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Feral cats: Do Trap-Neuter-Return programs work?

by Tom Gotsis

1. Introduction

It is difficult to conceive of cats as constituting a problem. They are, after all, wonderful companions for an estimated 23% of Australian households.¹ But for every one domestic cat there are an estimated seven feral cats.² Feral cats pose risks to native wildlife through predation and disease transmission. Many of the native animals feral cats kill are threatened or endangered species.

Cat advocates claim the only ethically acceptable way to reduce feral cat numbers is Trap-Neuter-Return (TNR).³ Unlike lethal alternatives, such as euthanasia, TNR involves trapping, sterilising and releasing feral cats back into the environment. TNR is strongly supported in the United States by cat advocates and support for it in Australia appears to be increasing. However, TNR is not supported by wildlife advocates, who claim it is ineffective and poses unacceptable risks to wildlife.

Legally, the status of TNR programs is uncertain. Releasing cats back into the environment as part of a TNR program may constitute an offence of abandonment⁴ or unlawful liberation.⁵ The [*Animal Welfare \(Population Control Programs\) Bill 2014*](#) is a Private Member's Bill introduced in the Legislative Assembly on 11 September 2014 by Mr Alex Greenwich.⁶ Its primary objective is the removal of the legal uncertainty surrounding TNR programs. Although the Bill provides some operational safeguards for TNR programs, they are of an indirect and discretionary nature. Overall, the Bill is based on the premise that TNR programs are effective and have minimal negative consequences. As the Second Reading Speech to the *Animal Welfare (Population Control Programs) Bill 2014* states:⁷

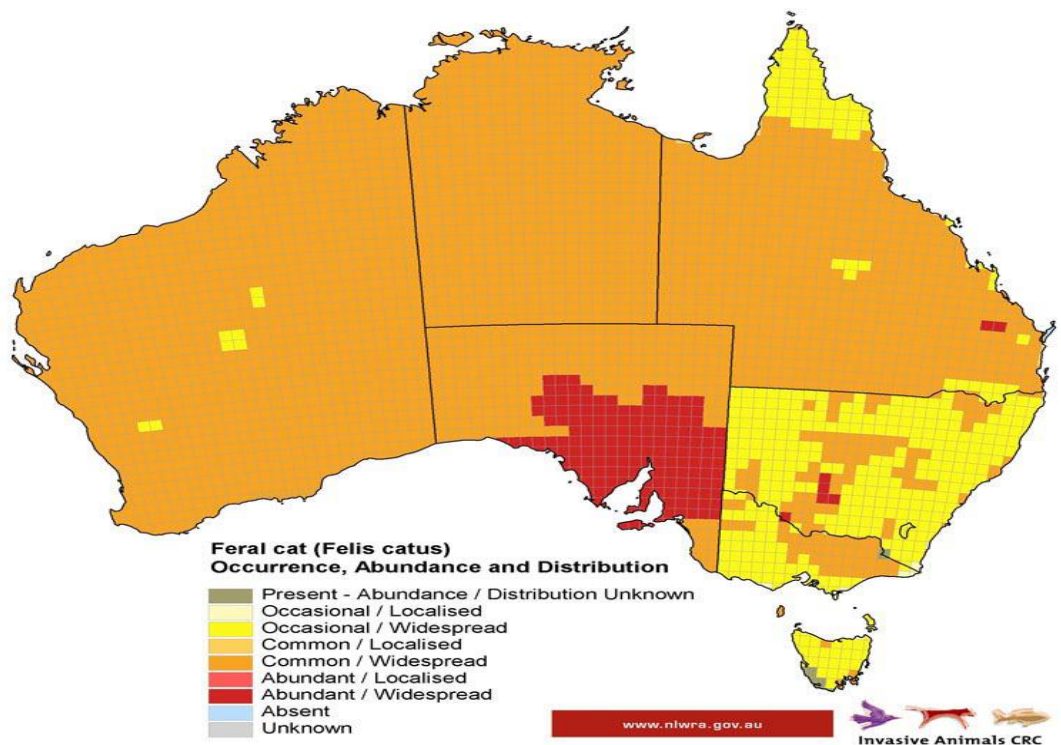
TNR is likely to decrease population sizes and therefore have a beneficial effect on the ecosystem. But even if it is incorrect to say that TNR is effective in decreasing population sizes, it certainly cannot increase them and so the ecosystem would be no worse off than it otherwise would have been.

This paper presents an overview of scientific evidence on the effectiveness of TNR programs, including field studies, literature reviews and mathematical modelling. For the moment it is enough to say that the evidence is somewhat mixed and far from conclusive.

2. Prevalence of feral cats

It is believed cats first arrived in Australia as pets of European settlers during the 18th century and were soon afterwards released into the wild to control rabbits and rodents.⁸ It is estimated there are now about 2.5 million domestic cats and between 5 and 18 million feral cats across Australia (depending on prey availability, which rapidly affects cat numbers).⁹ In NSW feral cats are found mainly at the “occasional/widespread” level of occurrence and abundance.¹⁰

Figure 1: Feral cats in Australia



Source: Australian Government National Land and Water Resources Audit; Invasive Animals Cooperative Research Centre, *Assessing invasive animals in Australia*, 2008, p 41

The rapid growth in cat numbers is largely due to:¹¹

- The ability of cats to live in a diverse range of habitats (including deserts, forests, woodlands and grasslands).

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- The exceptional hunting skills possessed by cats, which enable cats to prey effectively on a diverse range of animals (mammals, birds, reptiles, amphibians and invertebrates), including on animals their own size.¹²
- The high natural reproductive capacity of cats: a female cat is likely to reproduce for all her adult life, and can produce up to three litters per year with an average of four kittens per litter.¹³

Factors that can naturally limit the population growth of cats include:¹⁴

- Inadequate diet (cats need large amounts of fresh meat to survive and reproduce).
- Adult cats are vulnerable to predation and competition.
- Kittens and juvenile cats can have high mortality rates.

3. Threat to native wildlife from feral cat predation

It is estimated that feral cats in Australia eat 75 million animals each night — more than 20 billion mammals, reptiles, birds and insects a year.¹⁵ Recent research also suggests that predation by cats has been a key factor in most mammalian extinctions since European settlement and is the “most severe threat to terrestrial mammals in all threat categories.”¹⁶ About 80 endangered and threatened native species are presently thought to be at risk from feral cat predation in Australia.¹⁷

Predation by feral cats is listed as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and the *Threatened Species Conservation Act 1995* (NSW).¹⁸ In its final determination, Gazetted in 2000, listing predation by feral cats as a Key Threatening Process, the NSW Scientific Committee said:¹⁹

Predation by Feral Cats has been implicated in the extinction and decline of many species of mammals and birds on islands around Australia and in other parts of the world, and in the early extinction of up to seven species of small mammals on the Australian mainland. ...

In New South Wales, predation by Feral Cats has been linked to the disappearance by 1857, of 13 species of mammals and 4 species of birds from the Western Division. ... several Endangered and Vulnerable species in New South Wales are currently threatened, including the Hastings River Mouse *Pseudomys oralis*, Sandy Inland Mouse *Pseudomys hermannsburgensis*, Pilliga Mouse *Pseudomys pilligaensis*, Bolam's Mouse *Pseudomys bolami*, Forrest's Mouse *Leggadina forresti*, Mountain Pygmy-possum *Burramys parvus*, Little Tern *Sterna albifrons*, Grey Grasswren *Amytornis barbatus*, Striated Grasswren *Amytornis striatus* and the lizard *Aprasia aurita*. Larger species such as Southern Brown Bandicoots *Isoodon obesulus* and Brush-tailed Rock Wallabies *Petrogale penicillata* may also be at risk locally or when other prey is scarce.

4. Threat to native wildlife from disease transmission

Feral cats carry a range of diseases that pose serious health risks to humans, native animals and livestock.²⁰ In Australia it has been reported that at least 30 species of pathogens found in cats have also been found in native fauna.²¹ Toxoplasmosis (the parasite *T.gondii*) poses especially significant health concerns:²²

T. gondii is probably the most significant parasite occurring in feral cats. Members of the cat family (Felidae) are the only known definitive hosts for *T. gondii*. The parasite can cause significant disease or death in humans, dogs, marsupials and other mammals, through consumption of uncooked meat or exposure to contaminated cat faeces ... Toxoplasmosis is also known to result in abortion and congenital defects in livestock. Two Animal Health Surveillance Quarterly reports in Tasmania attributed late abortions, stillbirths and perinatal lamb mortality in ewes to *T. gondii* transmission from feral cats.

5. Population control measures

Measures that have been used throughout Australia to attempt to control feral cat populations include: shooting; trapping; adoption; housing in shelters; euthanasia; toxic baits; and exclusion fencing.²³ Reflecting on past attempts to control feral cat populations, Woinarski says:²⁴

Enduring effective cat management needs additional targeted resources, but also needs far more determined and effective integrated policy settings across the complex spectrum from cat ownership in urban areas to cat eradication in some islands and other areas of biodiversity significance.

Preparation of a NSW Threat Abatement Plan for feral cats is being considered.²⁵ The Commonwealth Threat Abatement Plan for Predation by Feral Cats 2008 does not refer to TNR. Instead, its “very high priority” is to develop an effective toxic bait for feral cats, one that is designed to be eaten by cats but not by other animals.²⁶ That bait, [Curiosity®](#), which has been developed with investment from the Commonwealth, Victorian and Western Australian²⁷ Governments, is being evaluated for commercial release. According to the Commonwealth Department of the Environment:²⁸

The Curiosity® bait for feral cats is a long-term \$4.1 million project to develop a humane, broad-scale toxic bait to control feral cats in conservation areas. ... The most effective and available form of feral cat control over large areas is poison baiting. ... Curiosity® baits will be available for use in national parks and reserves ... [and] to large land-holders controlling feral cats. However, baiting around urban areas and any other areas with domestic cats will be restricted.

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The Commonwealth Environment Minister, Mr Greg Hunt, has recently called for research into developing a virus to eradicate feral cats, as a “safe and targeted form of biological control.”²⁹

In contrast to lethal forms of control, TNR programs promise a more ethically acceptable (non-lethal) way of reducing feral cat numbers. For this reason, TNR programs are strongly supported by cat advocates and are often financed and operated by volunteers³⁰ and animal welfare organisations.³¹ They involve trapping feral cats, sterilising them, clipping an ear (for easy identification) and returning the cats to the area and “colony” (population) from which they were taken.³² The population is then managed, which involves: providing the cats with food, water, and health care; trapping and neutering any newcomers to the population;³³ and (in some instances) arranging for the adoption of cats.³⁴

The [*NSW Companion Animals Taskforce Report*](#) comments that:³⁵

The most common mechanism used to desex unowned animals, particularly cats, is that of trap-neuter-return. This involves trapping, desexing and releasing animals back into the habitat from which they were captured. Trap-neuter-return schemes have not been contemplated in detail in this paper primarily due to concerns about the effectiveness of such schemes and their potential impact on local wildlife. However, it is noted that councils may choose to fund such schemes where appropriate and where resources permit.

Because feral cat populations are inherently difficult to manage, effectiveness emerges as a key issue when evaluating the various control methods. However, ethical considerations may also apply. As Ellis points out:³⁶

Although some animals pose severe problems for the environment, as well as for other animals, they are sentient creatures nonetheless ... [the] application of different standards to the control of “feral” animals or “pests” is inconsistent with a moral obligation based on the capacity to suffer.

In this context it is pertinent to note that in one year, 2012–2013, the number of cats (domestic and feral) euthanased by the RSPCA alone was 7,224 in NSW and 19,464 nationally.³⁷

6. The Animal Welfare (Population Control Programs) Bill 2014

Animal welfare legislation across Australia varies in its provisions.³⁸ Where, as in NSW, animal welfare legislation makes it an offence to abandon³⁹ or unlawfully liberate⁴⁰ an animal, the laws may prevent the operation of TNR programs.⁴¹ “Abandon” and “unlawfully liberate” are not defined in the relevant NSW Acts.⁴² As the RSPCA notes:⁴³

This leaves a grey area regarding animals that are trapped, neutered and released into the care of a community caregiver who feeds and monitors the animals ... it is not clear whether animals released under a TNR program, where they are continually managed, constitutes abandonment ...

6.1 Object of the Bill

The object of the [Animal Welfare \(Population Control Programs\) Bill 2014](#), which is said to be the first of its type in Australia,⁴⁴ is to facilitate the use of TNR programs for controlling feral cats (or other non-native animals) by removing the legal uncertainty that surrounds their operation.⁴⁵

As stated in the Bill's Second Reading speech:⁴⁶

TNR programs primarily involve desexing a large proportion of a specific population of un-owned, stray, feral or pest animals and returning them to the place where they were found. The animals can no longer produce new offspring. This helps to stabilise the population and potentially reduces it through natural attrition. Animals are also given veterinary treatment before being returned — such as vaccination, deworming and flea treatment — and those animals that can be are rehomed. For the program to work, new animals that join the group need to be desexed. Generally TNR programs are carried out on urban cat colonies.

Cats are provided with food and water, monitored for any need for veterinary care and can be provided with shelter. TNR programs are also increasingly being used to control rabbit populations and there is interest in trialling programs on other introduced species. TNR programs exist around the world, particularly the United States, as a humane alternative to euthanasia, which often involves cruel methods, such as baiting, that cause slow and painful deaths and can kill other non-target animals. A number of TNR programs are being run in Australia by volunteers.

... [these] programs are in legal limbo because releasing an animal could constitute abandoning that animal under the *Prevention of Cruelty to Animals Act 1979*. It could also breach the *National Parks and Wildlife Act 1974*, which makes it an offence to liberate a non-native animal anywhere in New South Wales without a licence. The *Animal Welfare (Population Control Programs) Bill 2014* would make the release of animals under a TNR program lawful if the program is sponsored by the Animal Welfare League, RSPCA New South Wales, the council, or the NSW National Parks and Wildlife Service in the case of a national park. ...

A number of international studies have demonstrated success with TNR in reducing the size of cat and rabbit colonies, and TNR has gained official approval from the RSPCA UK. The International Society of Feline Medicine[s] [Guidelines on Population Management and Welfare of Unowned Domestic Cats](#) published in the *Journal of Feline Medicine* on 21 August 2013 confirms that TNR programs are a well-documented, researched and effective method of population management ... TNR programs have strong community support because they are humane and do not involve cruel destruction methods. TNR programs could help stabilise populations through a reduction in breeding. This bill facilitates population control particularly in metropolitan areas and will complement existing measures taken by councils. TNR programs should be able to operate lawfully.

6.2 Main provisions

The [Bill](#) enables a “sponsoring agency” (such as a local council or the RSPCA) to sponsor a population control (TNR) program in a specified area of the State.⁴⁷ Under cl 4(2)(a) the program:⁴⁸

... must provide primarily for the capturing, desexing and releasing of the animals, but may also provide for the rehousing of animals suitable for domestication, the treatment or euthanasia of ill animals, the clipping of the ears of desexed animals, the implanting of microchips in desexed animals, and the provision of an adequate food supply for the population.

A number of safeguards are provided. Under cl 4(3) a TNR program in a reserve (which cl 3 defines to include national parks) can only be sponsored by the head of the Public Service agency to which the administration of the *National Parks and Wildlife Act 1974* is assigned. Clause 4(4) provides that regulations made under the prospective Act may prohibit or impose conditions on the sponsorship of a specified program or class of program. Clause 5 imposes annual reporting requirements for sponsored TNR programs. Clause 6(1) requires sponsoring agencies to keep a register of TNR programs and their outcomes. Clause 11 provides for exemptions from pest control orders made under the *Local Land Services Act 2013* for areas covered by TNR programs in metropolitan Sydney. On the other hand, for areas outside metropolitan Sydney, a TNR program must be expressly allowed by a pest control order.

The Bill does not intend to make TNR programs mandatory or to replace existing pest management programs with TNR.⁴⁹ Instead, the Bill primarily intends to protect sponsoring agencies and participants from civil liability⁵⁰ and to clarify that releasing an animal under a sponsored TNR program does not constitute abandonment⁵¹ or unlawful liberation⁵² of an animal.⁵³

7. Effectiveness of TNR programs

In order to examine the effectiveness of TNR programs, examples of three types of studies are considered: field studies recording the operation and outcomes of actual TNR programs; mathematical modelling based on established data on cat reproductive and predatory behaviours; and literature reviews that analyse previously published studies.

Overall, the studies discussed below provide only qualified support for TNR programs. This is because TNR programs, in order to be effective, require: sufficient resources to operate over many years; high sterilisation and adoption rates; and a closed population (that is, no new cats entering the population). In reality, these requirements, especially that of a closed population, are difficult to attain and maintain over a substantial period of time. It is also questionable as

to whether TNR programs protect wildlife. The predatory behaviour of cats has been shown to be instinctive, rather than driven by hunger. For this reason, the TNR tenet of providing cats with a steady supply of food has been shown not to prevent cat predation.⁵⁴ Not only do cats hunt instinctively, providing food to feral cats may lead to hyperpredation, as cats will be able to persist at high densities even when prey is scarce or in decline.⁵⁵

Clarke and Pacin:⁵⁶ This study followed attempts by the Ocean Reef Club in Florida to reduce a feral cat population by implementing a TNR program in 1989. No records were kept as to what the starting cat population was but the volunteer group that operated the program trapped and neutered approximately 200 cats per year for five years. This proved ineffective. An annual budget of \$100,000 was raised and paid staff was hired. In 1999, ten years later, the population stabilized at about 500 cats.

Castillo and Clarke:⁵⁷ Castillo and Clarke studied two TNR programs in Florida USA, one at Crandon Marina Park and the other at AD Barnes Park. Neither study reduced cat numbers. Although the number of original cats decreased in both cases, the overall populations either remained stable or increased. Significantly, the establishment of the TNR programs appeared to encourage local cat owners to abandon their cats.⁵⁸ As Castillo and Clarke note, 32.4% of cats at AD Barnes Park and 38.5% of cats at Crandon Marina were new cats.⁵⁹

The high number of cats and kittens that were dumped at the colonies throughout the course of our study confirms that the establishment of cat colonies on public lands with unrestricted access encourages illegal dumping of cats.

Contrary to what was expected, the existing cats did not prevent the new cats from joining the colony and accessing the food supply. Further, even after being provided with a regular supply of food, cats at both TNR programs continued to stalk and kill wildlife.⁶⁰

Jongman and Karlen, in their review of the field, cite Castillo and Clarke's study when they say:⁶¹

TNR programs are often inefficient in reducing the numbers of cats because the only cause of reduction is adoption and natural mortality, and migrating and abandoned cats replace those that die.

Castillo and Clarke believe that focusing resources on TNR programs is misplaced. They suggest that:⁶²

... supporters of managed cat colonies seek a long-term solution to the pet overpopulation issue by redirecting their efforts toward the underlying problem of managing irresponsible pet owners.

Andersen, Martin and Roemer:⁶³ Andersen, Martin and Roemer created a matrix population model, using published data on cat reproduction and survival rates, to compare the efficacy of TNR programs (which target fecundity) with the efficacy of euthanasia programs (which target survival) in controlling cat populations.

The authors note that there have been TNR programs which have achieved population declines but those programs incorporated a high rate of adoption (between 25% and 47%).⁶⁴ They argue that incorporating adoption into TNR programs overstates the efficacy of TNR because adoption permanently removes cats from the free-roaming population, rather than reducing the fecundity of the population.⁶⁵ This is a significant distinction given that only TNR combined with adoption may be effective at reducing cat populations.

Andersen, Martin and Roemer's matrix population model predicted cat populations to have high intrinsic growth rates. It further predicted that euthanasia was likely to be more effective at controlling cat populations than TNR.⁶⁶

- Reducing cat survival (by increasing euthanasia rates) would likely have a greater effect on cat population growth than reducing fecundity (by increasing sterilisation rates).
- A 50% increase in annual euthanasia rates would likely result in a population decline of 10% per annum; whereas a 75% increase in annual sterilisation rates would likely result in an increasing population.
- TNR programs need to have ongoing sterilisation rates of more than 75% of the fertile population in order to decrease the population.

Jessup:⁶⁷ Jessup reviewed a selection of studies on the impact of feral cats on wildlife, cat reproductive behaviour and TNR efficacy. Referring to these studies, he argues that TNR programs are not able to be defended on moral grounds because they effectively condone the ongoing killing of wildlife.⁶⁸

It is in cats' nature to hunt ... No reasonable refutation of this exists in the literature ... Providing abundant food for outdoor cats, even overfeeding, does not stop this natural hunting behaviour.

Jessup also argues that TNR programs, by enabling cats to remain in the wild, do not promote the welfare of cats because it appears cats living in the wild have shorter and harsher lives than their domestic counterparts.⁶⁹ He emphasises that what qualifies as a successful TNR program has varied, with many groups operating TNR programs failing or refusing to keep proper records, making it difficult to assess the effectiveness of their programs. He concludes:⁷⁰

... TNR is likely to succeed only when numbers of feral cats are small to begin with (30 to 40 or less); when the colony is closed (no immigration) or nearly so; where essentially all female cats in the area can be captured and neutered; where all the terrain is accessible (so pockets of untrapped animals do not remain); and

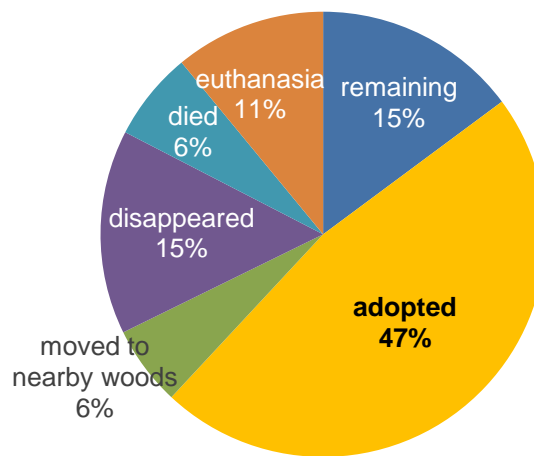
where capture and neutering efforts are early, intense and prolonged. These circumstances seldom prevail long enough for cat colonies to be eliminated.

Levy, Gale and Gale:⁷¹ This study evaluated the effectiveness of a TNR program conducted on 155 cats living on the grounds of the University of Central Florida, from January 1991 to April 2002. The results are summarised in Table 1 and Figure 2:

Table 1: Outcomes for a 155 cat TNR program, January 1991–April 2002	
Outcome	Number
Remaining	23
Adopted	73
Moved to nearby woods	9
Disappeared	23
Died*	10
Euthanasia [†]	17
Total population	155

* 6 cats died from automobile accidents and 4 from unknown causes [†] Due to injury/ illness.
 Source: J Levy, D Gale, L Gale, *Evaluation of the effect of a long-term Trap-Neuter-Return and adoption program on a free-roaming cat population* (2003) 222(1) JAVMA 42 at 43

Figure 2: outcomes (%) of 155 cat TNR program January 1991 – April 2002



Source: J Levy, D Gale, L Gale, *Evaluation of the effect of a long-term Trap-Neuter-Return and adoption program on a free-roaming cat population* (2003) 222(1) JAVMA 42 at 43.

As the authors note, adoptions accounted for a substantial portion (47%) of the decrease in the cat population.⁷² They conclude:⁷³

The results of our study indicated that long-term reduction of free-roaming cat numbers is feasible by TNR. However, natural attrition of cats would be expected to result in a slow rate of population decline. Implementation of an aggressive program of adoption ... accelerates that decline. Immigration or abandonment of new cats may be a frequent event, and free-roaming cats do not appear to have sufficient territorial activity to prevent new arrivals from

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permanently joining colonies. These new arrivals could substantially limit the success of TNR if an ongoing surveillance and maintenance program is not effective.

Foley, Foley, Levy and Paik:⁷⁴ This study analysed the results of two TNR programs to determine if they were effective in reducing their respective cat populations.⁷⁵ The first TNR program operated in California, from 1992 to 2003, and involved 14,452 cats being neutered. The second TNR program operated in Florida, from 1998 to 2004, and involved 11,564 cats being neutered. In both cases counts of the overall population size were not possible. Instead, population estimates and statistical analysis were used to indicate whether the TNR programs were having any effect on the rate of population growth. The results of the statistical analysis indicated ongoing population growth.⁷⁶ They also indicated that, in order for the TNR programs to reduce the feral cat populations, 71% to 94% of cats needed to be neutered.⁷⁷ The authors added:⁷⁸

Despite the substantial expenditure of resources ... they [the two TNR programs] probably were performed on too large a scale; many cats were neutered, but this constituted a very small overall proportion of the cats. ... Trap-neuter-return programs should be focused on well-defined, preferably geographically restricted, cat populations, rather than diluting effort across multiple populations.

Schmidt, Swannack, Lopez and Slater:⁷⁹ This study compared the effectiveness of euthanasia and TNR programs using a demographic population model covering a simulated 25-year period, with parameters estimated from a free-roaming cat population in Texas. The authors modelled euthanasia and TNR at 25%, 50% and 75% implementation rates, as well as combinations of the two control methods, for 0%, 25% and 50% maximum immigration rates. The results are summarised in general terms in Tables 2 and 3.

Table 2: Relative effectiveness of TNR and euthanasia in reducing population levels in a closed population (0% immigration)

Euthanasia	TNR	TNR and Euthanasia (combined)
Comparable	Comparable	Comparable

Source: P Schmidt et al: [Evaluation of euthanasia and TNR programs in managing free-roaming cat populations](#) (2009) 36 Wildlife Research 117 at 121–122.

Table 3: Relative effectiveness of TNR and euthanasia in reducing population levels in an open population (25% and 50% immigration)

Euthanasia	TNR	TNR and Euthanasia
Effective decrease in population when implemented at 75% rate	Less effective at decreasing population than euthanasia	Less effective at decreasing population than euthanasia

Source: P Schmidt et al: [Evaluation of euthanasia and TNR programs in managing free-roaming cat populations](#) (2009) 36 Wildlife Research 117 at 121–122.

The authors explain that any population reduction below the natural environmental carrying capacity leads to open niches that are eventually filled by immigrant cats:⁸⁰

Immigration by free-roaming cats from outlying areas is more likely if ubiquitous food and shelter resources raise carrying capacity, thus rendering population reductions following control efforts temporary, unless immigration from nearby areas and the owned cat population is otherwise prevented. Providing food and shelter to cats maintained in TNR colonies is a tenet of TNR advocacy ...

The model results also showed that population reduction from TNR was not immediate. For this reason, the authors emphasise that TNR programs may not be appropriate in ecologically sensitive areas.⁸¹

Jongman and Karlen:⁸² After reviewing previous studies conducted on TNR programs, the authors suggest that, due to cat migration and abandonment, it is unrealistic to expect that TNR programs can extinguish cat colonies. Instead, TNR programs should aim for initial reductions of cat numbers, relying largely on adoptions, and then establish small managed colonies.⁸³ Nevertheless, the authors argue that TNR remains the most effective non-lethal method for containing small and defined cat populations, provided that TNR programs do not operate in areas that enable cats to pose threats to native wildlife and public health.⁸⁴

Loyd and DeVore:⁸⁵ The authors constructed a Bayesian Belief Network⁸⁶ (BBN) to evaluate the effectiveness of different approaches to managing feral cat populations. The BBN compared expected population level changes, wildlife kill rates, financial costs and even stakeholder values for five management options and three population sizes.⁸⁷ The five management scenarios tested were: do nothing; euthanasia; basic TNR (with no adoption); TNR with adoption of kittens (TNR+); and TNR with medical testing, vaccination and monitoring (TTVARM). Three population sizes were examined: small (less than 50 cats); medium (50–100 cats); and large (100–200 cats).

The BBN calculated that the optimal decision for management of a small population of feral cats was TNR plus kitten adoption.⁸⁸ For medium or large populations of feral cats the BBN calculated that the optimal population control measure was euthanasia.⁸⁹ As Loyd and DeVore explain, other studies support their results:⁹⁰

Trap-euthanize strategies have proven effective at reducing cat populations and mitigating adverse effects on wildlife in a number of locations. In contrast, TNR programs alone have never been shown to stabilize a feral cat population in the scientific literature. Of the TNR studies reporting success, each program included removal of a significant number of animals for adoption.

Like Jessup and others, they make the point that it is at best inaccurate and at worst misleading to claim that TNR alone works

where cats have been removed for adoption under the banner of TNR.⁹¹ Effective outcomes require a base level of transparency.

Loyd and DeVore emphasise that their BBN results are founded not just on cat population outcomes, but on native wildlife outcomes too. They claim TNR programs may actually increase the adverse effects of feral cats on native wildlife.⁹²

While Trap and Euthanize efforts may have immediate benefits for the persistence of prey populations, TNR programs typically have a goal of slow attrition and maintenance of cat populations. Re-releasing exotic predators into the environment may actually increase the per capita impact of these cats as cat survivorship increases post-neuter due to decreased participation in risky behaviours, such as fighting and roaming.

RSPCA: In its 2011 research report⁹³ into the effectiveness of TNR programs RSPCA Australia refers to Grayson and Calver,⁹⁴ who argue that, when considering the possible effect of TNR programs on native wildlife, the precautionary principle should be applied. The precautionary principle, which is familiar to the climate change debate, urges avoiding potential risks despite uncertainty about the likelihood of negative consequences. As the RSPCA says, if Grayson and Calver's argument is accepted and the precautionary principle is applied when evaluating TNR programs, it means TNR programs should not be used because they entail risks to wildlife.⁹⁵

The RSPCA also refers to the need to consider that much of the research into TNR effectiveness has been conducted in the United States. Environmental differences may mean that TNR in Australia is less effective and more damaging to wildlife, compared with TNR in the United States. The United States, unlike Australia, has many large predators that can help reduce cat populations; and, unlike the United States, most of Australia's native species are small and vulnerable to predation by cats. Cats, it notes, are capable of taking some Australian species to the point of extinction.⁹⁶

The RSPCA suggests that a TNR program may be a good option in a well-defined area where a feral cat population only has limited impact on wildlife. However, it adds that:⁹⁷

Such a program would need to be well-managed and have sufficient resources to continue over time. It would need to include desexing of adults, re-homing of kittens and adults that are socialised to humans, and euthanasia of older or sick animals. However, as a long term strategy, in most of Australia, it is difficult to recommend.

It further suggests that, as resources for controlling cat populations are limited, resources in urban areas may be more effectively spent on education, increased community awareness about responsible cat ownership, targeted sterilisation programs and better regulations; which should reduce the number of owned animals and their offspring entering the feral cat population.⁹⁸ For remote Australia,

where feral cats are completely unsocialised and unsuitable for adoption, the RSPCA suggests the most cost-effective and humane option is likely to be targeted and ongoing lethal control in priority areas, where adverse environmental impacts are highest.⁹⁹

8. Conclusion

A major feature of the [Animal Welfare \(Population Control Programs\) Bill 2014](#) is that it provides legal certainty for participants in TNR programs. As for the practical effectiveness of TNR programs for feral cats, the evidence is far from conclusive. It suggests high adoption rates, high sterilisation rates, small and stable cat populations and confined locations removed from native wildlife are necessary requirements for successful TNR programs.

If that is the case, it begs the question whether feral cat TNR programs should only be sponsored in prescribed circumstances; for example, where they:

- Operate only in metropolitan Sydney?
- Manage small stable populations of cats?
- Sterilise a high proportion of adult cats?
- Adopt cats to responsible homes?
- Identify and sterilise any new cats that enter the population?
- Provide an indication of their likely impact on wildlife?¹⁰⁰
- Have the resources to operate over many years?

¹ [Contribution of the pet care industry to the Australian economy \(7th edition\)](#), 2010, Australian Companion Animal Council Incorporated, Sydney, p 16.

² In this paper the term “feral” refers to all undomesticated cats, including stray cats that that have no existing link to a household. Studies have shown that the terms “feral” and “stray” are emotionally loaded, affecting how people perceive the issue of controlling undomesticated cat numbers: M Farnworth, J Campbell and N Adams, [What's in a Name? Perceptions of Stray and Feral Cat Welfare and Control in Aotearoa, New Zealand](#) (2011) 14(1) *Journal of Applied Animal Welfare Science* 59–74.

³ Trap-Neuter-Return is also known as Trap-Neuter-Release in the literature.

⁴ Section 11 of the [Prevention of Cruelty to Animals Act 1979](#).

⁵ Sections 109 and 133(4) of the [National Parks and Wildlife Act 1974](#).

⁶ The Bill lapses on 13/2/2015.

⁷ A Greenwich, [Animal Welfare \(Population Control Programs\) Bill 2014, Second Reading Speech](#), 11 September 2014, Hansard, Legislative Assembly, 357. In support of the effectiveness of TNR programs the Second Reading Speech refers to guidelines issued by the International Society of Feline Medicine: [ISFM Guidelines on Population Management and Welfare of Unowned Domestic Cats \(Felis catus\)](#) (2013) 15 *Journal of Feline Medicine and Surgery* 811 at 813.

⁸ Australian Government, Australian Bureau of Agricultural and Resource Economics and Sciences, Invasive Animals Cooperative Research Centre and Institute of Applied Ecology at the University of Canberra, [Feral Cat \(Felis Catus\)](#), 2011.

⁹ Commonwealth Department of the Environment, Water, Heritage and the Arts, [Background Document for the Threat Abatement Plan for Predation by Feral Cats](#), 2008, at 1.2; Insight program, [Eradicat](#), SBS, 9 April 2013. Australian Government, National Land and Water Resources Audit and Invasive Animals Cooperative Research Centre, [Assessing invasive animals in Australia](#), 2008, Canberra p 41. ABC Fact Check: [Are feral cats killing over 20 billion native animals a year?](#) ABC News 20 November 2014.

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¹¹ Australian Government, Australian Bureau of Agricultural and Resource Economics and Sciences, Invasive Animals Cooperative Research Centre and Institute of Applied Ecology at the University of Canberra, [Feral Cat \(Felis Catus\)](#), 2011; F Nutter, J Levine and M Stoskopf, [Reproductive capacity of free-roaming domestic cats and kitten survival rate](#) (2004) 225(9) Journal of the American Veterinary Association 1339.

¹² Commonwealth Department of the Environment, Water, Heritage and the Arts, [Threat Abatement Plan for Predation by Feral Cats](#), 2008, paragraph 1.2.2.

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¹⁴ Australian Government, Australian Bureau of Agricultural and Resource Economics and Sciences, Invasive Animals Cooperative Research Centre and Institute of Applied Ecology at the University of Canberra, [Feral Cat \(Felis Catus\)](#), 2011; F Nutter, J Levine and M Stoskopf, [Reproductive capacity of free-roaming domestic cats and kitten survival rate](#) (2004) 225(9) Journal of the American Veterinary Association 1339. Nutter et al report that 127 of 169 (75%) of the kittens in their study died or disappeared before 6 months of age, and they refer to similar results found in other studies.

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¹⁹ NSW Government, Environment and Heritage, [Predation by feral cats — key threatening process listing](#).

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⁴⁸ The Explanatory Notes state that the population control programs provided for by the Bill are “known in common parlance as trap-neuter-return programs”: page 2.

⁴⁹ A Greenwich, [Animal Welfare \(Population Control Programs\) Bill 2014, Second Reading Speech](#), 11 September 2014, Hansard, Legislative Assembly, 357.

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ISSN 1838-0204