# Domestic Cats & Urban Wildlife


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**Australian Pet Welfare Foundation**


COMMUNITY CAT PROGRAM
Protecting people, cats & wildlife

Slides prepared by Emeritus Professor Jacquie Rand (Chief Scientist, Australian Pet Welfare Foundation and Dr Kate Dutton-Regester

# Natural born killers: the problem with cats

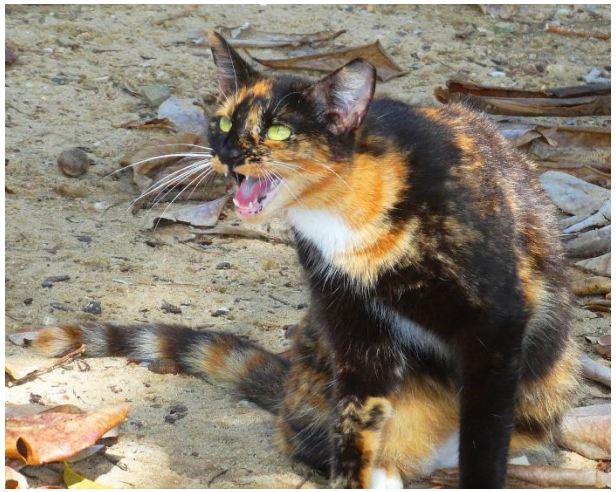
Australian Geographic, 2013

## Staggering Stats: Cats Kill Billions of Animals a Year

Live Science, 2013

## Domestic cats kill billions of animals every year

Live Science, 2013



# Keep pet cats indoors, say researchers who found they kill 230m native Australian animals each year

Australian Pet Welfare Foundation

**Australia's 3.7m domestic cats wreak environmental havoc and should be contained, authors of new study say**

# Australian research based on 4 papers **aimed at estimating numbers of prey caught by feral, pet and semi-owned/unowned cats**

Biological Conservation

**How many birds are killed by cats in Australia?**

*J.C.Z. Woinarski, B.P. Murphy, S.M. Legge, S.T. Garnett, M.J. Lawes, S. Comer, C.R. Dickman, T.S. Doherty, G. Edwards, A. Nankivell, D. Paton, R. Palmer, L.A. Woolley*

2017

**Introduced cats (Felis catus) eating a continental fauna: The number of mammals killed in Australia**

*B.P. Murphy, L.A. Woolley, H.M. Geyle, S.M. Legge, R. Palmer, C.R. Dickman, J. Augusteyn, S.C. Brown, S. Comer, T.S. Doherty, C. Eager, G. Edwards, D.A. Fordham, D. Harley, P.J. McDonald, H. McGrego, K.E. Moseby, C. Myers, J. Read, J. Riley, D. Stokeld, G.J. Trewella, J.M. Turpin, J.C.Z. Woinarski*

2019

WILDLIFE RESEARCH

**How many reptiles are killed by cats in Australia?**

*J. C. Z. Woinarski, B. P. Murphy, R. Palmer, S. M. Legge, C. R. Dickman, T. S. Doherty, G. Edwards, A. Nankivell, J. L. Read, D. Stokeld*

2018

**Predation by introduced cats Felis catus on Australian frogs: compilation of species records and estimation of numbers killed**

*J. C. Z. Woinarski, S. M. Legge, L. A. Woolley, R. Palmer, C. R. Dickman, J. Augusteyn, T. S. Doherty, G. Edwards, H. Geyle, H. McGregor, J. Riley, J. Turpin, B. P. Murphy*

2020

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

- For each species -birds, mammals, reptiles and frogs – are all based on same previously collected data sets
- **For pet cats**, data based on 6 publications from 4 studies **designed to determine the relative proportion of prey observed to be caught by cats & number caught per cat that predated**
- **Were NOT designed to determine proportion of pet cats that caught prey**
- Surveys of people responding questionnaires in 1989-1994
- Canberra (collected 1993-4), Hobart (collected 1991) & South Australia (collected 1989)

# What research was used for pet cats? 6 publications, 4 studies

**Barratt** x 2 papers CSIRO *Wildlife Research*, 1997 and 1998

- Well conducted and written for the design used; peer reviewed
- Selected homes bordering nature reserves in Canberra & ornithological groups
- Door knocking & letter box drops
- Survey data from 135 cat owners recorded **observations of prey their cats caught** (1993-94) & collected samples of prey caught from 138 cats

**Paton** – 3 references used - a 2-page publication in Bird Observer 1990 (**not peer reviewed**), republished in a workshop & conference proceedings - all from same data set

- Data collection - mail out**??** to ornithological groups in SA collected in 1989 (43 year old data)
- Data collected from 709 people on what pet cats were observed to catch

**Trueman** – **unpublished** honours thesis from Tasmania, not available on-line or in full

- Door to door & telephone surveys of what 166 pet cats were observed to catch (1991)
- **Woinarski's comment** "It was a particularly hard one to interpret, they're (the results) are pretty obscure"

# BIRDS

# Findings:

**Barratt** - Selected homes bordering nature reserves in Canberra & ornithological groups

- Cats that predated caught **median of 1.2 birds/year and mean of 2.5 birds/year**
- **"Median numbers** of prey estimated to be caught per year are approximately half the mean values, and are a **better representation** of the average predation by house cats"
- **"Estimates of predation by house cats, particularly extrapolated estimates, should be treated with caution**. Predation **estimates alone do not prove that prey populations are detrimentally affected,** especially in highly disturbed and modified environments such as suburbs."
- "Irrespective of the accuracy of predation estimates, without measurements of the abundance and population dynamics of prey species, the impact of predation by house cats remains uncertain."

**Paton -** Survey of 709 people in SA – one 2-page publication, republished in a workshop & conference proceedings; 43-year-old data – **Not peer reviewed**

- Cats caught **average 8 birds/year**

**Trueman** – unpublished honours thesis from Tasmania = **3.3 birds/year**

**Woinarski calculated** = average of **4.5 birds/year observed** to be caught by pet cats

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Biological Conservation

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# How many birds are killed by cats in Australia?

J.C.Z. Woinarski[a,*], B.P. Murphy[a], S.M. Legge[b], S.T. Garnett[a], M.J. Lawes[c], S. Comer[d], C.R. Dickman[e], T.S. Doherty[f], G. Edwards[g], A. Nankivell[h], D. Paton[i], R. Palmer[j], L.A. Woolley[a]

2017

- **<u>Study not designed to determine proportion of cats which predate</u>**
- Multiplied 4.5 birds/year by 3, because owners observe 30% of catch
- Calculated - average cat catches 15.6 birds/year (half more, half less)
- **Multiplied by all 3.88 million pet cats** (includes cats indoor only!)
- “Pet cats kill 61 million birds per year” (included introduced birds)
- In media, authors then implied this data translates to a population effect

- Study assumed **ALL** pet cats catch an average of 15.6 birds/yr regardless of age, or if contained inside
- How accurate is this for pet cats?
- Is it accurate to assume all pet cats predate?
- Is this a gross overestimation?
- **How does it translate to a population effect?**

Need for contemporary data

Data being used is 35-45 years old!

***From this….***

***To this***

# COMMUNITY CAT PROGRAM

Protecting people, cats & wildlife

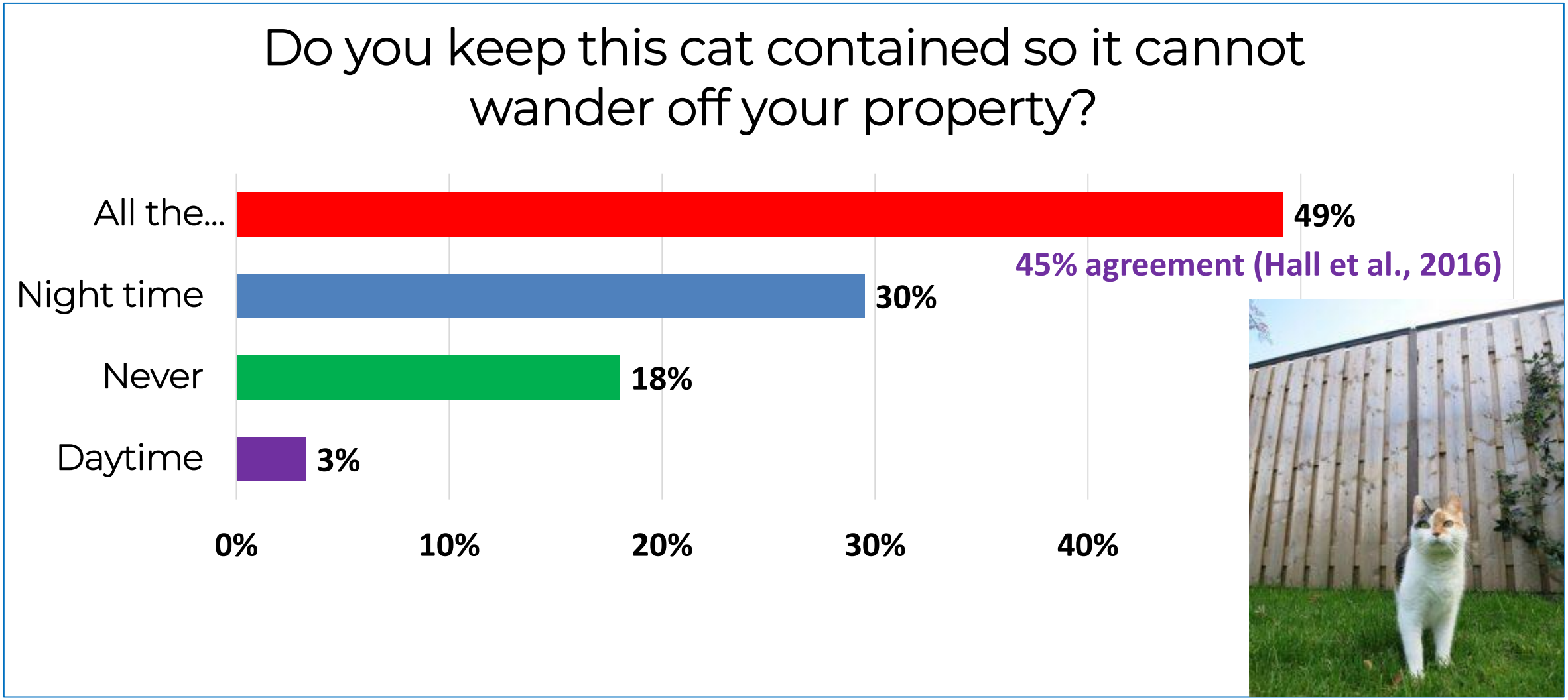
## ACTIVITIES INCLUDE:

- Free desexing program (5 years and going)
  - Camera trapping
  - GPS tracking
- Surveys – ownership & caring behaviours

## TARGET AREAS

- Low socioeconomic areas
- Large proportion renters (lack fences, fly screens
- High cat intake into shelters

# Study of Cat caring behaviours of low SES people enrolling cat in free desexing program (phone survey)



# Study of *ALL* cats being enrolled in free desexing program (n= 264 cats) – 2022

- **Designed to determine proportion of cats** that hunted & relative proportion of prey observed to be caught.
- **78% of cats DID NOT hunt or hunted only insects** (4% hunt only insects)
- **22% of cats observed to hunt** (excluding those hunting only insects, slugs, snails)
- **Only 7% of cats were observed to catch birds**

# Predation and Risk Behaviors of Free-Roaming Owned Cats in Auckland, New Zealand via the Use of Animal-Borne Cameras

*Bruce S, Zito S et al; Frontiers in Veterinary Science 2019*

- Cat-borne video cameras on 37 pet cats for 3 days in Auckland NZ
- 65% outdoor all times, 35% inside at night

Investigated:

- Stalking, pursuing, and seizing prey
- Altercations with other cats
- Risky behaviours e.g. venturing into roads

# Predation and Risk Behaviors of Free-Roaming Owned Cats in Auckland, New Zealand via the Use of Animal-Borne Cameras

*Bruce S, Zito S et al; Frontiers in Veterinary Science 2019*

- 62% cats (23 cats) engaged in 121 predation events
- 40 events resulted in prey capture
- **Insects – 87%, skinks 13%**
- **No mammals, birds or amphibians captured**
- **One already deceased bird was scavenged**
- 87% of cats engaged in risky behaviour
- Most common risky behaviour was venturing onto road

# What might reality be for owned cats?

- Based on contemporary cat keeping behaviour, Woinarski paper is likely a 15 times overestimation.
- Woinarski assumed that all 3.88 million pet cats predated an average of 15.6 birds a year = 61 million birds caught by pet cats/year

**Based on our data:**

- If only 22% of pet cats predate and only 7% of these predate birds = around 4 million birds predated, including introduced species

  (3.88m cats x 7% predate birds x 15.6 birds/yr = 4.15 million)
- **Only 1/15$^{th}$ of what they calculated!**
- 73% of birds caught are native (Woinarski), 58% Canberra (Barratt, 1997), 73% in Hobart, (Trueman, 1991), 88% in Adelaide (Paton, 1991).
- 3 million native birds per year caught by pet cats

# How many birds caught by cats in highly modified environments? Stray cat estimates

- Effects of stray cats are extrapolated from just 5 studies
- 3 were from rubbish dumps in small rural towns
- Another explicitly stated they only analysed stool samples that contained evidence of wildlife remains and **excluded those that appeared to be fed cat** food in periurban bushland (Dandenong Valley Regional Park)
- 8 parks in Greater Melbourne – BUT **only if stool had feathers, hair, bones**
- Stray cats catch 61.5 birds per cat/ year
- Assumed all 0.7 million stray/unowned cats living in highly modified environments predated similarly to those samples analysed.
- Results are in no way representative of stray cats, the vast majority (>99%) are fed intentionally by humans (unpublished data from Australian Community Cat Program)

# Conclusion

- Evidence appears **quite flawed** for number of birds killed by pet and stray cats from papers Woinarski x 3, Murphy (Threatened Species Hub, funded by Federal Govt.)

- **No population effect investigated** BUT implied in media

# What evidence do we have of a population effect?

# Association between cats & passerine birds

- 57 sites across metropolitan Perth
- Investigated factors effecting passerine bird community composition (eg. magpies)
- No link between cat density and passerine bird species richness (number & species diversity)
- Decreasing bird population with increasing housing density, and with increasing distance from bushland
- Habitat destruction and degradation were the critical factors, not cats

Grayson J, Calver M, Lymbery A. 2007:.

# Bird nests: Sydney bushland

- Predation of bird eggs & nests in 24 forest patches through Sydney metropolitan region
- Avian predators attacked all patches
- Black rats attacked nests in 10 areas
- No nests attacked by cats
- Reduced nest predation associated with higher cat activity

Matthews, 1999

Received: 24 September 2021 | Accepted: 31 March 2022

DOI: 10.1111/1365-2656.13700

Journal of Animal Ecology | BRITISH ECOLOGICAL SOCIETY

# Habitat provision is a major driver of native bird communities in restored urban forests

Elizabeth Elliot Noe[1] | John Innes[2] | Andrew D. Barnes[1] | Chaitanya Joshi
Bruce D. Clarkson[1]

- Investigated **diversity and abundance of birds** in **urban forests**
- Hypothesized that native bird biodiversity would be positively affected by amount & quality of native forest and negatively affected by rats, possums and cats
- Found that avian species richness increased when composition most similar to undisturbed forests

# Habitat provision is a major driver of native bird communities in restored urban forests

Journal of Animal Ecology | BRITISH ECOLOGICAL SOCIETY

**However**.....

- Contrary to prediction, **invasive mammals (cats, rats, possums) had no significant effect on native bird species richness and abundance**
- Hypothesized that avian species remaining in urban forests and cities cope with predation
- However, habitat restoration important!

# Birds


Why the disparity between reports of how many killed and population effect?

# Cats are opportunists

- Two studies (UK, France) showing birds killed by cats less healthy than birds killed by cars or flying into windows
- Used validated measures of bird health - splenic mass and body condition/muscle mass
- Concluded that cats are opportunist hunters & tend to remove sick, old, fallen out of nest
- These birds would not contribute to next breeding season

Baker PJ, et al *Ibis* 2008;150:86-99.27.
Møller AP, Erritzøe J. *Oecologia* 2000.

# Royal Society for the Protection of Birds - UK

"Despite the large numbers of birds killed, there is no scientific evidence that predation by cats in gardens is having any impact on bird populations U.K.-wide.

It is likely that most of the birds killed by cats would have died anyway from other causes before the next breeding season, so cats are unlikely to have a major impact on populations."

# Mammals

**Introduced cats (Felis catus) eating a continental fauna: The number of mammals killed in Australia**

*B.P. Murphy, L.A. Woolley, H.M. Geyle, S.M. Legge, R. Palmer, C.R. Dickman, J. Augusteyn, S.C. Brown, S. Comer, T.S. Doherty, C. Eager, G. Edwards, D.A. Fordham, D. Harley, P.J. McDonald, H. McGrego, K.E. Moseby, C. Myers, J. Read, J. Riley, D. Stokeld, G.J. Trewella, J.M. Turpin, J.C.Z. Woinarski*

- Based on same studies as birds – **designed to determine relative proportion of prey observed to be caught by pet and stray cats** (from 1990's)
- **Not designed to determine proportion of cats which predate**
- Observed 8.6 mammals/year; multiplied by 5 – only observed catch 20%
- Calculated – cats caught 46 mammals/year
- **Multiplied by all 3.88 million pet cats** (regardless of inside only)
- **Most 98% mammals (Barratt) caught by pet cats were introduced rats, mice and rabbits**
- Franklin 2021 – 97% of mammals caught by pet cats were mice, rats, rabbits

# Is there evidence for a population effect on native mammals in urban areas?

# Urban cats and urban wildlife

- Perth study – investigated number & diversity of native mammals across 3 bushland sites (Lillith 2010)
- Compared 3 areas which for >10 years either:
  1. Banned cats (strict prohibition of cat ownership)
  2. Required cats inside overnight and to wear a bell
  3. No regulations regarding cats

# Species diversity in 3 bushland sites

Lillith MC, et al. *Biology* 2010;16:162-172.

- Numbers of most abundant medium-sized mammals were similar across all sites - brushtail possums and southern brown bandicoots

- Smaller mardo *Antechinus flavipes* - highly susceptible to cat predation - mostly at an unregulated cat site.
- **Total mammals** caught at unregulated site exceeded other sites but vegetation denser
- Concluded: **pet cats are not major influence** on the species diversity or abundance of small and medium-sized mammals and **vegetation characteristics are likely more important.**

# Melbourne Bandicoots

- Southern brown bandicoot abundance was higher in peri-urban areas compared with nature reserves
- Highest at sites with most urbanized surroundings - cats also prevalent
- Lower abundance in nature reserves where cats largely absent

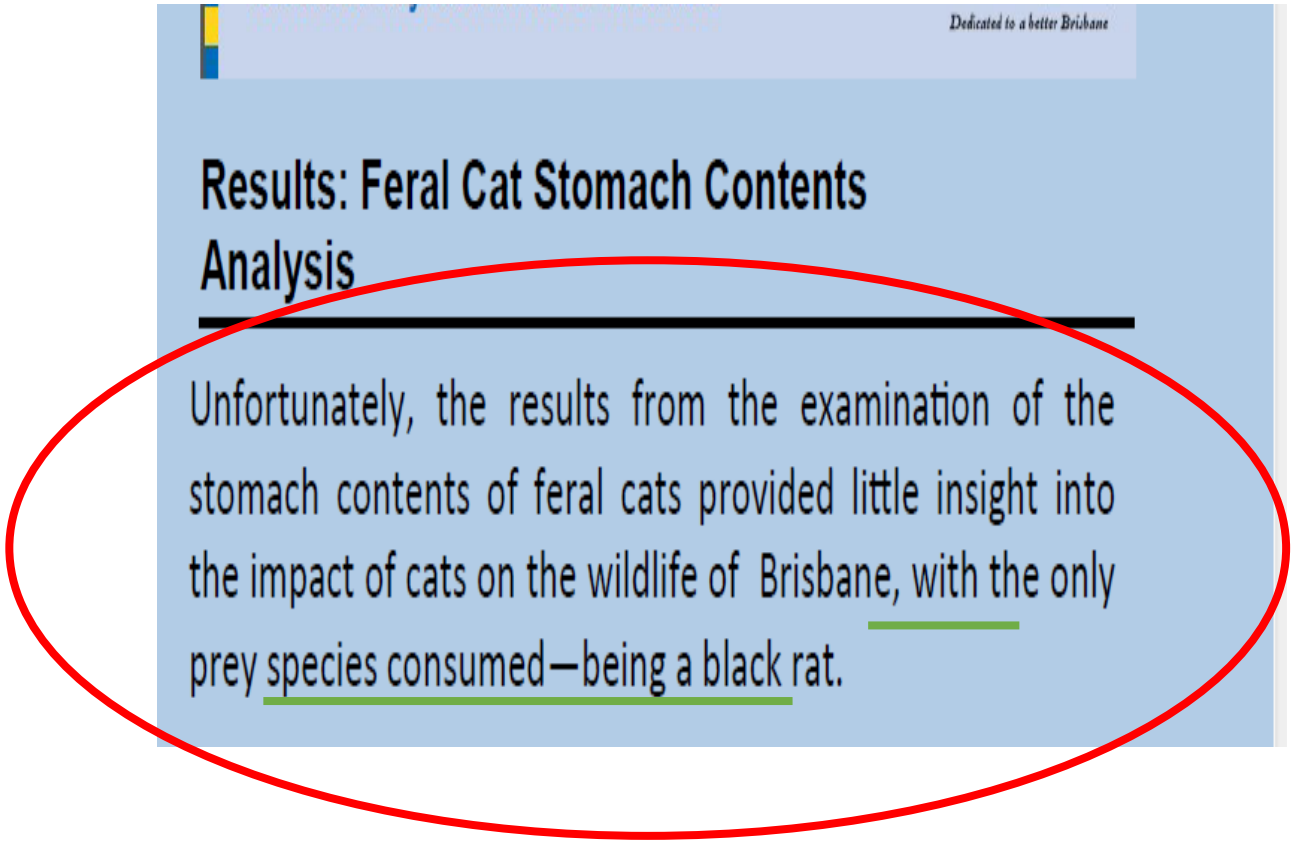
Maclagan, 2018

# Brisbane City Council study...

## Stomach Contents Analysis Results

Each year, Brisbane City Council implements a pest animal trapping program funded through the Brisbane Invasive Species Management Plan (BISMP) Implementation program, to manage the threats that pest animals pose to the environment, biodiversity and social values in Brisbane.

In order to better understand the risks posed by invasive species, and the prey consumed by invasive predators, analysis was undertaken of stomach contents of fifty cats and foxes captured within and outside of natural areas.




Brisbane City Council:
Invasive Species Times
Issue 4 2015-16

**Study of prey analysis of domestic cats** (Leis 2021) **Southern Downs Shire**, Qld (2-3 hrs drive Brisbane)

- Investigated stomach and colon samples from cats killed in pound
- Predominantly **cat food, house mice and carrion** (eastern grey kangaroos) and **no species of conservation concern in cat**

# Reptiles

# How many reptiles are killed by cats in Australia?

*J. C. Z. Woinarski, B. P. Murphy, R. Palmer, S. M. Legge, C. R. Dickman, T. S. Doherty, G. Edwards, A. Nankivell, J. L. Read, D. Stokeld*

Australian Pet Welfare Foundation

- Owners observed an average **3 reptiles/year** but only see 22% of catch so extrapolated to 13.6/yr = 63 million/year
- **Woinarski: "**However, much of the interpretation of these result are constrained by shortcomings in evidence: our study did not seek to assess whether predation by cats is leading to chronic ongoing depletion in the 'standing crop' of Australian reptiles."
- **Barratt: "Vertebrate species that successfully invade suburban environments are likely to be mobile and widespread,** while species in surrounding habitats may be relatively immobile and patchily distributed."


CAT
www.davisem.com.au
45194 D
324D
CAT


Look what the cats did to the wildlife

# Protecting species of conservation concern should be first priority

- Do it with **data and <u>good science</u>**!
- Keep building the evidence - looking at a range of cats, account for indoor vs. outdoor

  = Get better estimates about **<u>what cats are actually doing</u>**

**Free desexing program** for owned & semi owned cats
- 5 years and ongoing

**Aim of CCP**: Increase desexing rate, **reduce no of stray cats**

**Targeting Low SES**
- Population largely renters
- High numbers of free roaming cats
- High cat intake to shelters

- Camera trap data – Are free roaming cat no's declining over time?

- Tracking collars – how far do semi-owned/restricted matter cats roam?

- Camera trap data – Relationship between cats, wildlife, landscape

- Video cam collars – how much do owned cats predate?

- Surveys to understand cat containment & predation and RF's for predation

- Surveys to understand how cats cared for & transition to ownership

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# Our Ecology Research

## 1. Are the number of free roaming cats declining over time?

Aims

- To determine if the implementation of free desexing is effective in reducing free roaming cat numbers and pound/shelter intake.

# Our Ecology Research

## 1. Are the number of free roaming cats declining over time?

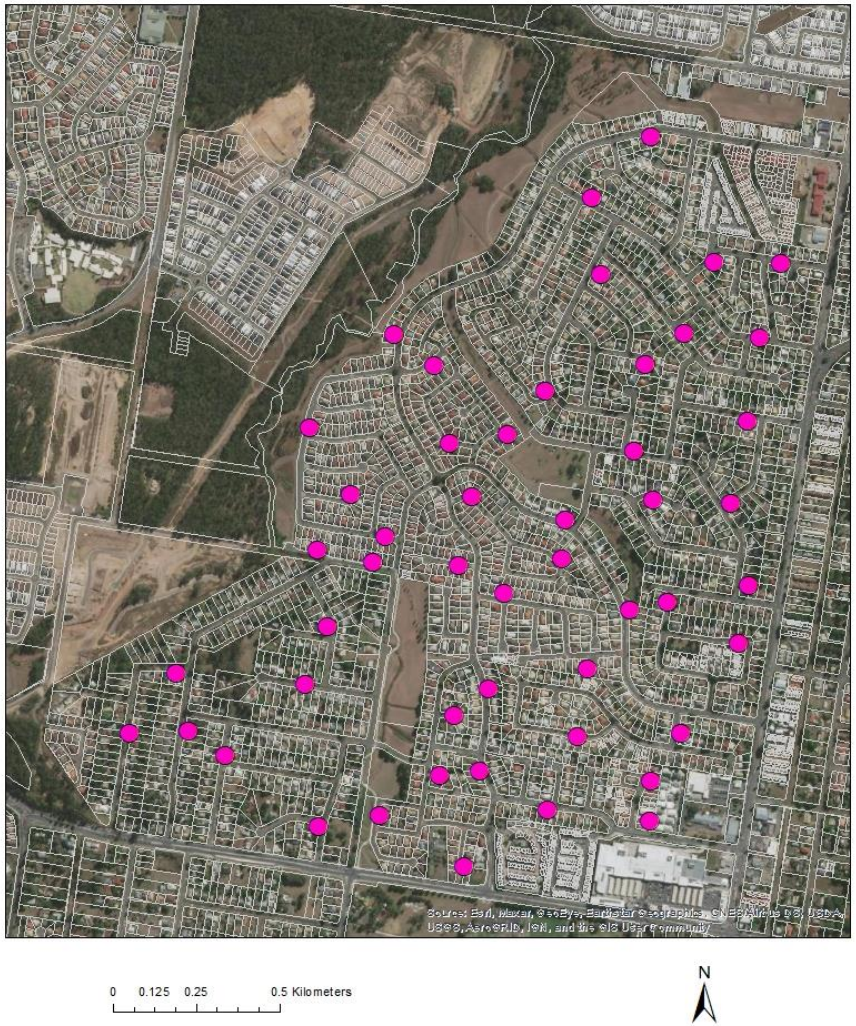
Methods:

- Camera trap observations
- Target suburbs: Rosewood, Redbank Plains, Goodna
- 50 Cameras/suburb (150 cameras/deployment), placed approx. 200m apart
- Deployed for 2 weeks per location in Summer & Winter
- Project started June 2000 (deployment 10 starts Jan 2025)
- EcoAssist used to ‘’clean’’ images
- Ecological modelling – N-mixture models

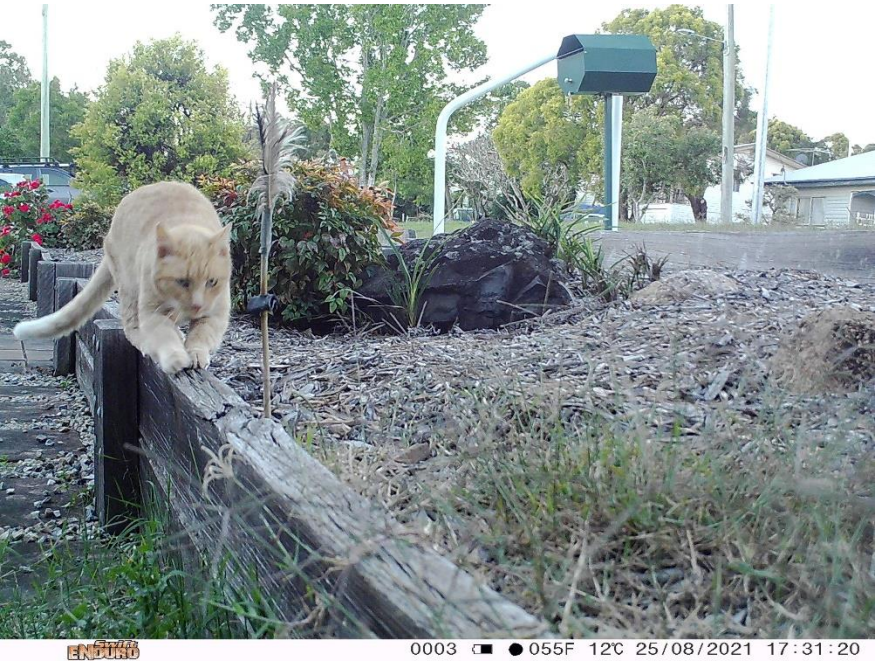
# Camera locations:


Rosewood Camera Placement 2021 WINTER


Goodna Camera Placement 2021 WINTER




Redbank Plains Camera Placement 2021 WINTER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0026 073F 22

| Overall/All suburbs | Number of cats |
|---|---|
| Deployment 3 | 3888 |
| Deployment 4 | 2329 |
| Deployment 5 | 2807 |
| Deployment 6 | 1801 |
| | |
| **Goodna** | |
| Deployment 3 | 1831 |
| Deployment 4 | 847 |
| Deployment 5 | 1226 |
| Deployment 6 | 510 |
| | |
| **Redbank Plains** | |
| Deployment 3 | 948 |
| Deployment 4 | 724 |
| Deployment 5 | 865 |
| Deployment 6 | 585 |
| | |
| **Rosewood** | |
| Deployment 3 | 1109 |
| Deployment 4 | 758 |
| Deployment 5 | 716 |
| Deployment 6 | 706 |

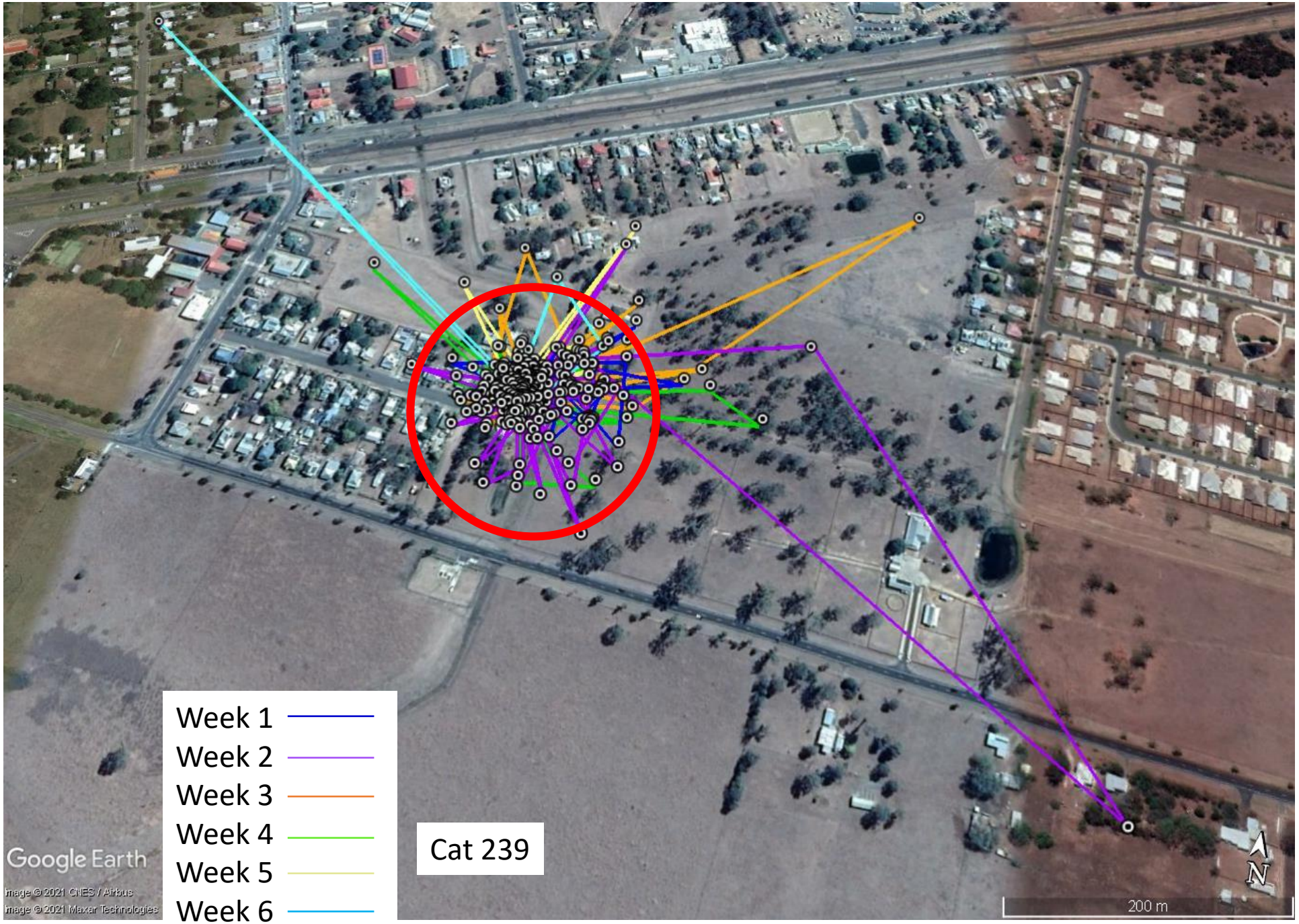
# Number of cats observed per deployment

# Our Ecology Research

## 2. Tracking ‘Restricted matter’ cats

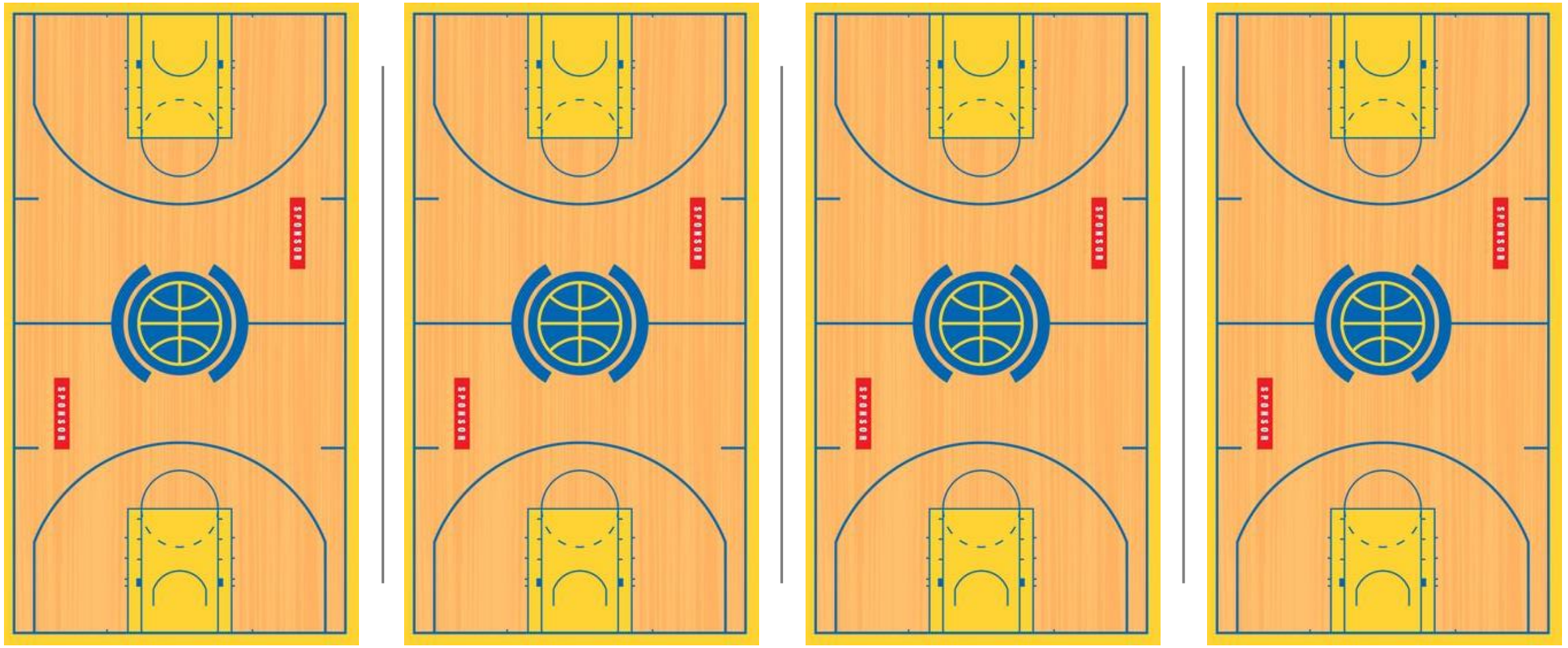
Aims

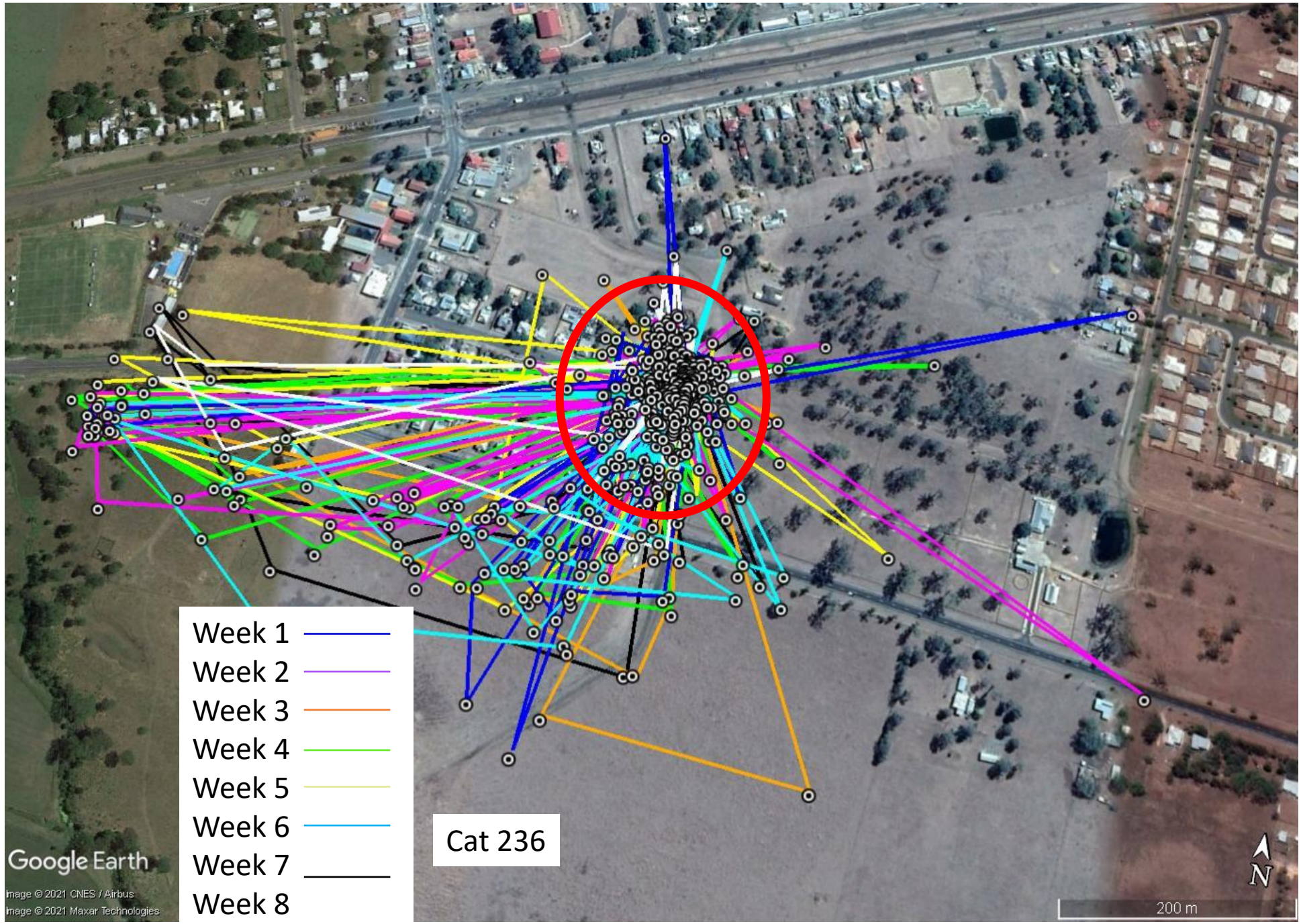
To track the movement patterns of semi owned cats (cats that are not owned but may receive some form of care from humans).




95% home range 0.2 - 0.4 hectare

# 0.2 hectares = roughly the size of 4 basketball courts






95% home range 0.2 - 0.4 hectare

# Our Ecology Research

## 3. Association between cats, wildlife and land use

Aims

- To determine what factors ***(pet cat density, dog density, housing density, garden composition, proximity & size of remnant habitat)*** predict wildlife species presence/ absence, richness & abundance in suburbs of Ipswich, QLD.

# Our Ecology Research

## 3. Association between cats, wildlife and land use

Methods

- Camera trap observations
- Target suburbs: Rosewood, Redbank Plains, Goodna
- 50 Cameras/suburb (150 cameras/deployment), placed approx. 200m apart
- Deployed for 2 weeks per location in Summer & Winter
- Project started June 2000 (deployment 10 starts Jan 2025)
- EcoAssist used to ‘’clean’’ images
- Ecological modelling – N-mixture models

**Data collection ongoing, data analysis in progress**

# Our Ecology Research

## 4. Predatory and risky behaviours of free-roaming owned cats

Aims

- To monitor the frequency of predatory and risky behaviours of free-roaming owned cats
- To determine how far free-roaming owned cats travel from their home
- To explore predictors of predatory and risky behaviours (age, sex, outdoor access, proximity to bushland).
- Investigate owner perception of cat behaviours vs. reality

# Our Ecology Research

## 4. Predatory and risky behaviour of free-roaming owned cats


Methods

**Video camera**

- Study size, 70 cats of mixed age that go outdoors
- Video camera collar worn by each cat over 2 days

**GPS tracker**

- GPS collar worn by each cat for 5 days to track movements


**Survey**

- Questions to elicit what owners perceive their cats do in terms of predation, sleeping, and other activities

# IT'S TIME!

Let's manage cats scientifically & humanely

To decrease cats and costs, and impact on people and wildlife.

Australian Pet Welfare Foundation

The University Of Queensland
AUSTRALIA

COMMUNITY CAT PROGRAM
Protecting people, cats & wildlife