

# Emerging technologies to enhance individual cat management

John L Read

# Thylation



THE UNIVERSITY  
*of* ADELAIDE

# What animals are preferred cat prey ?



**24 *Ctenophorus pictus*, 3 *Pogona vitticeps***  
1 *Tympanocryptis intima*, 1 *Tympanocryptis lineata*,  
3 *Ctenotus schomburgkii*, 1 *Mus domesticus*, 1 *Poephilla*  
*gutatta*

# Cat prey selectivity

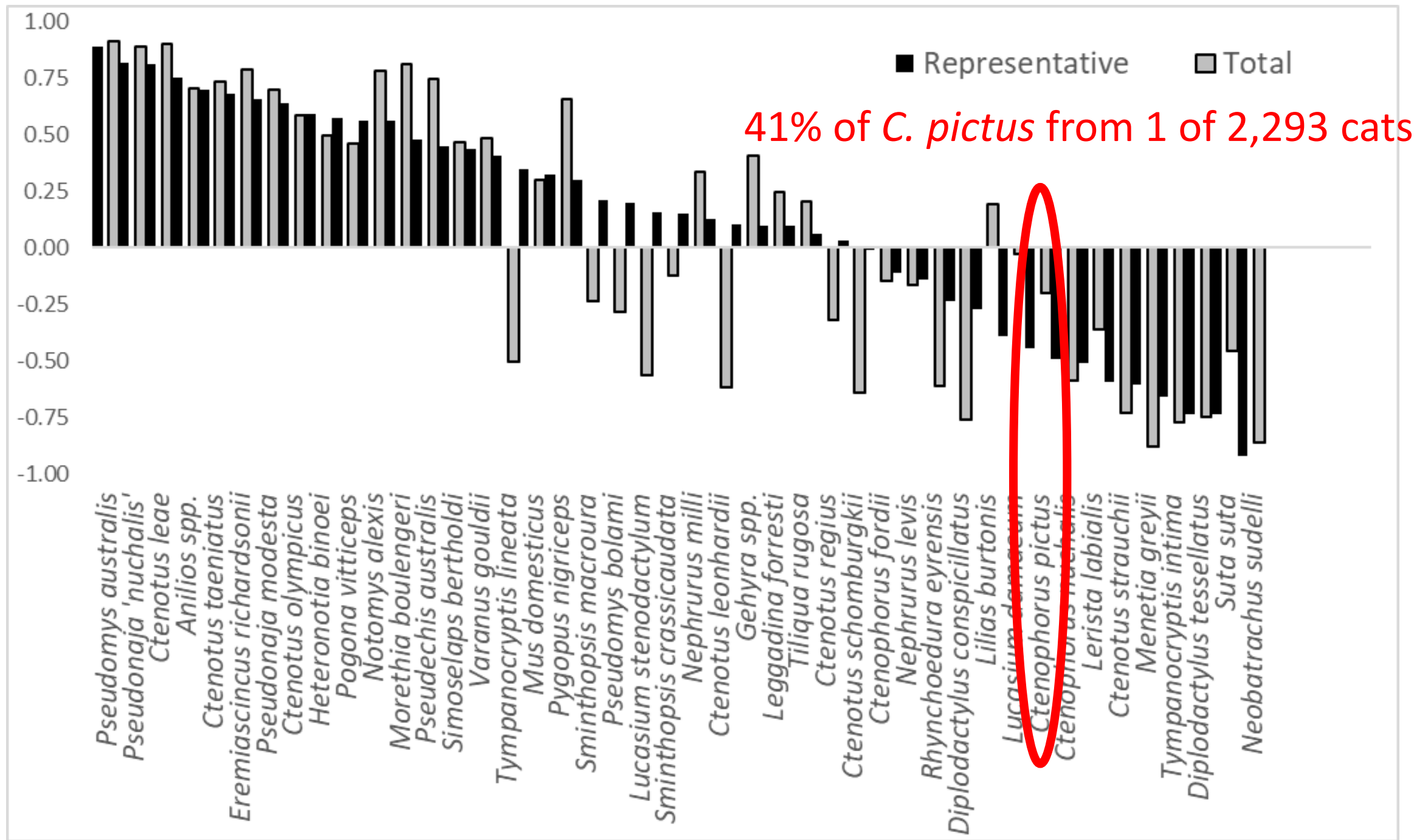


Are (Painted) Dragons at high risk?

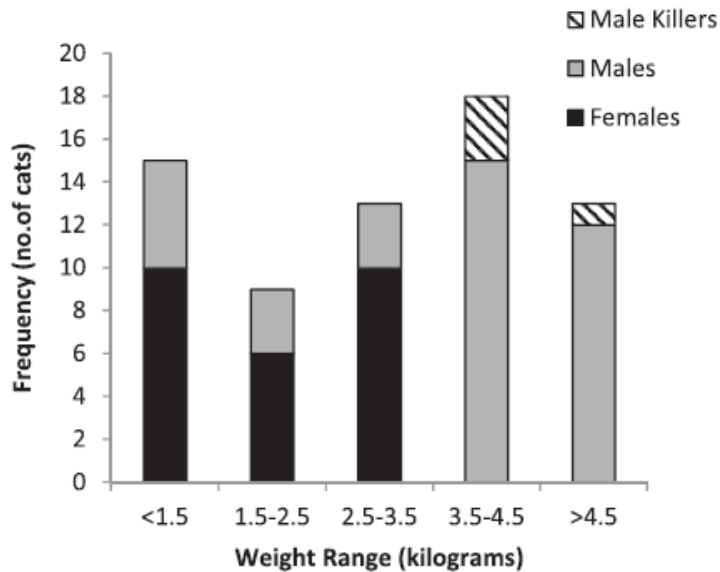
- 27 year study
- Dissected 2,293 feral cats
- Identified **3,234** vertebrate prey items
- Compared with relative abundance from **>70,000** regional vertebrate records



John Read, Katherine Moseby, Hugh McGregor subm. to Wildlife Research



# Catastrophic cats: Individuals that learn to hunt challenging prey

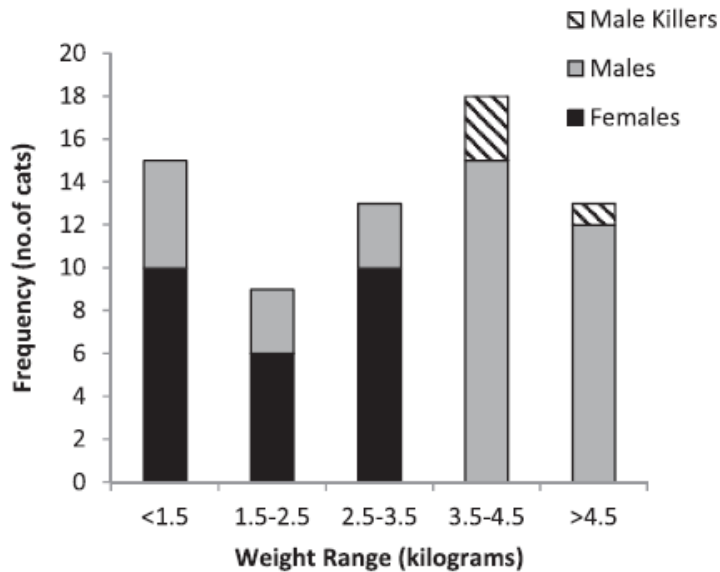


Frequency of male and female weights for cats (including quoll killers) captured during the western quoll reintroduction into the Flinders Ranges National Park in South Australia.

**DNA confirmed ten of 41 chuditch reintroduced to Flinders Ranges were killed by just 4 feral cats.**

Cat number	Sex	Weight (kg)	Quoll attacks
1	M	4.3	2
2	M	5.0	3
3	M	4.1	3
4	M	3.7	2

# Catastrophic cats: Require specific management tools



Frequency of male and female weights for cats (including quoll killers) captured during the western quoll reintroduction into the Flinders Ranges National Park in South Australia.

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**Chuditch killers were typically only trapped at cached chuditch carcasses**

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**Focussed on hunting Painted Dragons  
Probably not interested in rabbit (or quoll) bait!**

# Curious





**Curious**



**Easy to trap**

**Curious**



**Aware**



# Curious



# Aware



# Oblivious



**Curious**



**Aware**



**Oblivious**



**Easy  
to  
Felixer**

**Curious**



**Aware**



**Oblivious**



**Alarmed**



**So cats differ in their prey selection & alertness**

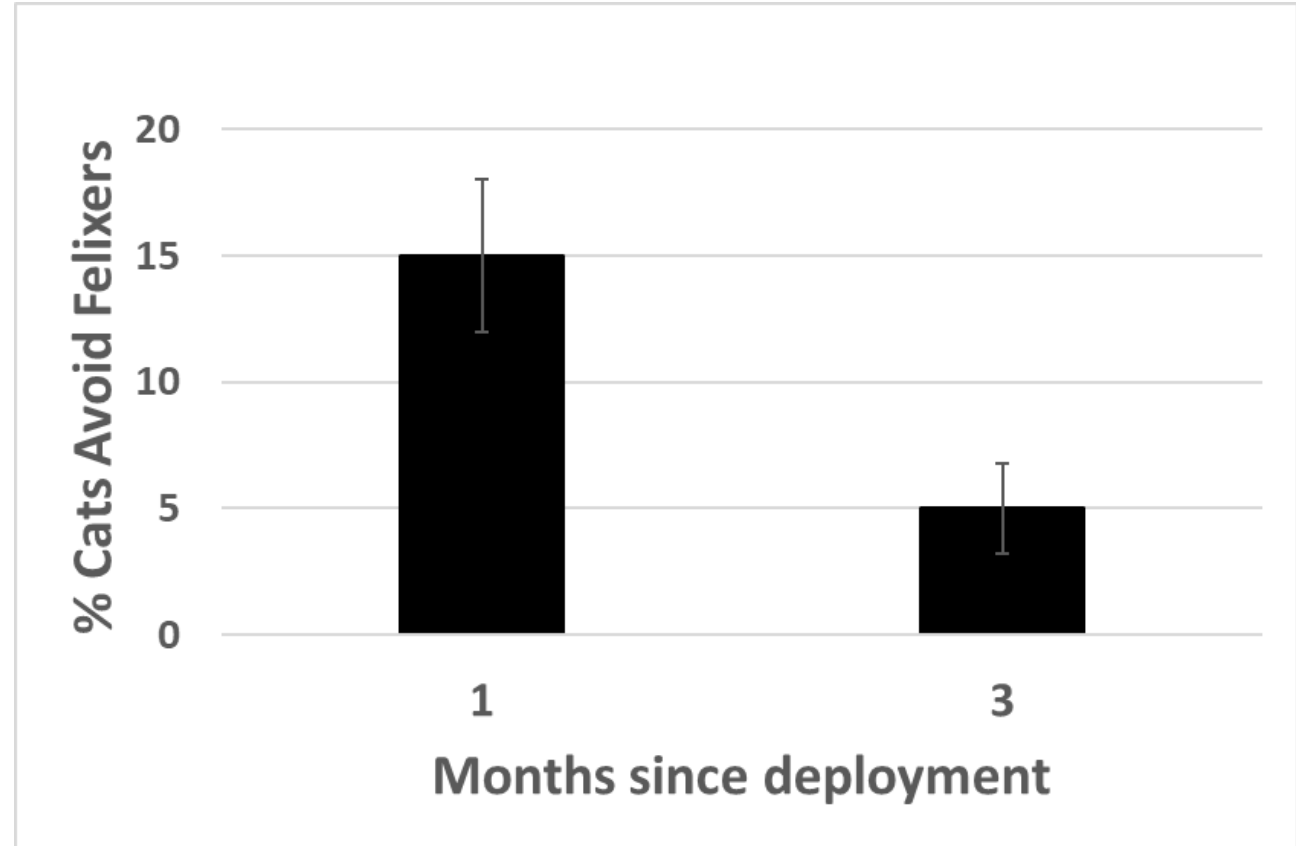
**But the WAFCWG is concerned with  
management**

**Do cats vary in response to control tools?**





- **Some cats avoid Felixers initially**
- **Neophobia declines through time**
- **Concealment reduces neophobia**



**Ned L. Ryan-Schofield, John L. Read, Hugh W. McGregor, Todd J. McWhorter, Katherine E. Moseby**





**Ask Michael Johnston to see his  
enlightening/disturbing videos of  
cats ignoring or avoiding traps**

Curiosity kills some cats

but

Wariness (or disinterest) saves others

**Neophobia or avoidance is a challenge for all  
forms of feral and stray cat control**

Curiosity kills the cat

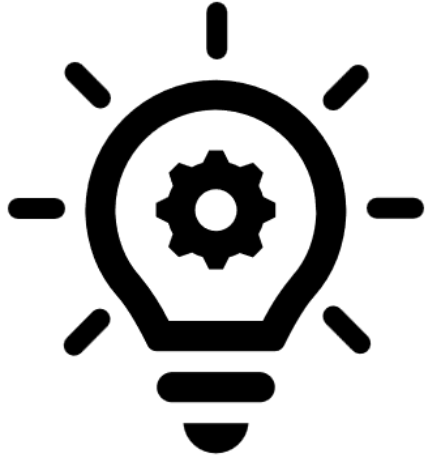
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**Multiple tools and variability of deployment is  
optimal for sustained feral cat control**

- **All** cats are individuals (so are cat owners!)
- “My cat doesn’t wander/hunt/spray”

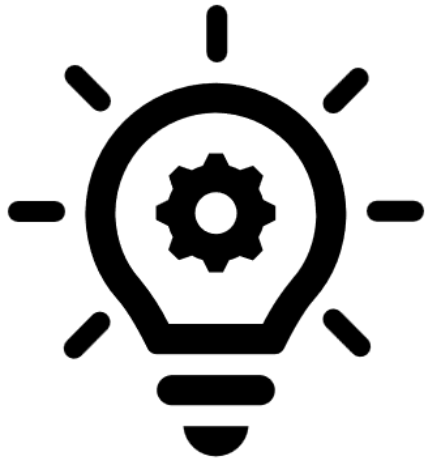


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- **Cats transition from pet to feral to pet**

WAFCWG

- All cats are individuals (so are cat owners!)
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- Many cats (pet, stray or feral) are very smart, they learn and resist management
- Cats transition from pet to stray to feral & back

WAFCWG



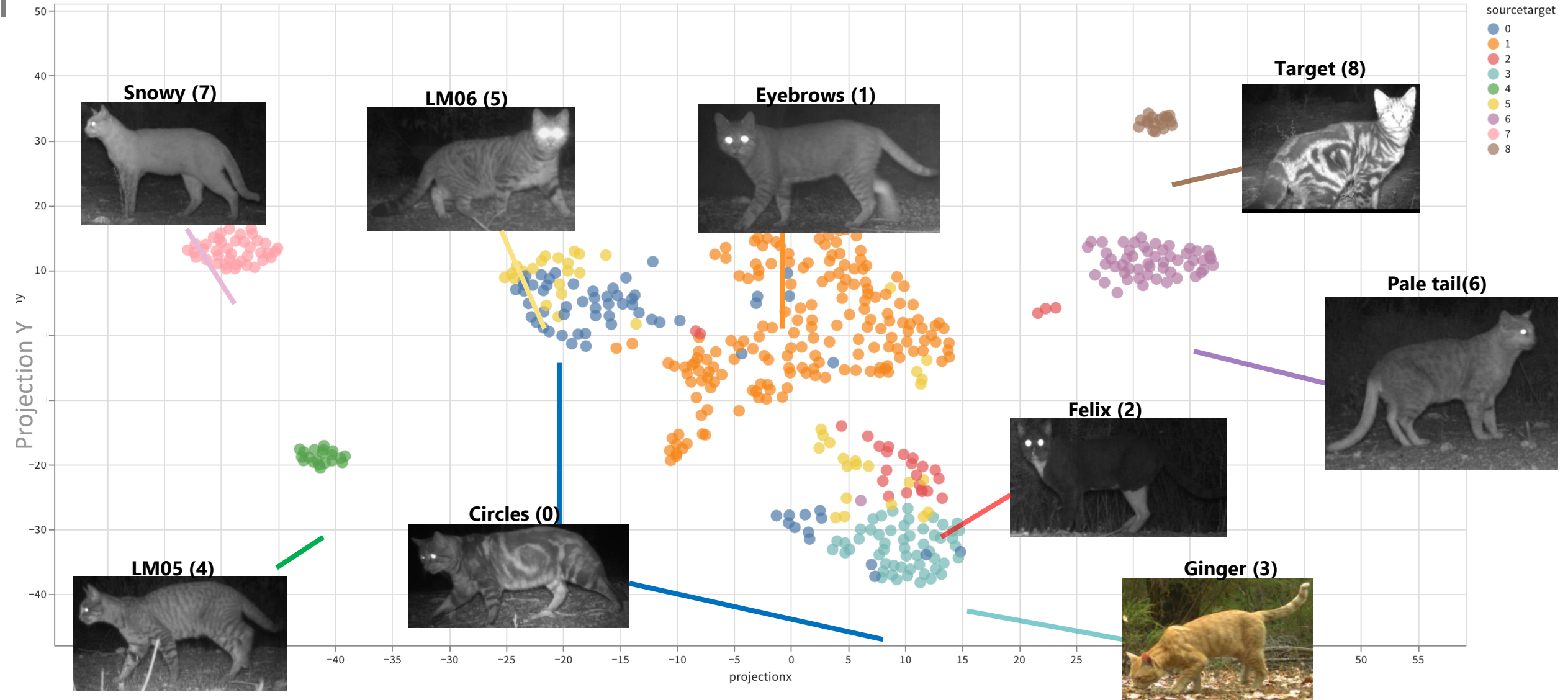
**Need to manage cats (feral, stray and pet) as individuals  
not a numbers game or one size fits all**

**Therefore ideally we need to:**

- 1) distinguish individual cats or predictive traits**
- 2) develop/adapt management tools to target individuals  
and distinguish pets**

**Emerging technology and Community support are key**

# Machine Learning can identify cats



Cat image data and visual IDs  
courtesy of DBCA (**Marika  
Maxwell and Adrian Wayne**)

**Lewis D'Antonio, Todd McWhorter, John Read, Stefan Podgorski and Ian Reid**

**Artificial intelligence (including Machine Learning) can distinguish:**

- **Cats from wildlife**
- **(Most) Individual feral cats by their patterns**

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**But the future is even more exciting.....**

**Bluetooth  
antenna and GPS**

**EDGE AI camera  
10 frames per second**

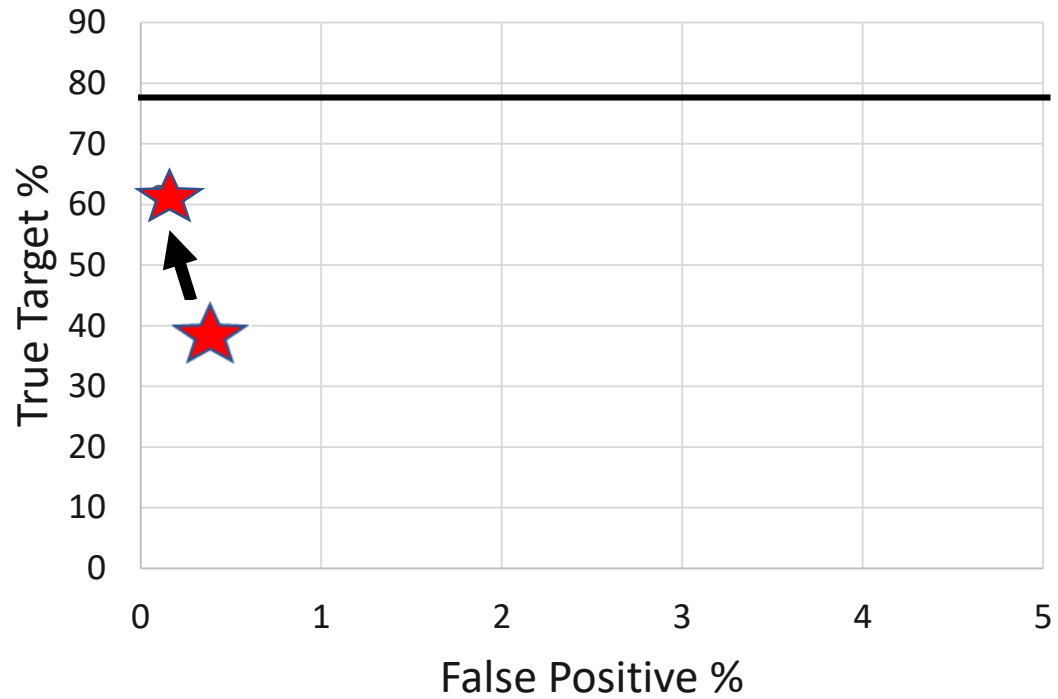






10 Frames per second provides:

- more still images for AI (different angles)
- enables gait to be used to distinguish individuals
- **Edge AI** enables these identifications to trigger immediate management



24% of cats too fast or too angled to efficiently target with Felixers

0.5% False targeting is **very** low and within APVMA registration guidelines

Edge AI camera using multiple images improved targeting efficacy by 20% in **first** retraining



# The ADIMA SafePet Solution

- Registered cats wear a council-issued low cost, ultra-lightweight BLE tag that is linked to microchip and registration



- Council deploys base-stations at 'cat free zones' and roving detectors (garbage trucks) used to detect nearby cats.

- Using ADIMA web-service Council can prove when registered cats stray **without trying to trap.**



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- Only councils and cat owners (via Bluetooth app) will have access to private data on cat ownership and location

- Cat owners benefit through notifications (ultimately including health stats) about their cat and owners of lost cats can alert council to initiate additional searches.**





# ADIMA-V1.0 Principle of Operation

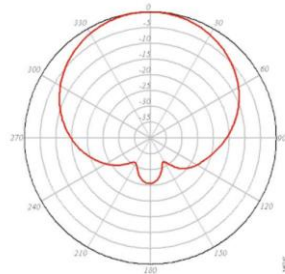
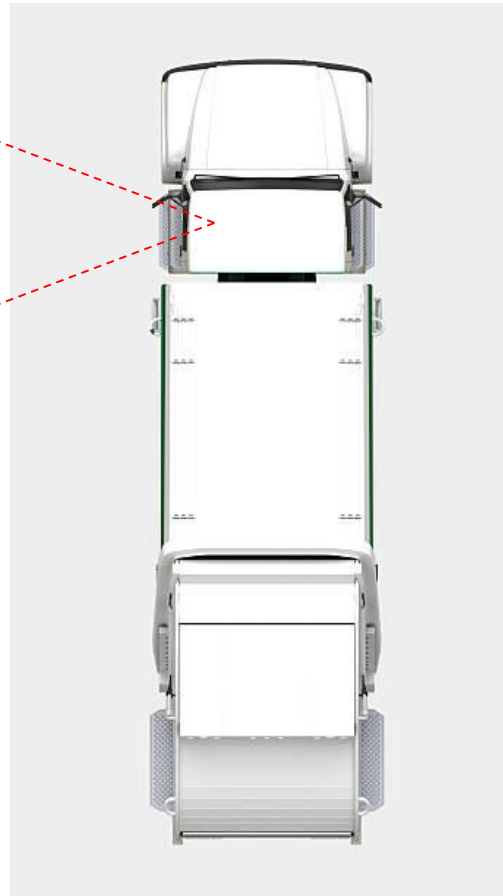


Fig1 - Antenna Azimuth Chart



Directional 2.4GHz directional antenna (~30-60 deg 3dB beam width) is mounted on ranger vehicles or garbage truck. This detects tags to the left side of the vehicle. This is to reduce the size of the detection zone as well as to detect tags reliably within most suburban blocks of land.

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# ADIMA-V1.0 Principle of Operation



Example showing stray pet detection

Pet's registered address

Detection region, does not overlap

Base-station / vehicle location

Detection regions can be calculated using vehicle location, direction of travel, GPS fix accuracy, antenna pattern and received power.

Repeat detections from different vehicle locations within a short time period, can also be used to triangulate and reduce the region dimensions.

Detection accuracy may also (potentially) be improved by incorporating topography, vegetation and structure density data.

Concept illustration only to explain how algorithm may determine if any animal is stray (single detection).



Cat carers want better management of owned and unowned cats too



# Individual recognition enables differentiated management of cats



**TARGET\_PHOTO**

# Individual recognition enables differentiated management of cats



**TARGET\_PHOTO**

**80% confident no collar**

**40% confident not distinctive local pet**

**60% confident it is bandicoot killer**

**100% confident no rego tag**



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**TARGET\_PHOTO\_BLOCKED**

Take home message

**Take the 'F' out of WAF~~X~~CWG!**

## Take home messages

- **Individual cats (pet, stray and feral) vary in appearance, behaviour, risk and response to management tools**

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- **Adaptive (including individualised) and diverse management required for eradication and optimal sustained control (because cats learn!)**

## Take home messages

- Individual cats vary in appearance, behaviour, risk and response to management tools
- Adaptive (including individualised) and diverse management required for eradication and optimal control
- **Pet cats can/should be distinguished from strays and ferals to enable management of unowned cats**



Thankyou

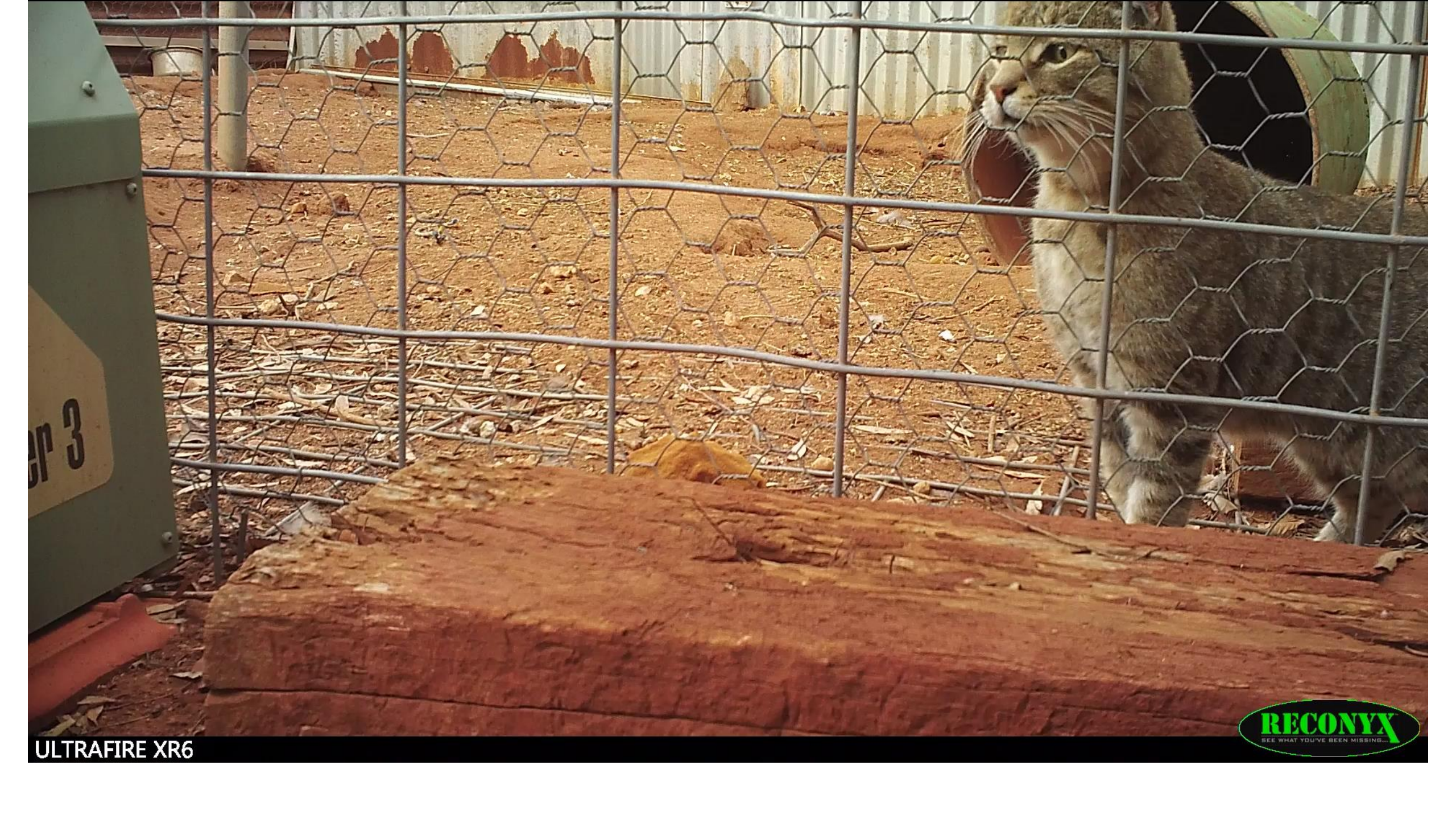


## **Caveats**

**Conservation, animal welfare and human health benefits should be motivation and key deliverables of cat management, not dead cats.**

**Management of habitats (herbivores, fire) and key cat food (rabbits, rodents, refuse) are typically at least as important as removing cats.**

**Empowering responsible cat owner wishes (safety, welfare, aesthetics, management) needs to be key driver of policy and technology.**



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ULTRAFIRE XR6

