



# 2016 RESEARCH FINDINGS

in the School of **VETERINARY & LIFE SCIENCES**

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Feral cat. (Photo: J. Lochman)

## The rapid expansion and origin of feral cats in Australia

One-third of Australian native mammals have suffered either dramatic range contraction or extinction since European settlement. This figure is 90% for medium-size (0.03–3.5 kg) mammals.

A number of causes have been proposed to explain the decline in mammals, including competition, diseases, altered fire patterns, variability in weather and site fertility, and predation by introduced predators, specifically the fox (*Vulpes vulpes*) and the feral cat (*Felis catus*).

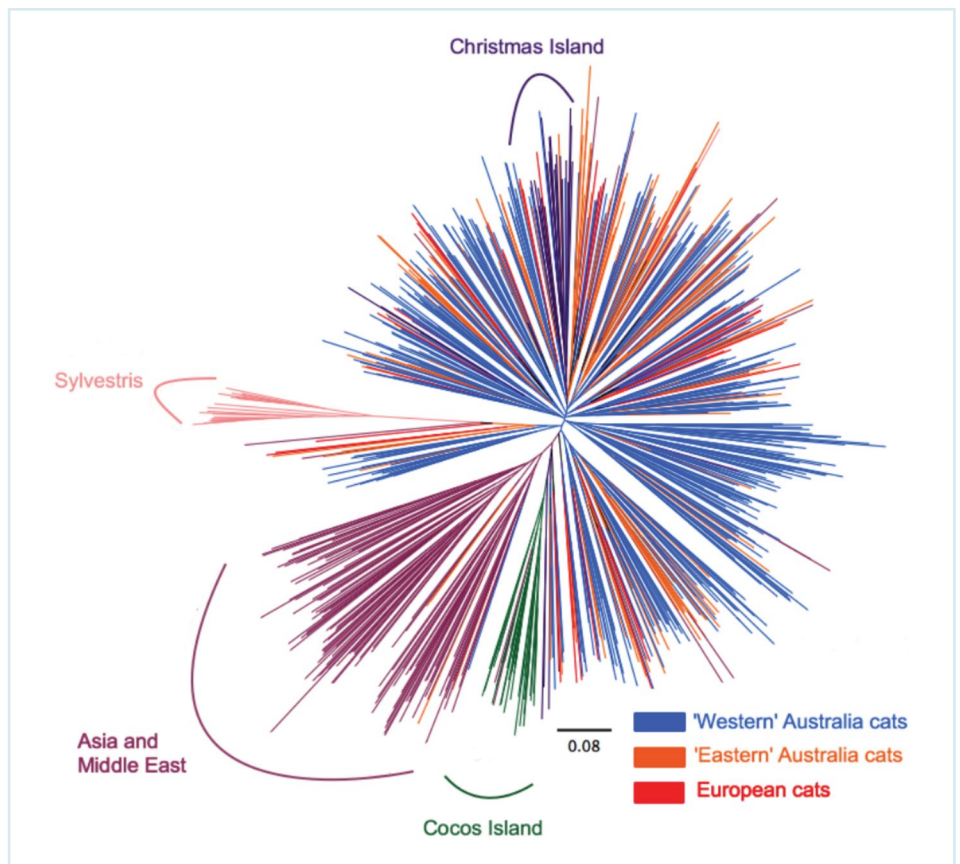
Introduced predators appear to have contributed to the Australian mammal decline more than any other causative factor and predation by introduced foxes and feral cats is the single most important cause. A number of Australian arid zone mammal reintroductions have also been completely compromised due to direct predation from introduced predators.

The aims of this study were to identify and date the origin of cats into Australia. This data is critical to evaluate the role of feral cats in mammal extinctions and declines that have occurred over the last 200 years. If the cat was already present on the continent prior to this event then its implicit involvement in the fauna decline may be less convincing as other factors that may have played a more important role in the loss of Australia's biodiversity.

### Methods and results

A set of highly discriminatory DNA-profiling markers were used to identify individual Australian feral, stray and domestic cats from Australia, Asia, and Europe. These genetic markers were developed for the first forensic

case involving a cat, to convict a murderer (Menotti-Raymond et al. 1997). The chance that two cats would have an identical DNA profile was over 1 in 100 billion feral cats, meaning we are able to identify a particular cat with a high degree of certainty.



**FIGURE 1** Details of an individual-based tree of 830 domestic, stray and feral cat specimens created on the basis of DNA profiles showing four, near 'monophyletic' groups — Asia, Cocos (Keeling) Island, Christmas Island (Indian Ocean), and the Scottish wild cat (*Felis silvestris silvestris*)

Samples from over 800 adult animals were collected over their distribution across Australia, Asia, and Europe. Using DNA-profiling markers, we identified a single large pan-Australian feral cat population that had moderate genetic diversity (Figure 1) and displayed a high level of difference from Asian cats.

Cats first appeared in Australia ~200 years ago, at the time of settlement, and appear to be predominately of European origin.

### Conclusions and recommendations

#### Are house, stray and feral cats inter-related and intermixing?

Given a steady and plentiful food source, cats may form large groups, although at a local level and in colonies, cats are a generally solitary species, aggressive to immigrants, exhibiting high inbreeding and low dispersal. Females will occupy small non-overlapping home ranges, overlaid

by the larger home range occupied by a dominant male.

This study showed the house cat and strays (e.g. found on the street or around rubbish-dumps) show high levels of genetic mixing and were not genetically different. Surprisingly though, comparisons between house/stray and true wild or feral cats were genetically different ( $P < 0.001$ ), suggesting that there is limited mixing between these two groups.

#### How can genetic information be used to provide better information on managing cats in Australia?

The data shows poorly supported geographic subdivision in the Australian feral cat population. Cats would be difficult to eradicate on mainland Australia because the genetic population is effectively the size of the Australian continent. The implications for managing feral cats suggest that they may be able

to respond and recover from local control efforts through immigration. If so, then control efforts may need to be ongoing and site-specific.

Cats appear to have adapted surprisingly quickly to the Australian environment. They are also highly transient, moving quickly over the continent. The genetic signature of the Australian cat population and the historical record (developed by Abbott 2002) suggests an expansion of feral cats over an area of ~7.6 million square kilometres in as little as 70 years, an extraordinary accomplishment that is unprecedented in invasion ecology. ■

### More information

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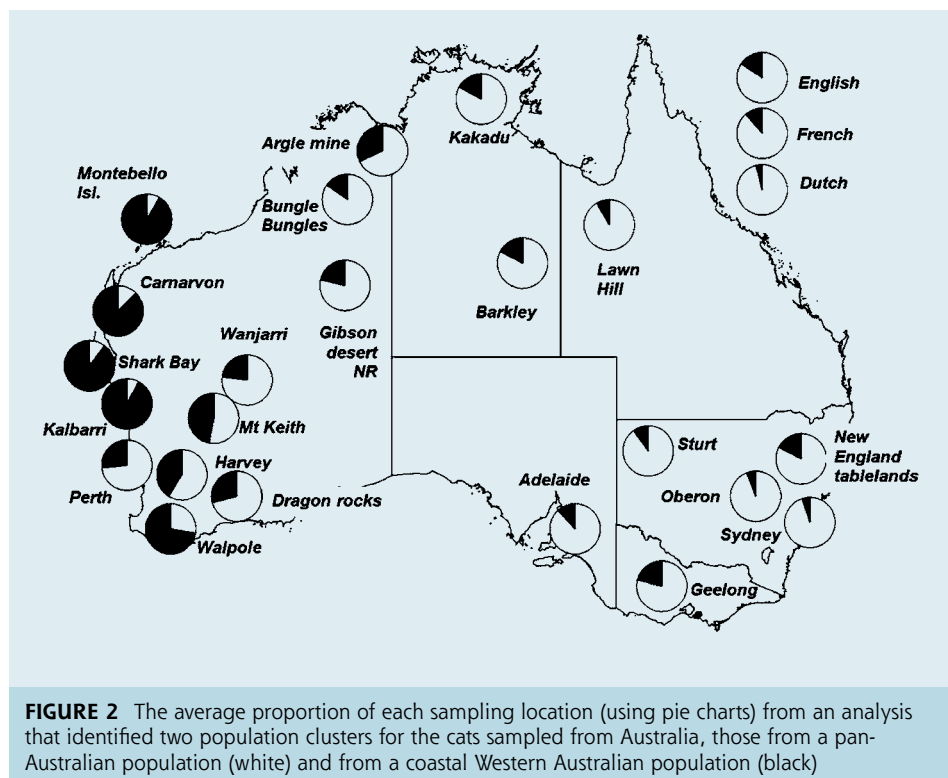
### Acknowledgements

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### References

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- Menotti-Raymond, M., David, V.A., O'Brien, S.J. 1997. Pet cat hair implicates murder suspect. *Nature* 386: 774–775.

This article is an excerpt from this research project by Spencer, P.B.S., Menotti-Raymond, M., and O'Brien, S.J. et al. 2015. The population origins and expansion of feral cats in Australia. *Journal of Heredity*. In press. doi: 10.1093/jhered/esv095.



**FIGURE 2** The average proportion of each sampling location (using pie charts) from an analysis that identified two population clusters for the cats sampled from Australia, those from a pan-Australian population (white) and from a coastal Western Australian population (black)



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