Environmental and Conservation Sciences
Professor Mike Calver
[redacted]

8th July 2020

Mr Ted O'Brien MP
Chair, The House of Representatives Standing Committee on the Environment and Energy

Dear Mr O'Brien

Submission to the Inquiry into the Problem of Feral and Domestic Cats in Australia

We write to request that the inquiry investigate, with a view to prohibiting, the use of Trap-Neuter-Return (TNR) in Australia.

This issue is relevant to several terms of reference of the Inquiry:

1. *the prevalence of feral and domestic cats in Australia;*
2. *the impact of feral and domestic cats including on native wildlife and habitats;*
3. *the effectiveness of current legislative and regulatory approaches;*
5. *the efficacy (in terms of reducing the impact of cats), cost effectiveness and use of current and emerging methods and tools for controlling feral cats, including baiting, the establishment of feral cat-free areas using conservation fencing, gene drive technology;*
7. *public awareness and education in relation to the feral and domestic cat problem; and*
8. *the interaction between domestic cat ownership and the feral cat problem, and best practice approaches to the keeping of domestic cats in this regard.*

The full submission follows.

Yours sincerely,

[redacted]

Prof. Michael C. Calver
Dr. Heather M. Crawford
Prof. Patricia A. Fleming
Ms. Claire N. Greenwell

Submission to the Inquiry into the Problem of Feral and Domestic Cats in Australia

We request that the inquiry investigate, with a view to prohibiting, the use of Trap-Neuter-Return (TNR) in Australia. TNR has been proposed by some advocates as a strategy to manage unowned domestic cats near human habitation. Under TNR, unowned domestic cats are trapped, desexed and then returned to the site of capture, where they may receive supplementary feeding from caregivers.

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7. *public awareness and education in relation to the feral and domestic cat problem; and*
8. *the interaction between domestic cat ownership and the feral cat problem, and best practice approaches to the keeping of domestic cats in this regard.*

Despite lobbying in support of TNR (e.g. Australian Pet Welfare Foundation https://petwelfare.org.au/community-cat-program/, Animal Welfare League of Queensland www.g2z.org.au), we contend that newly published research strongly supports the view that TNR cats continue to hunt, spread disease to people, pets and wildlife, and cause significant public nuisance, while the welfare of the cats themselves is compromised – a view endorsed by the Australian Veterinary Association (AVA).

A. Wildlife issues

TNR fails to address the impacts on wildlife. High cat densities in urban areas can have serious conservation consequences on wildlife species occupying these environments [2,3]. Cities and the surrounding urban matrix are critical for biodiversity conservation with more than half of all Australian threatened fauna species occupying habitats in these environments [4].

Hernandez et al. [5,6] used video cameras attached to collars to quantify the activity and hunting of cats living at 11 regularly-provisioned TNR colonies in Georgia, USA. This footage revealed that 83% of 29 collared cats hunted (i.e., stalking, harassing, capturing prey). Across an average of only 22 hours of video footage per cat (range 3.8–60 hours), 18 cats were recorded killing 174 animals (average 9.6 animals/cat, max. 65 killed by one cat). The average number of hunting events was 9.4/day with a 44% success rate that varied with prey taxa (82% success for Orthoptera, 76% amphibian, 69% reptile, 64% mammal and 17% avian). TNR colony cats therefore clearly hunt despite regular provision of food, and their impact on wildlife populations could be substantial, including prey that are eaten or abandoned when dead or injured [7]. Extrapolating from these data, the estimated 700,000 stray cats currently in Australia [8], this would be equivalent to 2.4 million prey, every day, taken by stray cats in Australia. A study of stray cats in Perth, Western Australia (WA), found that cats that were regularly fed by people were in better physical condition than cats who were not know to be fed. However, fed and unfed strays both consumed wildlife including endemic marsupials [27].

Much more extensive sub-lethal effects are also likely to occur (i.e., if cat presence deters or negatively influences the behaviour and breeding of species like song birds

[9]). In Australia, a recent study by Greenwell et al. [10] documents the systematic decline of a colony of seabirds – Fairy Terns, by a single, free roaming, desexed cat – exactly the kind of cat that would be on the streets, with subsidised food, under TNR. The study provides evidence for significant predator-induced mortality to adult terns and their chicks, the alteration of natural behaviour in response to a persistent predator and the complete reproductive failure of the entire colony of 222 birds. The case-study argues strongly against the practice of trap-neuter-release programs due to the potential for desexed cats to remain a significant threat to wildlife populations post-release.

B. Public health and disease transmission to domestic pets and livestock

Cats are major reservoirs of disease, harbouring at least 36 diseases of various forms in Australia alone, some of which pose a significant risk to human health [11-17]. The close proximity and high density of cats in urban and peri-urban environments combined with a free-roaming lifestyle and limited preventative, ongoing treatment among TNR cats increases the risk of transmission to humans [11]. The high-risk of zoonotic disease transmission to humans has consequently resulted in the prohibition of the release of TNR cats in populous areas. As Cummings et al. point out, *"the public health hazards that feral cats represent, including maintenance of flea populations and continuous production of faeces, are not diminished by neutering through a TNR program [18]."*

Toxoplasmosis is one of the most well-known diseases spread by cats due to its high global incidence rate and harmful effects, affecting ~ 30% of the human population [2,12]. In Australia, it is estimated that 10 million people may be affected at any one time with symptoms ranging in severity; the most extreme cases include toxoplasma-associated schizophrenia and mortality [13, 14].

A study into the prevalence of zoonotic parasites in the urban areas of central Spain found high prevalence of endoparasites (29.2%), *Toxocara cati* (11.7%) and seroprevalence of *Toxoplasma gondii* infection of (24.2%) among 263 TNR cats [15]. Complex interactions between neutered and non-neutered cats has the potential to increase disease transmission among the cat population, limiting the protection of vaccination administered during TNR processing [16,19].

In recent years, *Rickettsia* spp. flea-borne diseases (e.g. typhus) have re-emerged in Orange-County, California [18]. Sixty-six cases of human flea-borne rickettsial cases were investigated in 2012/13. Of those, 27% (18) reported exposure to rescued cats, adopted strays or cat colonies, while 62% reported exposure to pet cats or other wildlife, such as opossums [18]. Transmission between opossums, feral cats and pet cats, who then pass the disease onto their owners is the most likely route of flea-borne rickettsia [20], although, feral cat feeding stations are an alternative route for transmission [see 15]. While human infection of *Rickettsia spp.* has been reported in most parts of the world and detected in cat and dog fleas in Western Australia, no transmissions of the *Rickettsia felis* had been recorded in Australia until 2011, when five patients were treated in Victoria [21-23]. These cases highlight the potential for the transmission of cat-flea typhus in Australia.

Free-roaming cats also pose a significant risk to agricultural production through disease transmission [2,24]. Among the most notable are infections of toxoplasmosis, resulting in ovine abortion, and the protozoan parasite *Sarcocystis gigantea*, which may render the muscle of infected individuals unsuitable for human consumption [25, 26].

The potential for transmission of disease between feral cats, TNR cats and companion animals is of concern, given the free-roaming lifestyle of both TNR and feral cats. Free-roaming TNR cats are likely to come into conflict with pet cats at some stage of

their lives if stealing food and fighting. Such contact may spread disease and novel pathogens [3].

C. Welfare of stray cats

The recent review by Crawford et al. [3] identified ten issues relevant to the welfare of TNR cats:

1. Cats are returned to locations that are not ideal and where there are many potential consequences for whole communities. Many TNR cats are maintained in private backyards and in public spaces (e.g., schools), but maintenance in these areas does not prevent cats from roaming across whole neighborhoods.
2. The TNR process itself is likely to be stressful for cats in the short-term and possibly in the long-term, though studies are lacking.
3. Stray cats are vulnerable to injury due to vehicle collisions, exposure to poisons, fighting with cats and other species, and human cruelty. There is overwhelming evidence for injuries to cats in urban environments.
4. Stray cats are vulnerable to high parasite load and disease that compromise their health, and TNR cats represent potential vectors of these to humans, pet cats and wildlife.
5. It is difficult (sometimes impossible) to adequately treat stray cats for parasites and pathogens and is challenging to administer effective dosages and regularity of treatments, particularly for cryptic or aggressive cats. The usefulness of carrying out incomplete regimes of worming and vaccination is questionable and a costly exercise.
6. TNR cats can be in poor body condition which compromises their health and wellbeing. Evidence suggests that their external body condition does not always reflect internal health or lack of parasites/diseases.
7. TNR cats will still hunt and scavenge refuse despite provision of regular food by caretakers.
8. TNR cat colonies impact urban residents.
9. TNR cats can compromise the welfare of pet cats, and prioritising TNR cats over pet cats can lead to community conflict.
10. TNR compromises the welfare and persistence of urban wildlife and prioritises stray cats over wildlife.

Furthermore, research by Crawford et al. [27] revealed that while stray cats often appear healthy, many are scavenging dangerous refuse, are in significant danger of ingesting toxins or foreign substances that may block or injure their gastrointestinal tract and have high helminth parasite loads. The age profile of the stray cats differed significantly from that of owned populations, with strays mainly under the age of five [27]. Their shortened lives likely result from fighting, road accident trauma and other hazards [27].

Conclusion

Despite the practice of releasing unowned cats being an offence under welfare and biosecurity legislation, and a lack of support from the AVA or Australian Government, TNR continues to be undertaken in Australia [28].

Significant resources are being invested in the control of feral cats in Australia. For example, in 2019, the NSW Government invested $30 million dollars in feral cat research aiming to minimise the damage caused by cats [29]. However, Australia currently lacks a legislative framework to deal with unowned cats, which are a major problem in and around urban centres [3]. Much of the good work carried out at great expense on feral cats is rapidly undone through a constant migration of stray cats into bushland.

The process of TNR raises various ethical and welfare challenges but, ultimately, such practices are unlikely to solve cat problems [3].

A. Stray cats managed through TNR still pose a substantial threat to wildlife [10].

B. The public health hazards that stray cats represent, including maintenance of flea populations and continuous production of faeces, are not diminished by neutering through a TNR program [18].
C. In many cases, TNR is unethical of the basis of animal welfare grounds because of the hazards TNR cats face and lack of adequate care [3].

Removal of stray cats will enhance, not impede, cat welfare, and we support education and legislation to these ends. In light of the above, we urge the Inquiry to recommend against TNR in Australia and adopt a holistic approach to control cats, as outlined by Crawford et al. [3]. This includes targeted adoption, early-age desexing and community education – initiatives that are likely to be much more effective in the longer-term and offer significant cat welfare benefits.

References

1. Australian Veterinary Association Management of cats in Australia Available online: https://www.ava.com.au/policy-advocacy/policies/companion-animals-management-and-welfare/management-of-cats-in-australia/ (accessed on Dec 8, 2019).
2. Woinarski, J.C.Z.; Legge, S.M.; Dickman, C.R. *Cats in Australia : companion and killer*; CSIRO Publishing: Clayton South, Victoria, 2019; ISBN 9781486308439.
3. Crawford, H.M.; Calver, M.C.; Fleming, P.A. A case of letting the cat out of the bag—why Trap-Neuter-Return is not an ethical solution for stray cat (*Felis catus*) management. *Animals* **2019**, *9*, 171.
4. Yencken, D.; Wilkinson, D. *Resetting the compass : Australia's journey towards sustainability*; CSIRO Pub, 2000; ISBN 9780643091733.
5. Hernandez, S.M.; Loyd, K.A.T.; Newton, A.N.; Carswell, B.L.; Abernathy, K.J. The use of point-of-view cameras (Kittycams) to quantify predation by colony cats (*Felis catus*) on wildlife. *Wildlife Research* **2018**, *45*, 357-365, doi:https://doi.org/10.1071/WR17155.
6. Hernandez, S.M.; Loyd, K.A.T.; Newton, A.N.; Gallagher, M.; Carswell, B.L.; Abernathy, K.J. Activity patterns and interspecific interactions of free-roaming, domestic cats in managed Trap-Neuter-Return colonies. *Applied Animal Behaviour Science* **2018**, *202*, 63-68.
7. Mcruer, D.L.; Gray, L.C.; Horne, L.A.; Clark Jr, E.E. Free-roaming cat interactions with wildlife admitted to a wildlife hospital. *The Journal of Wildlife Management* **2017**, *81*, 163-173.
8. Legge, S., Murphy, B. P., McGregor, H., Woinarski, J. C. Z., Augusteyn, J., Ballard, G., Baseler, M., Buckmaster, T., Dickman, C. R., Doherty, T., Edwards, G., Eyre, T., Fancourt, B. A., Ferguson, D., Forsyth, D. M., Geary, W. L., Gentle, M., Gillespie, G., Greenwood, L., Hohnen, R., Hume, S., Johnson, C. N., Maxwell, M., McDonald, P. J., Morris, K., Moseby, K., Newsome, T., Nimmo, D., Paltridge, R., Ramsey, D., Read, J., Rendall, A., Rich, M., Ritchie, E., Rowland, J., Short, J., Stokeld, D., Sutherland, D. R., Wayne, A. F., Woodford, L., and Zewe, F. (2017). Enumerating a continental-scale threat: How many feral cats are in Australia? *Biological Conservation* **206**, 293-303. doi: https://doi.org/10.1016/j.biocon.2016.11.032.
9. Bonnington, C.; Gaston, K.J.; Evans, K.L. Fearing the feline: domestic cats reduce avian fecundity through trait-mediated indirect effects that increase nest predation by other species. *J. Appl. Ecol.* **2013**, *50*, 15-24.
10. Greenwell, C.N.; Calver, M.C.; Loneragan, N.R. Cat gets its tern: A case study of predation on a threatened coastal seabird. *Animals* **2019**, *9*, 445.
11. Day, M.J.; Breitschwerdt, E.; Cleaveland, S.; Karkare, U.; Khanna, C.; Kirpensteijn, J.; Kuiken, T.; Lappin, M.R.; McQuiston, J.; Mumford, E.; et al. Surveillance of zoonotic infectious disease transmitted by small companion animals. *Emerg. Infect. Dis.* **2012**, *18*.

12. Aspinall, T. V.; Marlee, D.; Hyde, J.E.; Sims, P.F.G. Prevalence of Toxoplasma gondii in commercial meat products as monitored by polymerase chain reaction – Food for thought? *Int. J. Parasitol.* **2002**, *32*, 1193–1199.
13. Smith, G. Estimating the population attributable fraction for schizophrenia when *Toxoplasma gondii* is assumed absent in human populations. *Prev. Vet. Med.* **2014**, *117*, 425–435.
14. Johnson, A.M.; Roberts, H.; McDonald, P.J. Age-sex distribution of toxoplasma antibody in the South Australian population. *J. Hyg. (Lond).* **1980**, *84*, 315–320.
15. Montoya, A.; García, M.; Gálvez, R.; Checa, R.; Marino, V.; Sarquis, J.; Barrera, J.P.; Rupérez, C.; Caballero, L.; Chicharro, C.; et al. Implications of zoonotic and vector-borne parasites to free-roaming cats in central Spain. *Vet. Parasitol.* **2018**, *251*, 125–130.
16. Gerhold, R.W.; Jessup, D.A. Zoonotic diseases associated with free-roaming cats. *Zoonoses Public Health* **2013**, *60*, 189–195.
17. Henderson, W.R. *Pathogens in invasive animals of Australia*; Canberra, 2009;
18. Cummings, R.; Krueger, L.; Nguyen, K.; Morgan, T.; Fogarty, C.; Sun, S.; Servin, K.; Ostrowski, E.; Hearst, M. Orange County Vector Control and the County's Feral Cat TNR Program: Ne'er the Twain Shall Meet? *Proc. Vertebr. Pest Conf.* **2016**, *27*, 280–287.
19. Gunther, I.; Finkler, H.; Terkel, J. Demographic differences between urban feeding groups of neutered and sexually intact free-roaming cats following a trap-neuter-return procedure. *J. Am. Vet. Med. Assoc.* **2011**, *238*, 1134–1140.
20. Eremeeva, M.E.; Karpathy, S.E.; Krueger, L.; Hayes, E.K.; Williams, A.M.; Zaldivar, Y.; Bennett, S.; Cummings, R.; Tilzer, A.; Velten, R.K.; et al. Two pathogens and one disease: Detection and identification of flea-borne Rickettsiae in areas endemic for *Murine Typhus* in California. *J. Med. Entomol.* **2013**, *49*, 1485–1494.
21. Pérez-Osorio, C.E.; Zavala-Velázquez, J.E.; León, J.J.A.; Zavala-Castro, J.E. *Rickettsia felis* as emergent global threat for humans. *Emerg. Infect. Dis.* **2008**, *14*, 1019–1023.
22. Bitam, I.; Parola, P.; De La Cruz, K.D.; Matsumoto, K.; Baziz, B.; Rolain, J.M.; Belkaid, M.; Raoult, D. First molecular detection of *Rickettsia felis* in fleas from Algeria. *Am. J. Trop. Med. Hyg.* **2006**, *74*, 532–535.
23. Williams, M.; Izzard, L.; Graves, S.R.; Stenos, J.; Kelly, J.J. First probable Australian cases of human infection with *Rickettsia felis* (cat-flea typhus). *Med. J. Aust.* **2011**, *194*, 41–43.
24. Doherty, T.S.; Dickman, C.R.; Johnson, C.N.; Legge, S.M.; Ritchie, E.G.; Woinarski, J.C.Z. Impacts and management of feral cats *Felis catus* in Australia. *Mamm. Rev.* **2017**, *47*, 83–97.
25. Masters, P. Impacts of diseases spread by cats (*Felis catus*) on agriculture. In *National Feral Cat Management Workshop Proceedings*; Tracey, J., Lane, C., Fleming, P., Dickman, Quinn, J., Buckmaster, A., McMahon, S., Eds.; Invasive Animals Cooperative Research Centre: Canberra ACT, 2015; pp. 35–37.
26. Dubey, J.P. The history of *Toxoplasma gondii* - The first 100 years. *J. Eukaryot. Microbiol.* **2008**, *55*, 467–475.
27. Crawford, H.M.; Calver, M.C.; Fleming, P.A. Subsidised by junk foods: factors influencing body condition in stray cats (*Felis catus*). *J. Urban Ecol.* **2020**, *6*, 1–17.
28. Rand, J.; Hayward, A.; Tan, K. Cat colony caretakers' perceptions of support and opposition to TNR. *Front. Vet. Sci.* **2019**.
29. University of New England Feral cats targeted in new $30 million research program Available online: https://www.une.edu.au/connect/news/2019/06/feral-cats-focus-of-$30-million-research-program?utm_source=CISS+external+e-news+subscriber+list&utm_campaign=87be8e88d5-

EMAIL_CAMPAIGN_2019_06_17_03_23_COPY_01&utm_medium=email&utm_term=0_dca65e59c7-87be8e88d5- (accessed on Dec 8, 2019).