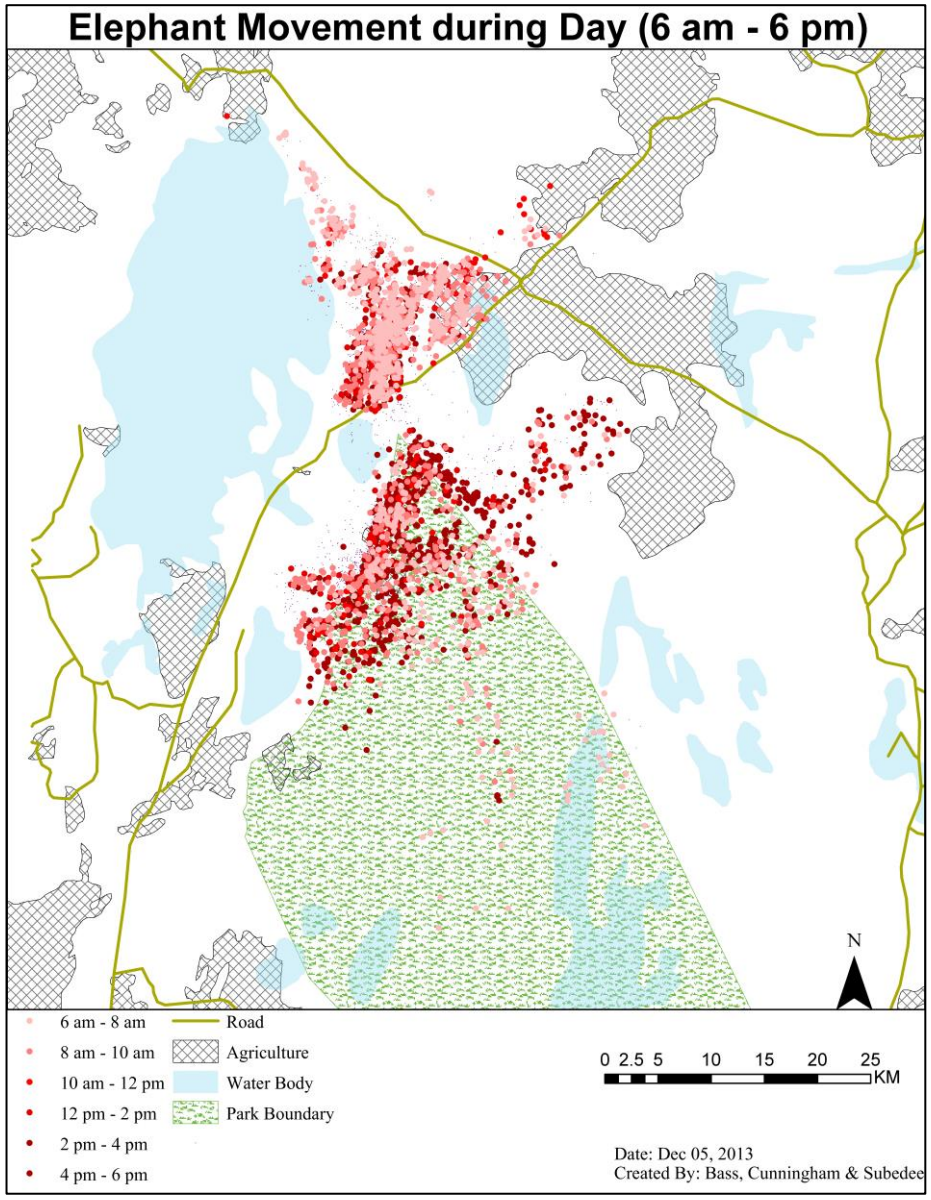
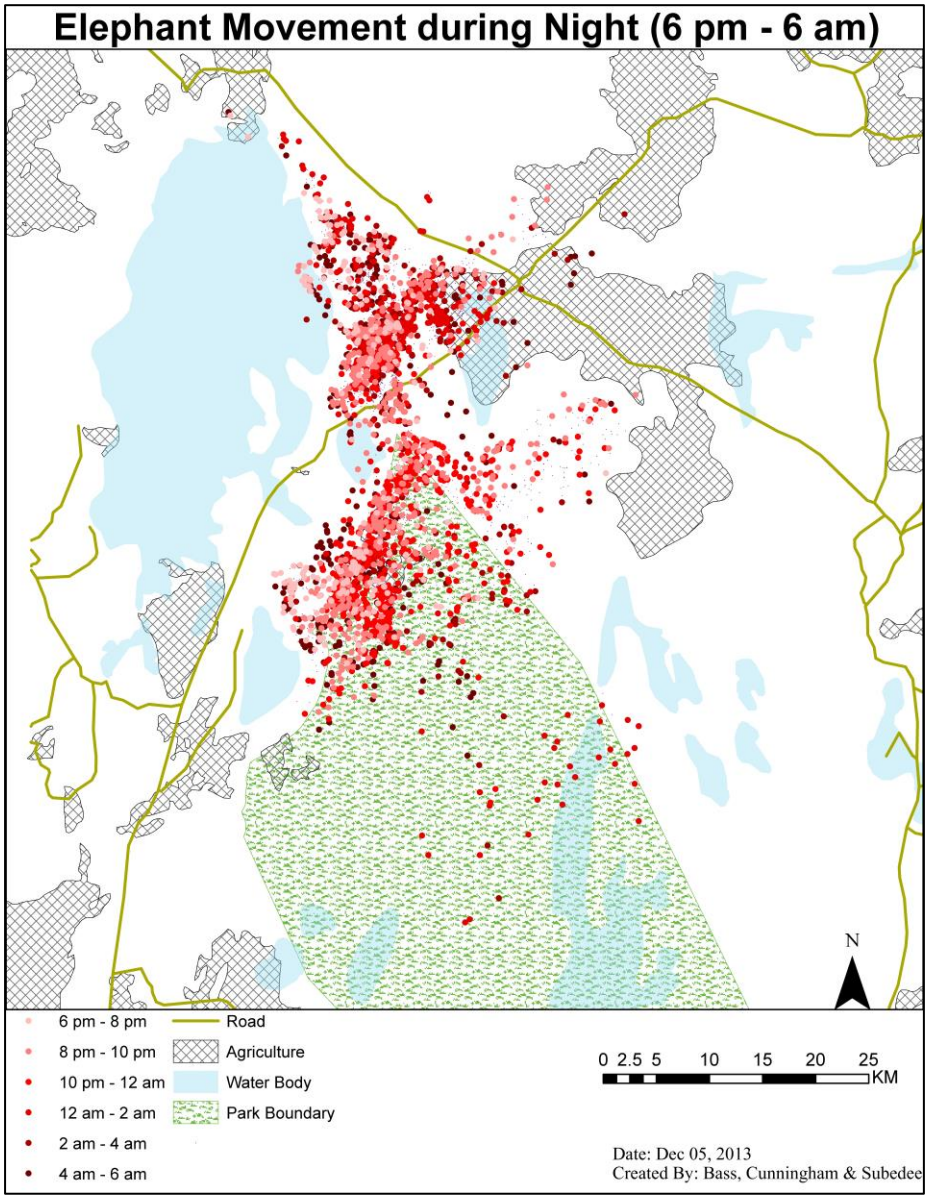


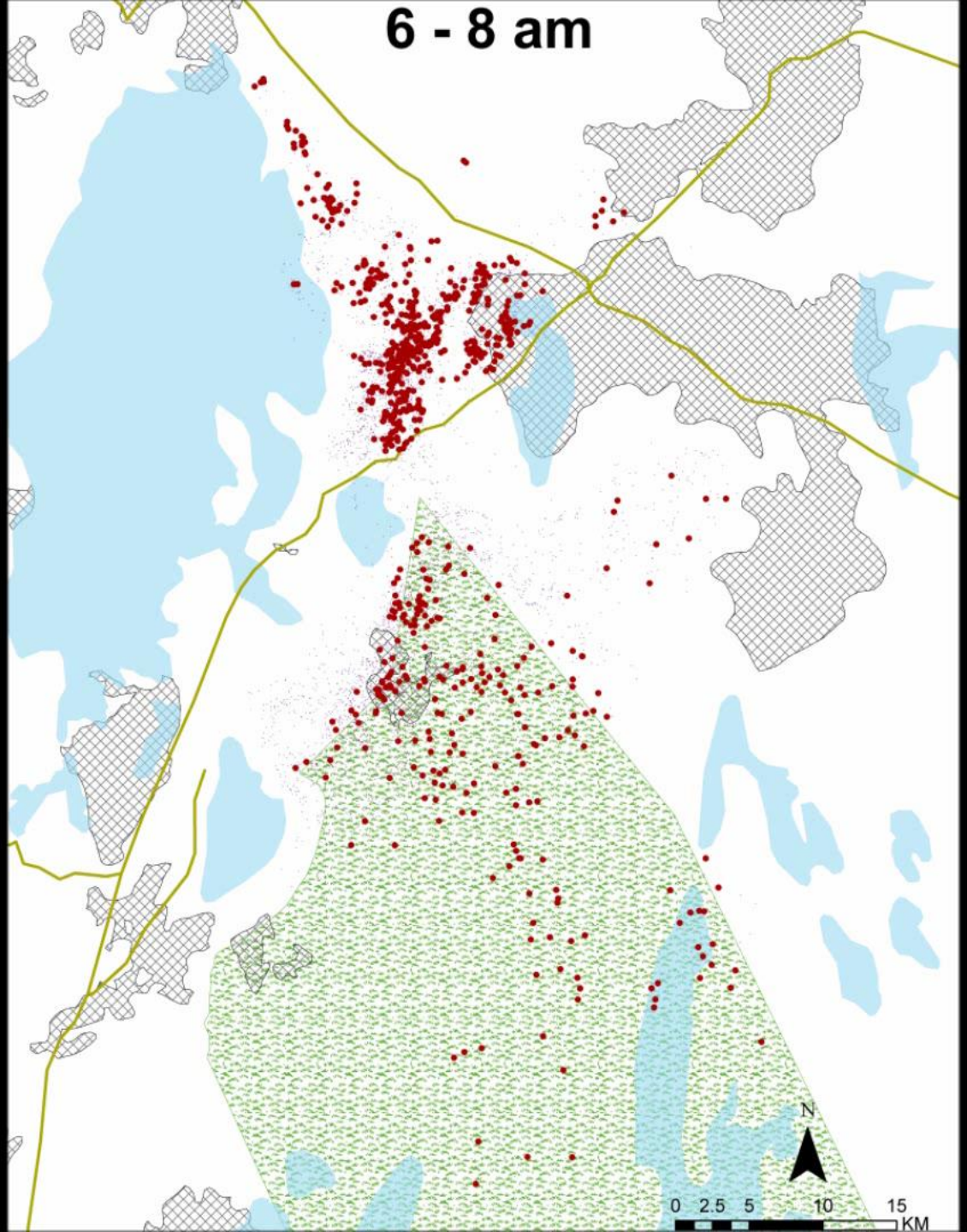
Image Credit: Google Earth

- Primary Research Objective
  - Identify potential distribution of elephants in vicinity of Tarangire National Park, Tanzania
- Ancillary Research Objectives
  - Time spent in agricultural fields and near water sources
  - Compare time elephants are inside the park to time outside the park
  - Determine distribution between day and night

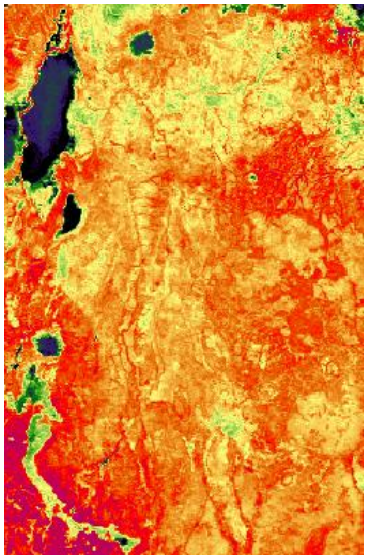
Methods


Elephant Movement during Day (6 am - 6 pm)
N
6 am - 8 am
8 am - 10 am
10 am - 12 pm
12 pm - 2 pm
2 pm - 4 pm
4 pm - 6 pm
Road
Agriculture
Water Body
Park Boundary
0 2.5 5 10 15 20 25
KM
Date: Dec 05, 2013
Created By: Bass, Cunningham & Subedee

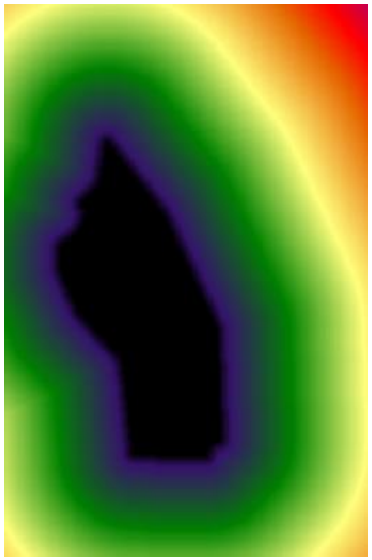

Elephant Movement during Night (6 pm - 6 am)
N
6 pm - 8 pm
8 pm - 10 pm
10 pm - 12 am
12 am - 2 am
2 am - 4 am
4 am - 6 am
Road
Agriculture
Water Body
Park Boundary
0 2.5 5 10 15 20 25
KM
Date: Dec 05, 2013
Created By: Bass, Cunningham & Subedee


6 - 8 am
N
0 2.5 5 10 15
KM

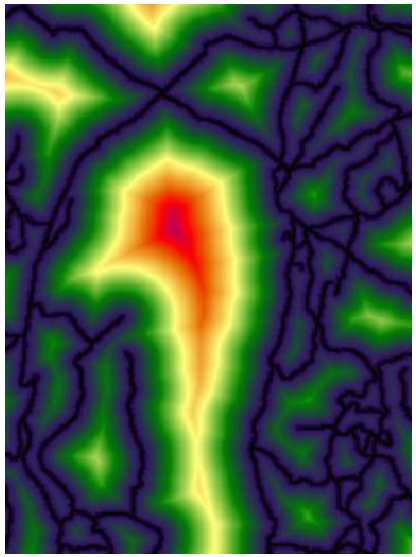
Landscape Variables for Predicting Elephant Distribution



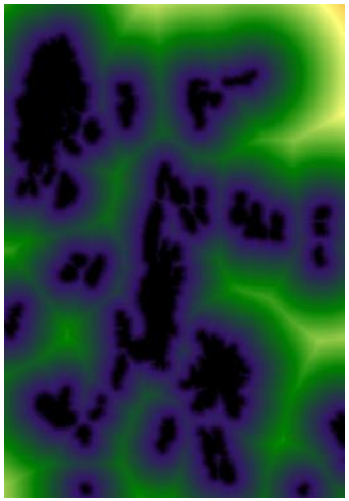
NDVI Suite



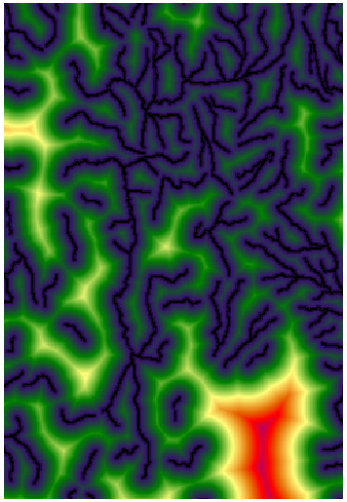
Park Boundary



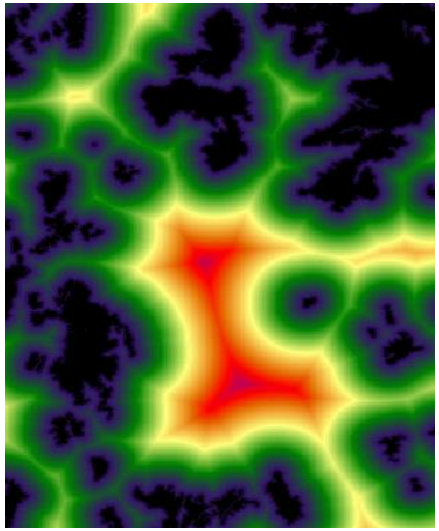
Roads



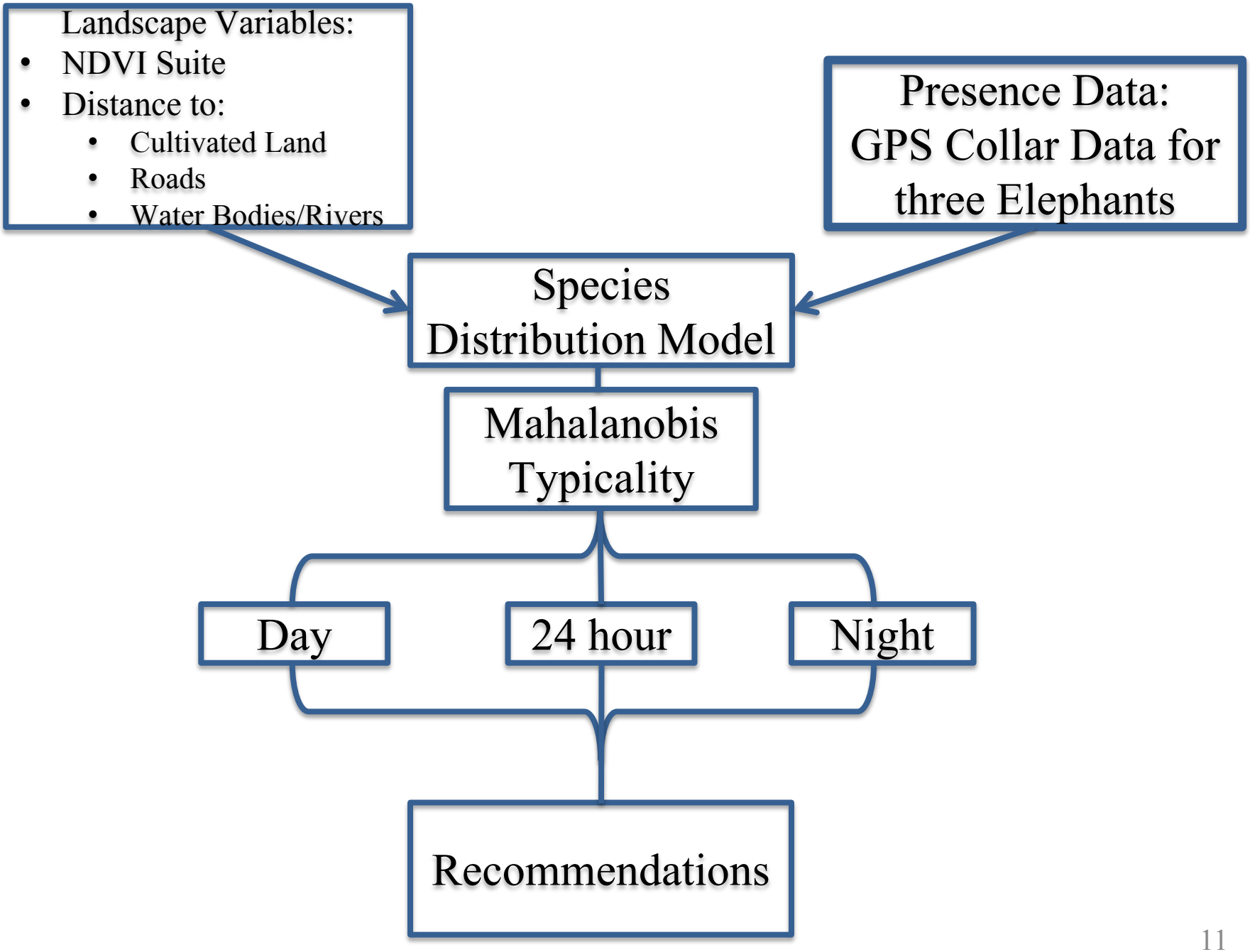
Water Bodies



Rivers



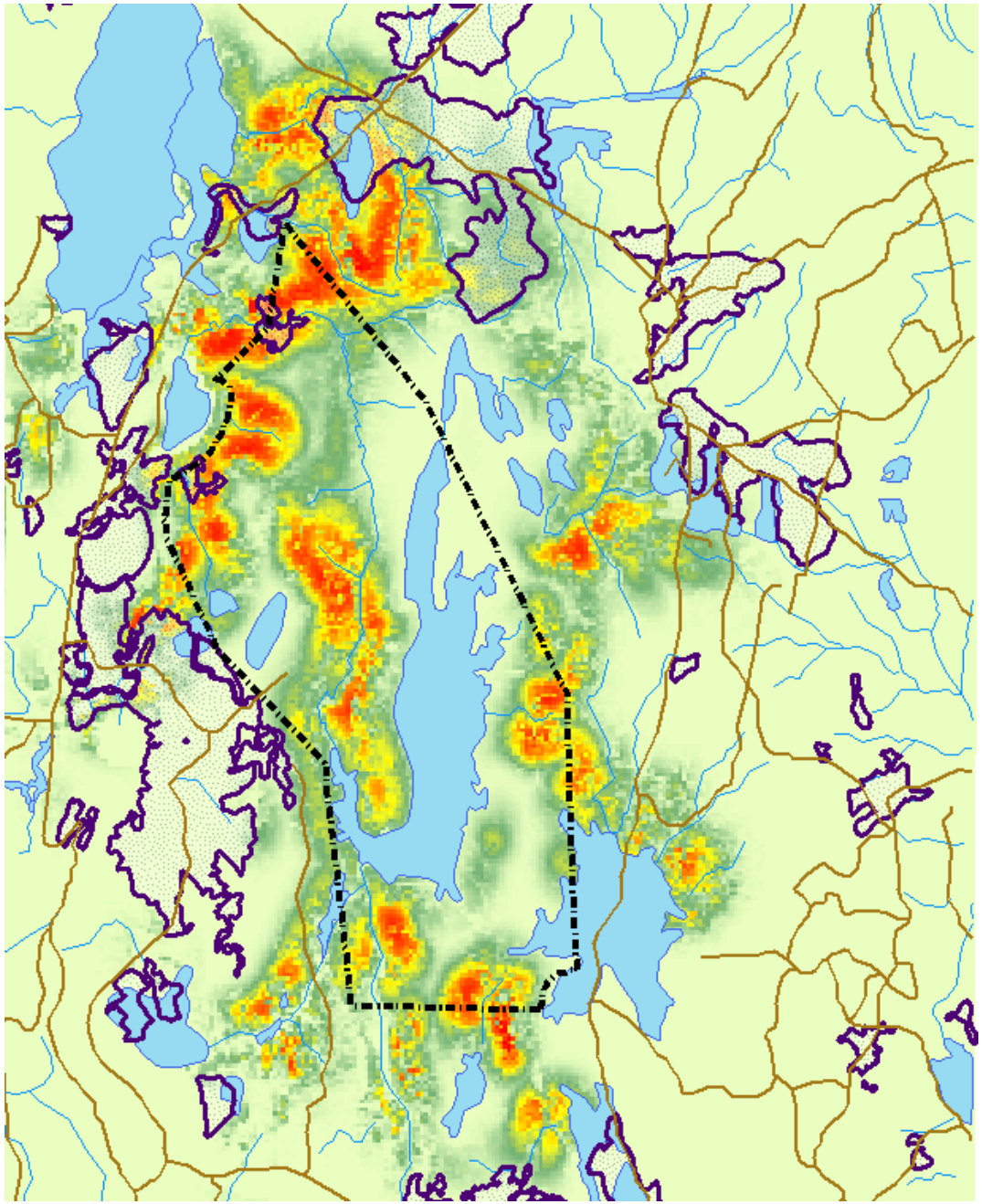
Cultivated Land


Landscape Variables:
• NDVI Suite
• Distance to:
• Cultivated Land
• Roads
• Water Bodies/Rivers
Presence Data: GPS Collar Data for three Elephants
Species Distribution Model
Mahalanobis Typicality
Day
24 hour
Night
Recommendations

Results

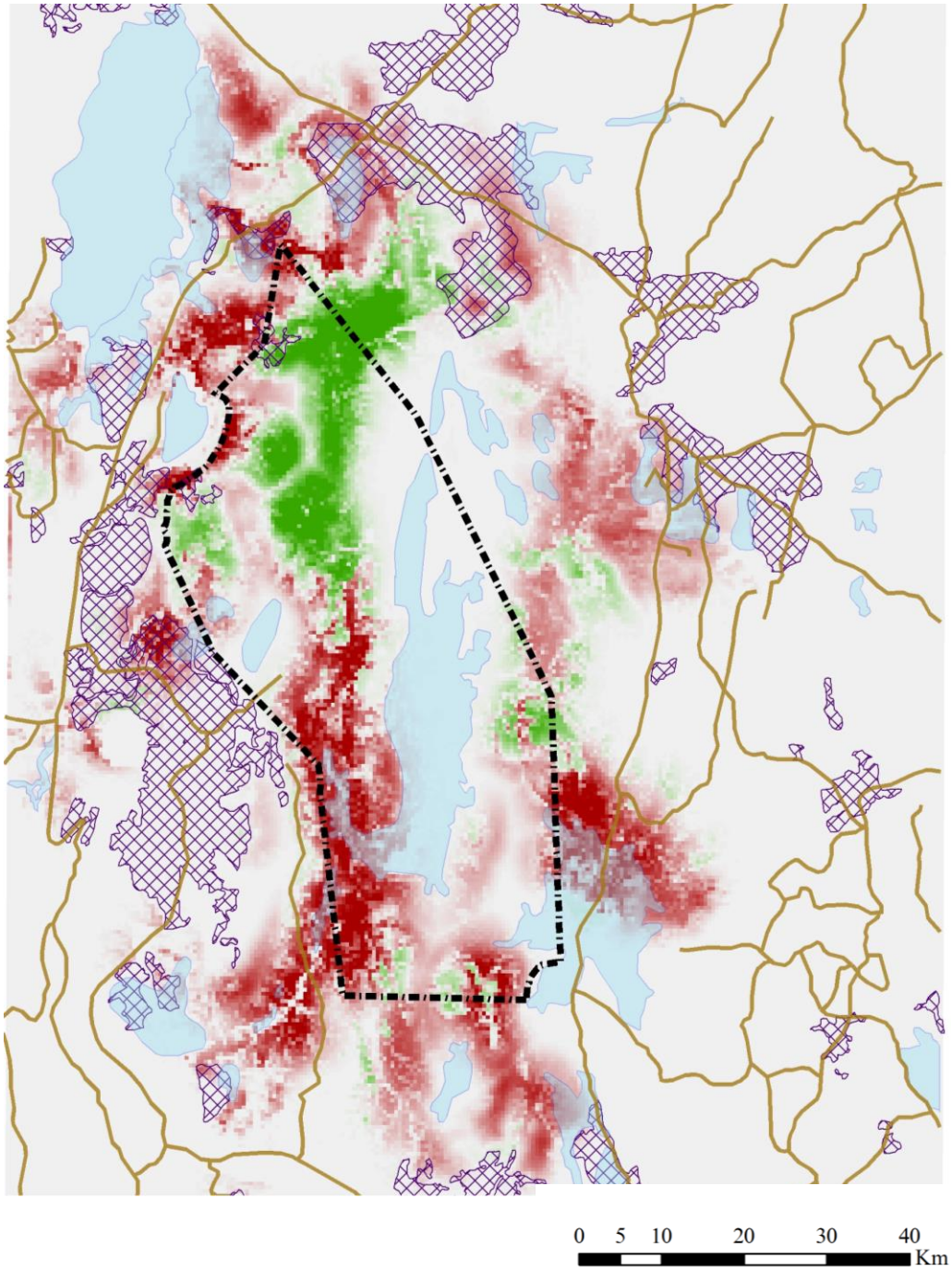
Typicality for all points

- Potential distribution highest inside park and near water sources



Day and Night Typicality Difference

- Typicality higher inside the park during the day, and higher outside the park at night

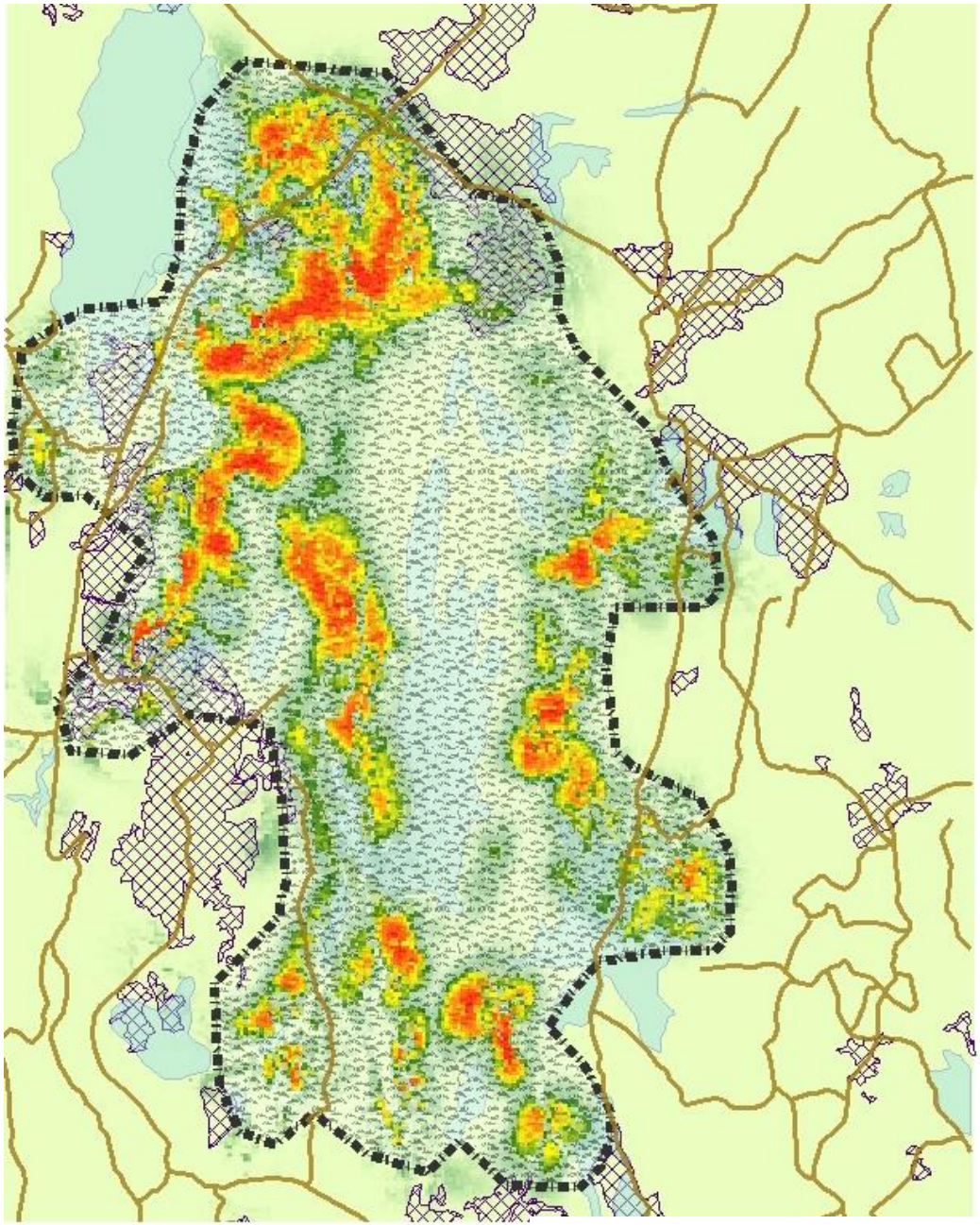


Conclusions

- Elephants spend majority of the day at northern end of park and are outside the park most of the night
- Elephants typically do not travel north of road B 144
- Encroaching agriculture north of park is primary anthropogenic threat to elephant distribution
- Expansion of park and/or easements of agricultural land are needed in order to mitigate threat to elephant distribution

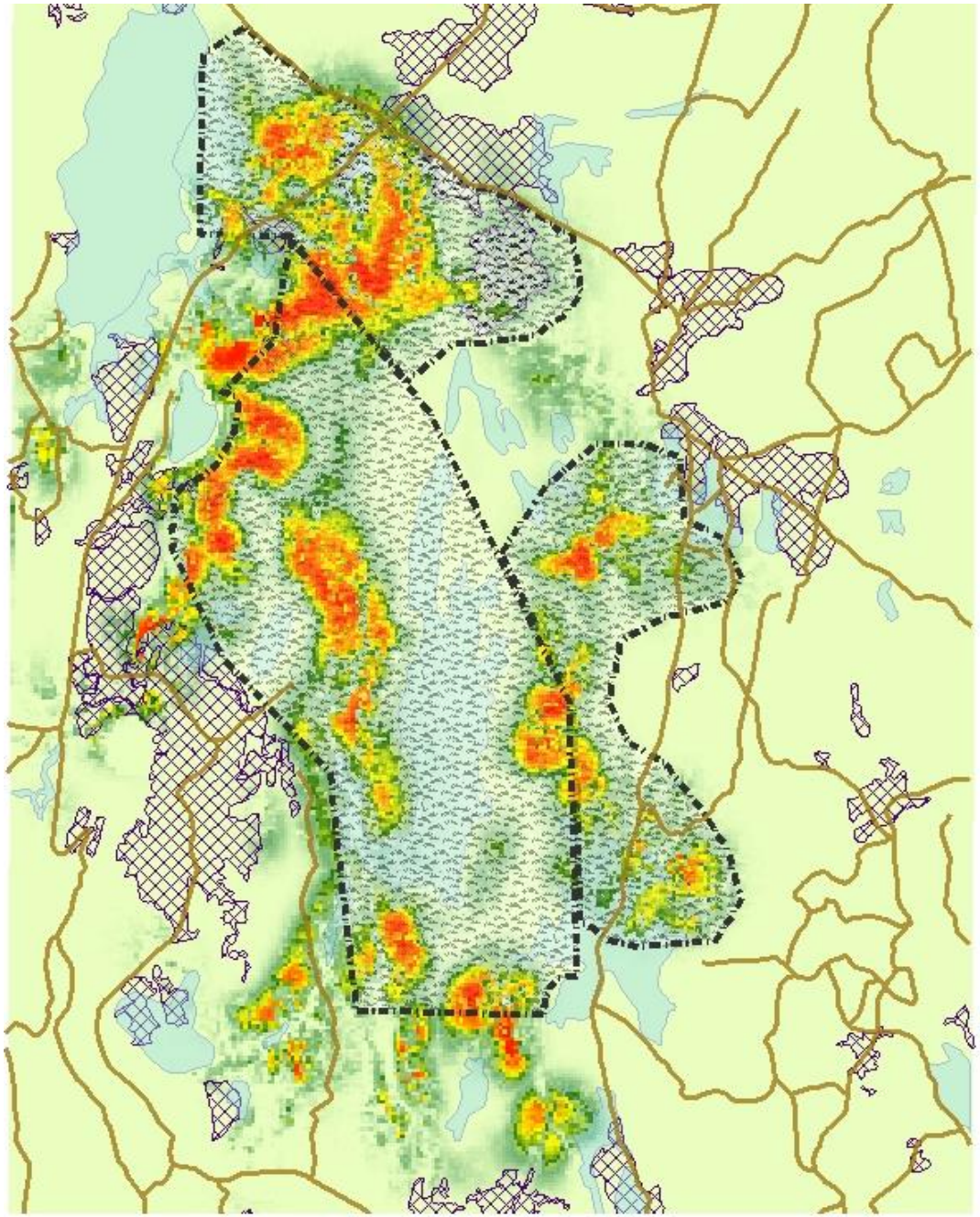
Scenario One

- Increase park area from 2,850 sq.. km to 7,360sq. km in order to encompass total potential elephant distribution



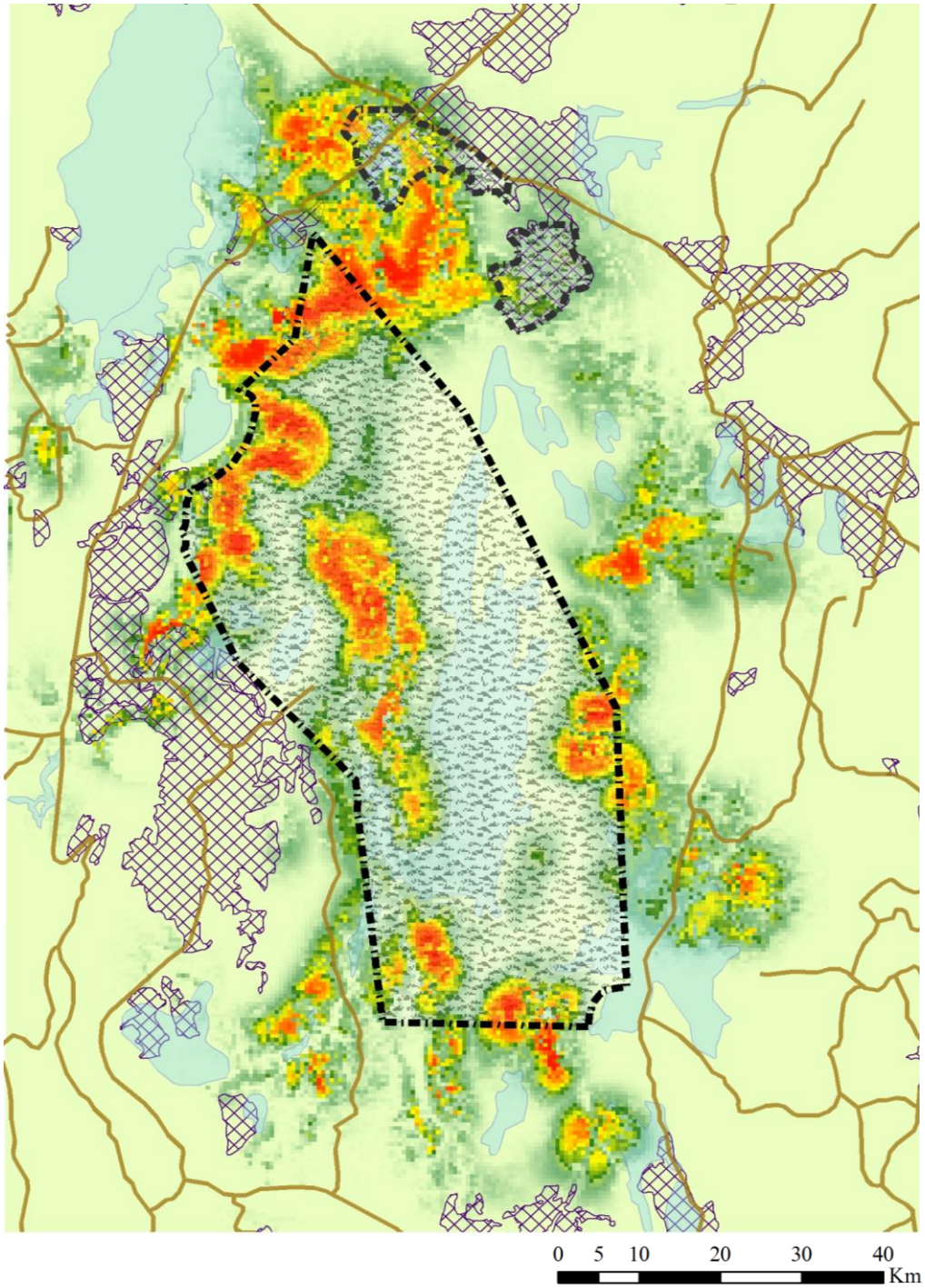
Scenario Two

- Increase park area from 2,850 sq. km to 4,570 sq. km in order to encompass areas of highest human-elephant overlap and high potential distribution/low agriculture



Scenario Three

- 198 sq. km of potential easements in agricultural areas within region of highest human-elephant overlap



Future Research

- Acquire data on town and settlement locations, crop type, elevation, and movement of elephants in southern extent of Tarangire
- Run species distribution model with only dry season movement data and with only wet season movement data

Thank You to:

Wildlife Conservation Society

John Rogan

Arthur Elmes

Spring 2013 WCS Seminar Research Team