Camera Traps for Terrestrial Biodiversity Monitoring in Northern Australia

Graeme Gillespie, Department of Land Resource Management, NT

Northern Territory Government

Northern Australia Environmental Resources Hub

National Environmental Science Programme

Typical applications of camera traps

Simple or targeted surveillance

General biodiversity surveys

Targeted species surveys

Population density estimation

Monitoring species and communities through time

Management evaluation

How do camera traps work?

‘Passive Infra-red (PIR) Sensor’

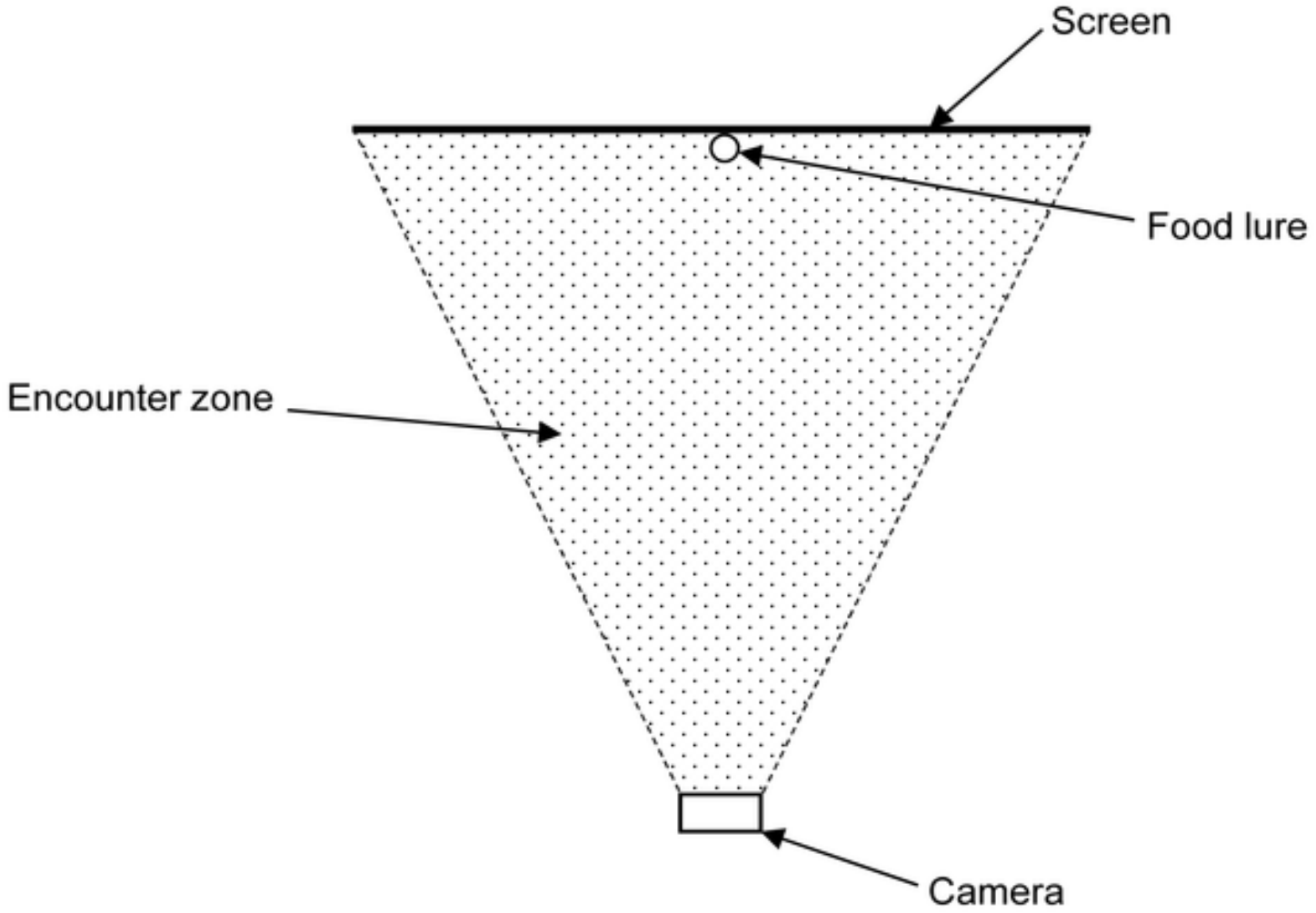
PIR sensors detect ‘heat in motion’; moving objects within the sensor’s detection zone that are a different temperature to the background environment.

Wedge-shaped zone of detection radiating outwards in front of the camera

Easy to use, wide variety of models

‘Active Infra-red’ cameras

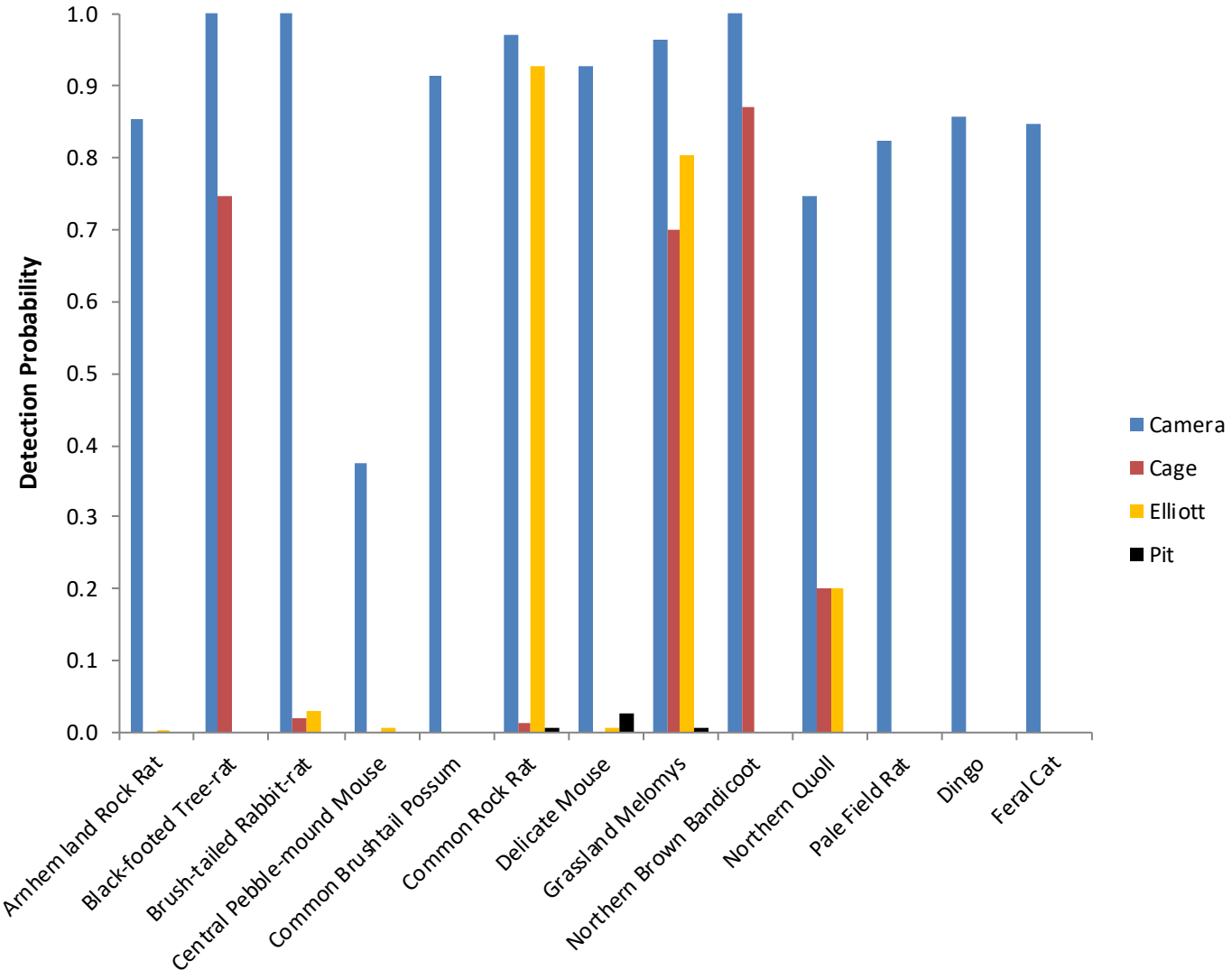
Figure 1. Overhead view of a camera trap showing the triangular zone between the camera and the shade cloth screen.



Glen AS, Cockburn S, Nichols M, Ekanayake J, Warburton B (2013) Optimising Camera Traps for Monitoring Small Mammals. PLoS ONE 8(6): e67940. doi:10.1371/journal.pone.0067940
http://journals.plos.org/plosone/article?id=info:doi/10.1371/journal.pone.0067940

Typical setup

Advantages


Detection Probability
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Arnhem land Rock Rat
Black-footed Tree-rat
Brush-tailed Rabbit-rat
Central Pebble-mound Mouse
Common Brushtail Possum
Common Rock Rat
Delicate Mouse
Grassland Melomys
Northern Brown Bandicoot
Northern Quoll
Pale Field Rat
Dingo
Feral Cat
Camera
Cage
Elliott
Pit

Other advantages

Low interference/disturbance to animals/populations

One method samples wider species range concurrently

Cost effective for remote locations

Cost-effective for long sampling periods

Cost effective for multiple concurrent sampling sites

Highly accessible technology requiring limited training

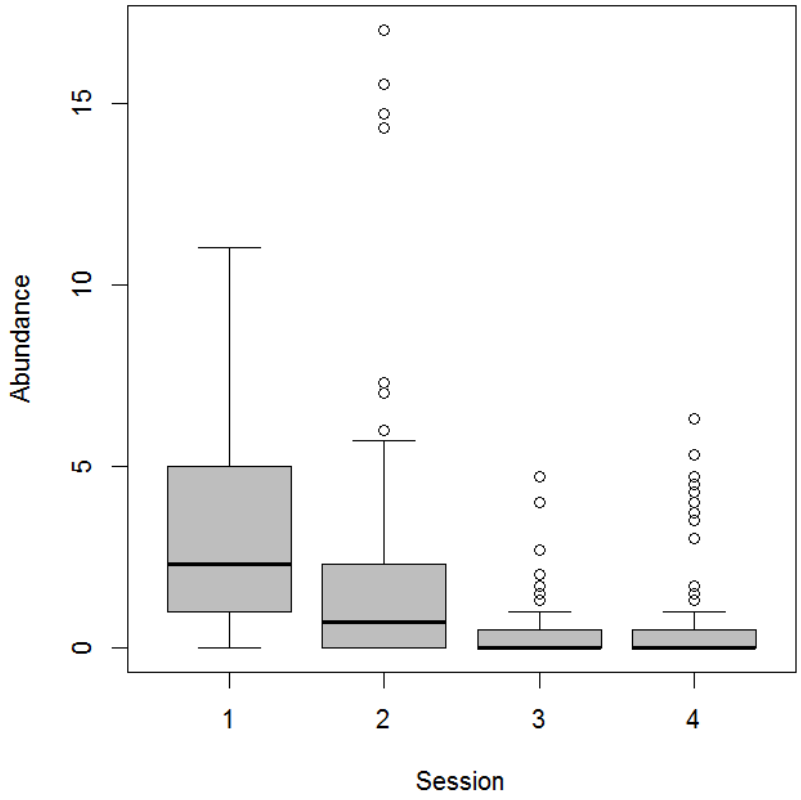
Monitoring applications

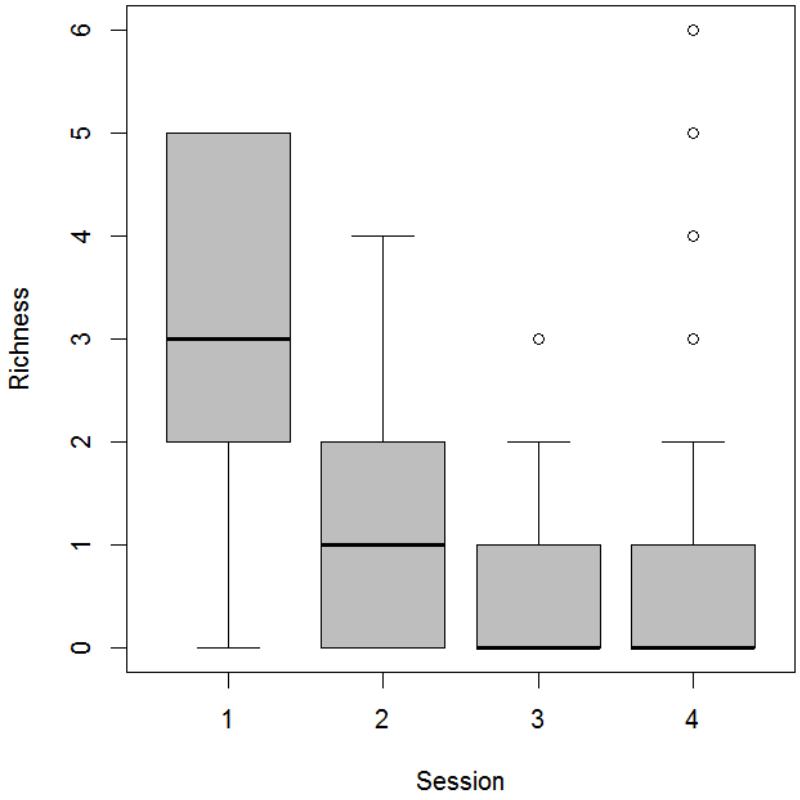
Occupancy modelling of species through space and time

Changes in species richness and composition

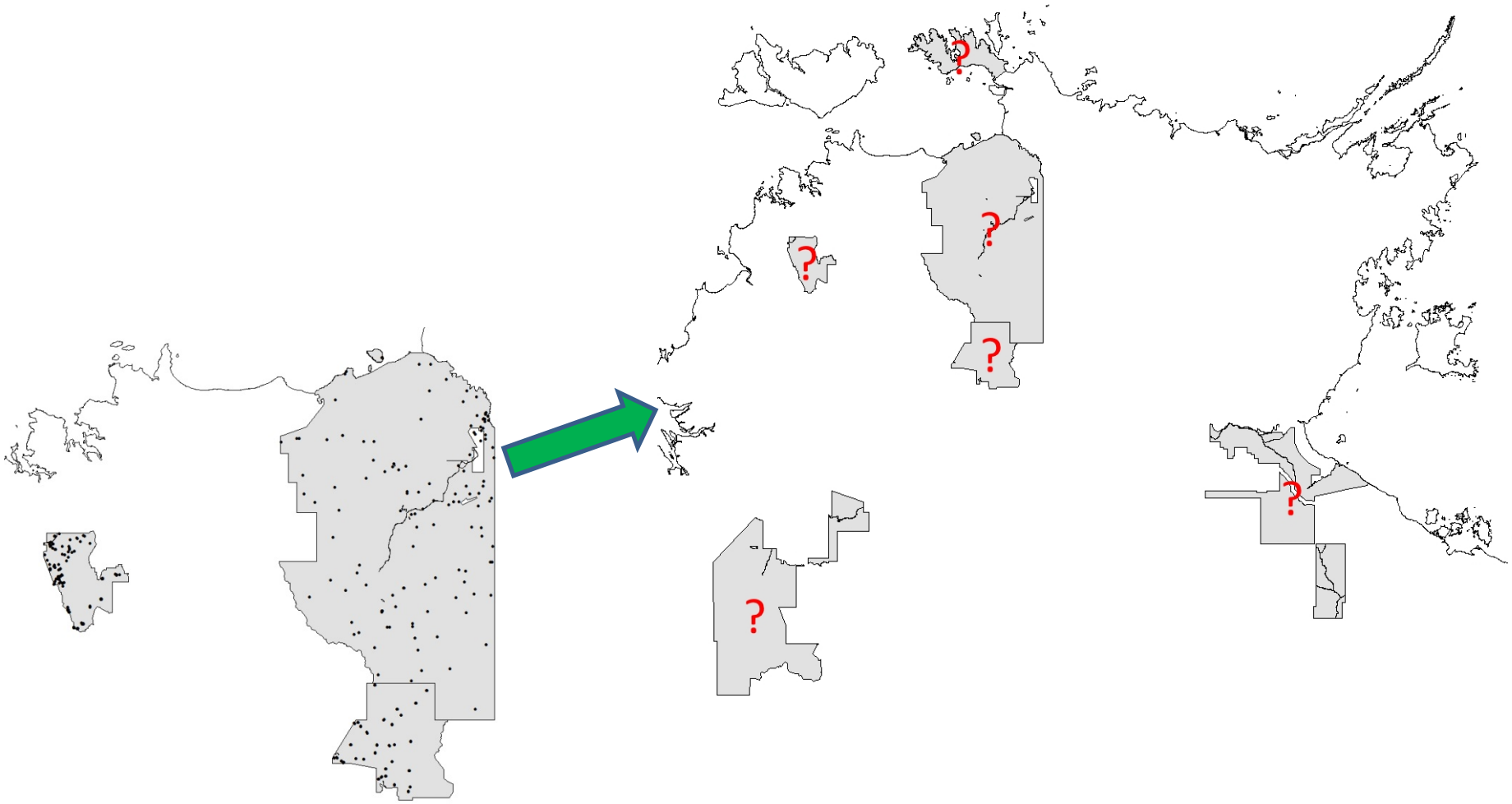
Spatially explicit population modelling

Long term mammal monitoring in the Top End

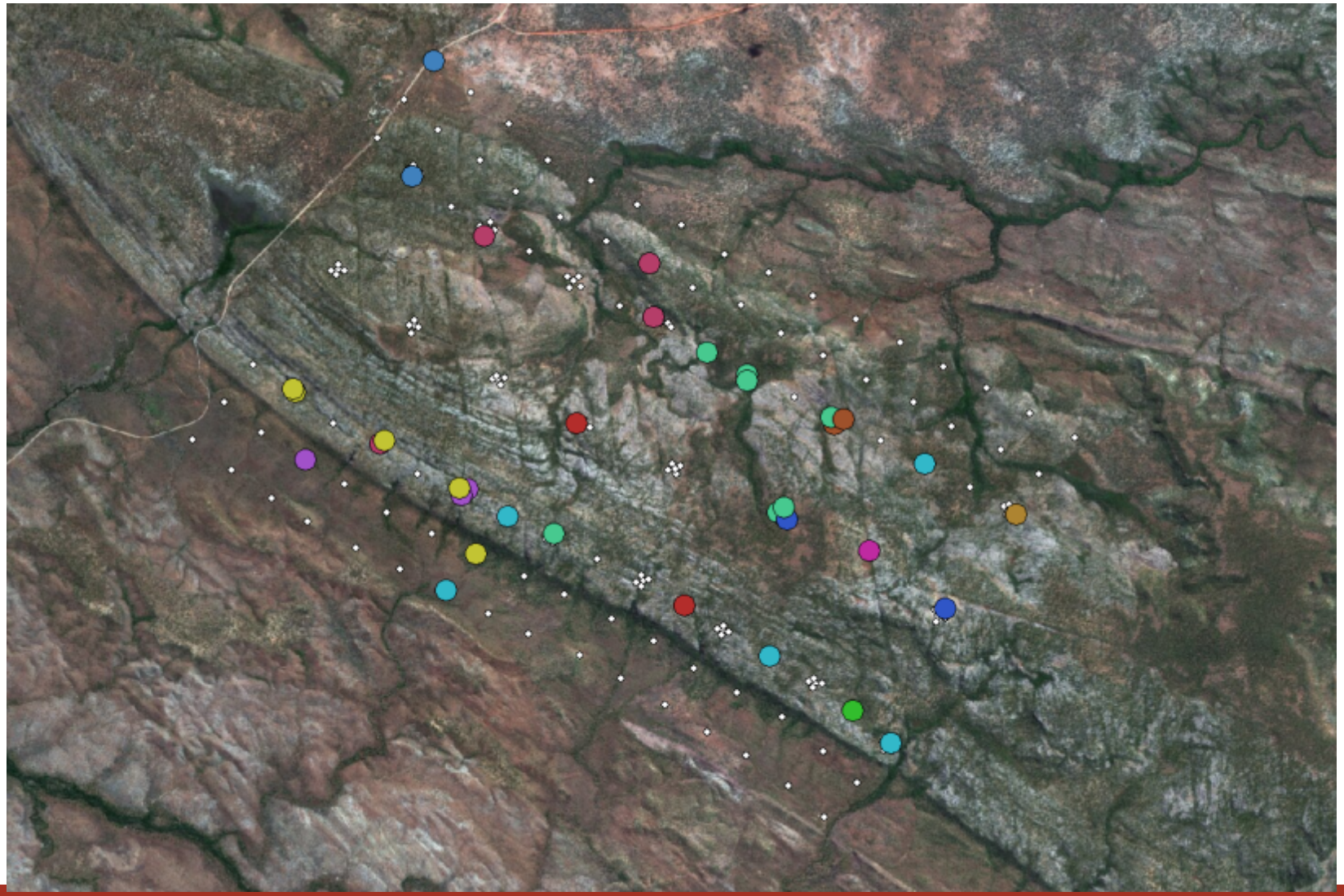




Long term terrestrial biodiversity monitoring in the Top End



No. feral cats in Kakadu National Park = 3299 (1518 – 6173)



Limitations

Cameras not designed for wildlife ecology

Limited sensor design

Fixed focal length

Fixed ISO

No sound recording

Inconsistent methods

Other limitations

Difficult to reliably identified closely related species

Limited application for reptiles and amphibians

High temperature constraints

Durability

Cost ?

Time-consuming manual photo-checking

Rudimentary data management systems

In the pipeline

Trialling methods for increasing detection of small mammals and reptiles.

Species/individual recognition software

Better database systems

Large user base

Development needs

Primitive

Improved sensor designs for wildlife ecology

Motion-only camera traps

Automatic data-logging

Remote download/programming capability

Methodology consistency