National Cat Management Group

AOTEAROA NEW ZEALAND

NCMG Report 2025

Contents

1. Executive Summary

The New Zealand National Cat Management Group recognises the intrinsic value of cats as complex and sentient beings, their value as a companion animal in New Zealand, and their value to communities, and New Zealand society. The National Cat Management Group also recognises the importance of balancing the needs of cats, cat owners, and semi-owners/stray cat care providers with the potential negative impacts of cats on communities, other species, and ecosystems. The New Zealand National Cat Management Group Report outlines recommendations and supporting evidence to achieve humane management of cats in New Zealand to protect both cat welfare and our unique environment.

Improved categorisation of cats which reflects the complexity of cat overpopulation is needed for successful management. The companion, stray, and feral cat categories have limited the ability to effectively manage cats in the past, particularly grouping all 'stray' cats; this category should include better differentiation among stray cats to inform management strategies. The divisions within each of the proposed categories in this report will enable effective and legal management of different types of cat populations, whilst also providing added safety for previously unprotected cats.

The National Cat Management Group's recommendations for cat management are based on assessing the existing literature and available resources concerning feral and domestic cat management strategies and feedback from stakeholder consultation. This is the third iteration of the report to include current research and changes in cat-related policies.

Efforts to manage cats in New Zealand should be monitored and evaluated to determine their effectiveness in controlling cat populations and providing benefits to local wildlife. Robust evaluation of cat management programs will provide much-needed information for other governments, cat advocates, and environmental organisations that undertake steps to address problems with cat overpopulation.

Cat management is complex, and the interests of all parties should be considered in decision-making. There is no 'one solution' for humane cat management and environmental protection; instead, different solutions are needed for different contexts. Humane and effective cat management requires all stakeholders to work together to ensure the diverse values associated with cats (including the intrinsic value of cats as sentient beings, their value as companion animals, and the value of New Zealand's biodiversity) remain the guiding motivation for action.

1.1. Technical Note for the 2025 NCMG Report

1. The name of the National Cat Management Strategy Group has been shortened to the National Cat Management Group.
2. A note on 'ownership.' New Zealand's Animal Welfare Act 1999 acknowledges animal sentience. Whilst sentience is not defined by the Act, the Group feels that referring to sentient companion cats as being 'owned' is imperfect and does not reflect the group's aspiration for cats and other 'owned' animals to be treated with a higher degree of care than simply an 'owned' chattel. Some members of NCMG would typically use labels such as 'caregiver' or 'guardian' to better reflect the desired level of responsibility and care towards 'owned' animals.

   However, should the NCMG's recommendations be used to create legislation, the Group recognises the necessity to identify the 'owner' or 'person in charge' of an animal as these terms are defined in the Animal Welfare Act. For this reason, 'owner' and 'ownership' are the default terms used in this document.
3. In the report, the term 'microchipping' includes the implantation of a microchip into a cat and the registration of the microchip with owner details on a national database. We have shortened the phrasing to simply 'microchipping' to improve readability and reduce the word count.
4. The NCMG recognises the differences in the following terms:
   a. euthanasia: from Greek, meaning 'a good death;' a high welfare death, for the benefit of the animal; for example, to relieve suffering
   b. humane killing: the killing of an animal not for their benefit; for example, population management
   c. destruction: used in the legislation such as the Animal Welfare Act; term used for killing unwanted and introduced animals (e.g., pests); synonymous with humane killing

   In the report, the term 'euthanasia' is interchangeably used with the terms 'humane killing' or 'destruction' when the term has been used in this manner in cited studies.
5. In the report, the phrase 'kept at home' or 'keeping cats at home' is synonymous with cat containment, confinement, or restricting free roaming.
6. At the completion of this work, Companion Animals New Zealand was finalising their regular pet population census. Some of the numbers listed are therefore preliminary and may change slightly when reported in their 2025 publication.

1.2. NCMG's Key Recommendations for Effective and Humane Cat Management

1.2.1. Acknowledge that all cats are sentient.

All legislation and plans to manage feral and domestic cats:

- Must recognise cats are sentient beings under the Animal Welfare Act 1999.
- Be informed by science and ethics to:
    - promote positive cat welfare and minimise harm to cat welfare
    - promote the value of cats to enhance the human-cat bond, advance responsible ownership, break down barriers preventing ownership, and reduce cat surrender and abandonment
    - determine the most humane approaches to stray and feral cat management
- Use improved categories of cats to inform cat management. The following cat population categories provide the basis for a management framework:
    - feral cats
    - domestic cats
        - companion (owned) cats
        - stray cats
            - socialised stray cats (managed and unmanaged)
            - unsocialised stray cats (managed and unmanaged)

1.2.2. Develop community education programmes.

Community education programmes about the positive and negative impact of cats are enacted to:

- promote the value of the human/cat relationship to increase positive human and cat welfare
- reduce nuisance behaviour
- reduce the risk of disease transmission
- reduce the negative impacts of cats on biodiversity

1.2.3. Develop strategic partnerships among organisations with an interest in cat management.

Humane and effective cat management requires all stakeholders to work collaboratively, including the adoption of MOUs between major stakeholders. This collaboration will require ongoing communication and involvement of all cat stakeholders in decision-making processes.

1.2.4. Develop public engagement strategies.

Develop public engagement strategies to understand community support for cat management and facilitate human behaviour change.

Effective and humane cat management will require identifying and engaging local community members with an interest in cat management based on their relationship with cats. Public engagement is needed to understand the diverse values, beliefs, attitudes, and social norms related to cats. Public engagement can also include:

- activities to educate and support human behaviour change
- advancing Responsible Cat Ownership
- humane non-lethal and lethal control of stray and feral cats

1.2.5. Establish Government commitment to national cat management legislation.

The enactment of a National Cat Management Act will allow for:

- mandated, comprehensive, and consistent implementation of nationwide humane management of all cat populations in New Zealand and ensure that enforcement can occur under the legislation; and
- the creation and implementation of local cat bylaws to assist with the humane management of cats.

1.2.6. Establish a National Cat Management Advisory Committee.

A National Cat Management Advisory Committee should oversee research, operationalise management plans, and coordinate and oversee the evaluation of management strategies. Funding and support from Government and other stakeholder groups will be necessary. An important component of the National Cat Management Advisory Committee will be the use of research to inform ongoing humane cat management strategies, including national allocation of resources, coordination, and priority setting.

1.2.7. Establish local cat management advisory groups.

Local governments should consider establishing cat management advisory groups with terms of reference that include:

- introducing and monitoring cat management plans in coordination with national mandatory requirements;

- consulting with key local stakeholders and communities; and
- identifying key metrics to evaluate the effectiveness of cat management plans.

1.2.8. Establish Government leadership in toxoplasmosis management.

Government leadership is needed in developing a national integrated, One Welfare approach to toxoplasmosis management to:

- ensure consistent vaccine coverage for farmed animals;
- support research into toxoplasmosis vaccine development for humans and other animals;
- develop tools to measure the risk of toxoplasmosis on all farmed animal species, wildlife, and human health;
- ensure implementation of integrated pest management on farms (e.g. rodents and feral cats) including improving management of animal feed and water;
- ensure implementation of action plans to mitigate the risks of toxoplasmosis on marine wildlife; and
- improve public education on toxoplasmosis to better understand the zoonotic risk to humans from infected cats and ways to minimise risk.

1.2.9. Identify sensitive wildlife areas to be protected from cats.

Sensitive wildlife areas should be identified nationally to assist with effective cat management strategies. Subsequently, implementing comprehensive and humane removal of cats from within those areas is required. Cats should be permanently removed and excluded from future, free-roaming re-inhabitation.

1.2.10. Integrate best practice cat management nationally for all cats.

Feral and domestic cat management should be integrated to ensure no gaps in responsibilities, laws, and initiatives, and to help streamline regional cat management. Individual cat movement between different populations is fluid, therefore, a coordinated and multifaceted approach through the development of a national cat management plan is needed to address all sources of cats in New Zealand's cat population. This management plan should provide a framework for best practice management for companion, stray, and feral cats, and include:

- the development of relevant Codes of Practice and Standard Operating Procedures for national cat management methods, to ensure consistency in cat management practises;

- the development of an auditing programme to promote compliance with best practice cat management; and
- over time, moving to enforceable regulations and penalties for non-compliance.

Best practice responsible cat ownership

Responsible cat ownership should include:

- mandatory identification (microchipping) and desexing of all cats before puberty and the regulation of breeding; and
- implementation of high-welfare cat containment along with education programmes to allow contained cats to express natural behaviours (mandatory in sensitive wildlife areas).

Best practice stray cat management

Stray cat management should aim to reduce the population of unowned cats humanely and effectively. Stray cat management should include the development and implementation of:

- best practice Stray Cat (including colonies) Management Guidelines including managed and targeted trap-neuter-return (mtTNR) programmes.
- a managed stray cat colony registry; and
- nationwide programmes for semi-owners/stray cat care providers about responsible cat management that emphasise desexing, identification, and providing appropriate health care.

Best practice cat management in sensitive wildlife areas

Sensitive wildlife areas (as determined under existing legislation and as part of Recommendation 4 of this report) are unsuitable for mtTNR programmes. Where mtTNR is inappropriate due to the proximity of a sensitive wildlife area, the NCMG supports the judicious use of trap and rehome as a strategy for managing stray cats and public sentiment. Where no other humane and non-lethal approaches are available the NCMG reluctantly acknowledges that trap and humane killing methods for stray cats may be necessary to protect vulnerable native species. These methods are only acceptable if done according to best practice guidelines to safeguard cat welfare.

1.2.11. Implement incremental changes to legislation.

Legislative changes in cat management should be incremental to allow public education, acceptance, and compliance with new requirements. Incremental

changes in mandating the components of the plan will likely be needed to make it effective. These changes must come from central and local government and be implemented locally.

1.2.12. Integrate robust monitoring and evaluation are integrated into all cat management strategies.

Evaluation of cat management strategies is needed to determine their effectiveness and inform changes to ongoing cat management plans at the national and local levels and should include:

- evaluation measures and processes for data collection agreed upon by all stakeholders;
- positive and negative outcomes are publicly reported to ensure transparency;
- assessment of the effect of owned and stray cat management strategies on feral cat numbers and their impacts on wildlife;
- cat management strategies are improved as new evidence becomes available; and
- creation and implementation of a centralised national database to track relevant cat management statistics.

1.3. The National Cat Management Group

The National Cat Management Group (NCMG) was formed in November 2014 to develop a national overarching strategy for responsible, compassionate, and humane cat management in New Zealand through a collaborative and proactive approach. See Appendix A for information about the purpose, goals and strategies of the New Zealand National Cat Management Group.

The NCMG consists of seven national organisations that have an interest in cat management including the following: Local Government New Zealand, Predator Free New Zealand Trust; Veterinarians for Animal Welfare Aotearoa, Companion Animals New Zealand, New Zealand Veterinary Association, NZVA Companion Animal Veterinarians, and the Royal New Zealand Society for the Prevention of Cruelty to Animals. The Ministry for Primary Industries is an observatory member, and the Department of Conservation is a technical advisory member.

The NCMG recognises the benefits and value of cat ownership and supports responsible cat ownership while acknowledging the problems associated with cat overpopulation and feral cats. The NCMG advocates that all efforts to manage cats

should be humane, whether cats are owned as companions, live in communities as strays, or inhabit wild places as ferals.

The NCMG recognises the challenges with effective management of cats being undermined by a lack of reliable data on the number of owned, stray, and feral cats, and the methods used to lethally and non-lethally manage cats.

Cat management is complex, and the interests of all parties should be considered in decision-making. Collaboration between diverse national stakeholder organisations in the NCMG, and many others not yet involved, is the key to addressing these important issues. There is no single solution for humane cat management and environmental protection; different solutions are needed for different contexts.

The NCMG developed this report to guide future decision-making for humane and effective cat management in New Zealand.

1.4. Acknowledgements

All parties contributed to the content of this document, and the primary writer was the SPCA Animal Welfare Science & Education Department. The financial contribution of the Companion Animals New Zealand and New Zealand Regional Councils is gratefully acknowledged. The contribution of RSPCA Australia is also gratefully acknowledged.

1.5. Version History

Version 3 | May 2025 (this version)

Version 2 | November 2019

Version 1 | September 2017

2. Introduction

New Zealand is home to millions of cats that have great value to people, communities, and New Zealand society. Cats and people living alongside each other also create a complex animal management problem. There are environmental and biodiversity costs, the potential for disease spread, community nuisance, and welfare concerns for cats. Addressing these issues creates ethical concerns about the euthanasia of thousands of healthy domestic cats and kittens, financial costs to organisations that manage unwanted domestic and feral cats, and emotional and moral stress for people involved.

Currently, there is no national strategy for cat management in New Zealand. Considerable efforts have been made to address cat overpopulation and the adverse impacts of feral cats. However, the complexity of the problem makes effective cat management challenging with no overall national approach (Gepp, 2019; Glen et al., 2023; Somerfield, 2019; Sumner et al., 2022). A new strategic approach to cat management is needed to mitigate the serious negative consequences of the owned, stray, and feral cat problem in New Zealand, and improve overall cat welfare. Evolving approaches to cat management will require a critical assessment of previous management strategies and a deeper understanding of cat populations and people.

3. Cat Management Should Protect Cat Welfare

A strategic goal of the National Cat Management Group is that approaches to cat management protect cat welfare. People have an obligation to provide cats in their care with a good life, and if killed, all cats should have a humane death.

3.1. Cat Welfare Matters

A strategic outcome of the National Cat Management Group is for New Zealanders to recognise the intrinsic value of cats as sentient beings.

Cats are recognised as sentient beings under the Animal Welfare Act 1999 (Animal Welfare Act 1999, a(i)). As sentient beings, cats have feelings that matter to them (see National Animal Ethics Advisory Committee, 2021). This report uses the Five Domains Model for animal welfare assessment to discuss cat welfare, and the welfare impacts of cat management (Littlewood et al., 2023; Mellor et al., 2020). According to the Five Domains Model, animal welfare is assessed as an animal's mental state based on care-related inputs of nutrition, environment, health, and an animal's behavioural interactions within their environment (Mellor et al., 2020). The Five Domains Model assesses both negative and positive states of welfare. Positive welfare includes having opportunities for agency, where an animal can voluntarily express goal-directed behaviour (Littlewood et al., 2023; Mellor et al., 2020).

3.2. The Human-Cat Relationship and Cat Welfare

A strategic outcome of the National Cat Management Group is that the human-cat relationship is recognised as important for cat welfare.

Cats and humans have a long history of a mutually beneficial relationship dating back almost 10,000 years (Driscoll et al., 2007, 2009; Haye et al., 2004; Turner, 2013). Cats provide valuable contributions to human societies, such as pest control, and they are important as human companions (Driscoll et al., 2007, 2009; Lipinski et al., 2008; Ovenden et al., 2024). Humans may provide care to cats such as providing food, shelter, veterinary care, and social companionship, and human-cat relationships are diverse (Adamelli et al., 2005; Crowley et al., 2020b; Ines et al., 2021; Ovenden et al., 2024; Zito, 2015).

New Zealand has one of the highest cat ownership rates, with 38-42% of New Zealand households owning at least one cat (Companion Animals New Zealand [CANZ], 2025; van Heezik et al., 2010). Benefits associated with having a companion

cat include social enablement (Giles-Corti et al., 2005; Zimolag et al., 2009), companionship (Castelli et al., 2001; Siegel et al., 1999), improved quality of life for the elderly (Stasi et al., 2004; Zasloff, 1996), enhanced ability to cope with grief and stress (Rohlf et al., 2005), specific health benefits (Allen et al., 2001; Anderson, 2004; Connell et al., 2007; Friedmann & Thomas, 1995; Jennings, 1997; Qureshi et al., 2009; Straede, 1993; Surma et al., 2022), and general health benefits (Grabka et al., 2007; Headey, 1999;), and benefits to children's health and development (Caprilli & Messeri, 2006; Gao et al., 2020; Gagnon et al., 2004; Nagengast et al., 1997; Platts-Mills, 2002; Ownby et al., 2003; Wu et al., 2002), especially in nurturing and social skills (Melson, 2003; Triebenbacher, 1999).

Cats are also beneficial to society as working animals, for example, on farms and as occupational therapy animals (D'Arcy, 2011; Rijken et al., 2011). Although the impact of cats on ecosystems is generally considered negative, cats may also have positive impacts on ecosystems. Cats can control pest species such as rodents and rabbits, which in large numbers may cause considerable environmental damage (Bergstrom, 2009).

Stray cats include animals that vary in their dependency on humans and sociability with humans. People who provide care to stray cats (i.e., semi-owners) report strong attachments to these cats, including companionship, a source of love, comfort, trust, purpose and enjoyment (Ma et al., 2023; Neal & Wolf, 2023; Scotney et al., 2023). People are motivated to care for stray cats based on animal welfare concerns and beliefs that their needs are similar to companion cats (Neal & Wolf, 2023). A recent study in Australia found many people who care for stray cats also have cats of their own (Ma et al., 2023).

Feral cats live in a wild state and do not have a relationship with people. This lack of relationship helps distinguish feral cats from unowned cats that live in human communities. Feral cats' legal status as a pest throughout most of New Zealand is relatively uncontroversial (Palmer & Thomas, 2023; Sumner et al., 2021).

Cats can be grouped into various population categories which make up a larger, interconnected network called a 'meta-population' (Alberthsen et al., 2013; Boone, 2015; McDonald & Hodgson, 2021; McDonald et al., 2023; Miller et al., 2014; Webb, 2008). The 'meta-population' includes aspects of the human-cat relationships, such as the human's perception of ownership of the cat and feelings of responsibility for the cat, association time, attachment, caretaking and interaction behaviours, and the cat's dependence on humans.

3.3. Recognising Different Types of Cats

A strategic outcome of the NCMG is that categories of cats are improved, recognised, and used in New Zealand.

The different populations/categories of cats inform how management strategies can more effectively target the source of the problem cats. For example, desexing programmes that aim to reduce reproduction will have little impact on cats that do not have an owner or carer willing to facilitate the desexing process (Alberthsen, 2014).

The cat population categories most used are described in the Code of Welfare: Companion Cats (2018):

- feral cat: a cat which is not a stray cat, and which has none of its needs provided by humans. Feral cats generally do not live around centres of human habitation. Feral cat population sizes fluctuate largely independently of humans, are self-sustaining, and are not dependent on input from the companion cat population.
- stray cat: a companion cat that is lost or abandoned and is living as an individual or in a group (colony). Stray cats have many of their needs indirectly supplied by humans and live around centres of human habitation. Stray cats are likely to interbreed with the unneutered [undesexed] companion cat population.
- companion cat: a common domestic cat (including a kitten unless otherwise stated) that lives with humans as a companion and is dependent on humans for its welfare.

The terms share a common basis: they describe some aspect of a cat's relationship with humans, whether the cat is 'owned', confined, socialised, or dependent on humans (Code of Welfare: Companion Cats, 2018; Haspel & Calhoon, 1990; Levy et al., 2003a,b; Marston & Bennett, 2009; Sumner et al., 2022; Toukhsati et al., 2007; Webb, 2008; Zasloff et al., 1998). These terms are inconsistently used in general and in the scientific and popular literature on cat overpopulation and management literature and can create confusion (Hughes et al., 2002; Slater, 2001; Toukhsati et al., 2007).

The stray cat population includes the sub-population of managed cats that are fed or cared for by people and are largely ignored in formal management strategies (Levy et al., 2014; Sumner et al., 2022; Toukhsati et al., 2007; Zito et al., 2015b). Managed stray cats have also been called 'semi-owned cats', defined as cats that are fed or cared for often or always for at least one month by a person who does

not perceive ownership for the cat (Zito et al., 2015b). Managed stray cats may live in a group otherwise known as a colony.

The NCMG recommends redefining the terms used to differentiate types of cats in New Zealand legislation to better reflect the cats that live in New Zealand and how they are managed.

The cat population categories in this report include:

- feral cat: unowned, unsocialised, and has no relationship with or dependence on humans;
- domestic cat:
    - companion (owned) cat: considered owned by a person, sociable, and directly dependent on humans; and
    - stray cat: of varying sociability (social to unsocial), interactions with, and dependence on humans (ranging from managed to unmanaged). Cats in this category may be lost or abandoned companion cats or born stray.

Unmanaged stray cats are not provided care by people. Managed stray cats are provided with some form of care (e.g., food, shelter, desexing, veterinary care) and may or may not be socialised. Stray cats may live as individuals or live in a group (i.e., a colony).

The term domestic cat is used in this document to refer collectively to all cats with some dependence (direct or indirect) on humans including cats in the stray and companion (owned) categories.

3.4. The Human-Cat Relationship and Cat Management

The human-cat relationship underpins the welfare implications of different strategies used to manage companion, stray, and feral cats in New Zealand (Palmer & Thomas, 2023; Sumner et al., 2022).

New Zealand cat owners are generally less accepting of restrictions on their cat's lives (Bassett et al., 2020; Gates et al., 2019; Hall et al., 2016b; Linklater et al., 2019; Walker et al., 2017), which is consistent with owners in other countries (Grayson et al., 2002; Hall et al., 2016b; Lilith et al., 2006; Toukhsati et al., 2012b). A recent study in Auckland found that owners perceive practices such as restricting access to the outdoors as infringing on their cat's choices, their interactions with the owner, and the owner's lifestyle (Ovenden et al., 2024).

Although stray cats are designated a pest in some places in New Zealand, this does not mean that the New Zealand public finds their lethal control acceptable (Farnworth et al., 2014). The higher acceptability of non-lethal methods for stray cats than for feral cats in one New Zealand survey was influenced by a person's occupation, gender, and the degree of urbanisation where they live (Farnworth et al., 2011). However, the differences in acceptability could be related to how lethal control is conducted. Half of the survey respondents in a New Zealand study thought stray cats should be assessed and euthanised (Gates et al., 2019), but this was categorically different to lethal management which included traps, shooting, and poison. People may be unaware of stray cats living in their communities (Gates et al., 2019) which has implications for whether they are concerned about their welfare. Where the relationship between humans and cats becomes increasingly distant, a decreased concern about the humaneness of methods for controlling cats is noted; however, non-lethal control methods are more favoured for stray cats than feral cats (Farnworth et al., 2014).

Semi-owners/stray cat care providers are key stakeholders in the cat overpopulation problem (Alberthsen, 2014; Ma et al., 2023; Neal & Wolf, 2023; Scotney et al., 2023; Toukhsati et al., 2007; Zito, 2015, Zito et al., 2015b). People who provide care to stray cats are an important target for initiatives aimed at managing stray cats. However, semi-owners/stray cat care providers may not consider themselves to be cat owners and are unlikely to comply with regulations and other measures directed at cat owners (Ma et al., 2023; Neal & Wolf, 2023; Zito et al., 2015b). Therefore, it is necessary to address this cat population and associated human care providers with strategies specifically designed for this group.

The public, conservationists, and cat advocates are more accepting of lethal control of feral cats (Farnworth, 2011; Nguyen et al., 2022; Palmer & Thomas, 2023), which has been linked to the lack of the human-cat relationship. Distinguishing feral cats as distinct from stray and companion cats may indicate reduced empathy for feral cats (Palmer & Thomas, 2023; Somerfield, 2019) or it may promote less concern. Ascribing a cat with the status of a pest can impact concern about their welfare (Farnworth et al., 2014). Studies in New Zealand have also found the public is more concerned about the impacts of feral cats, unmanaged strays, and colony cats on native and non-native wildlife compared to companion cats (Ovenden et al., 2024; Walker et al., 2017). Concerns for their welfare are mostly focused on humanely killing them, which often comes down to the method used (e.g., shooting, trapping, poisoning), rather than the actual act of killing (Deak et al., 2019; Palmer & Thomas, 2023). Non-lethal control methods for feral cats are preferred over lethal control methods by the public; however, inadequate justification and use of lethal control may be poorly supported by the public (Farnworth et al., 2014).

4. The Need to Manage Cats in Urban, Rural, and Wild Environments

A strategic goal of the National Cat Management Group is for the negative impacts of current cat management on domestic cat welfare, communities, and ecosystems to be recognised, understood, and better defined.

4.1. The Negative Impacts of Current Cat Management on Domestic Cat Welfare

A strategic outcome of the National Cat Management Group is for the negative impacts of current cat management on the welfare of companion and stray cats to be recognised, understood, and defined.

4.1.1. Abandonment and Surrender of Companion Cats

The frequent surrender of companion cats to animal shelters reduces the number of placements available for social stray cats needing homes. A detailed review of cat surrender and abandonment is beyond the scope of this paper, but it is extensively documented in the literature (e.g. Baquero et al., 2017; Casey et al., 2009; DiGiacomo, 1998; Kass, 2005; Ly et al., 2021; Marston & Bennett, 2009; Miller et al., 1996; Rinzin et al., 2008; Salman et al., 1998, 2000; Sandøe et al., 2019; Shore et al., 2005; Weng & Hart, 2021).

Abandoned companion cats face welfare harms and can add to stray cat populations (Castillo & Clark, 2003; Levy et al., 2003a; Natoli et al., 2006; Richards et al., 2004). Cat abandonment can be associated with many different circumstances, including:

- tenants moving out of a rental property/home leaving their cat behind;
- tenants with companion cats are unable to find a rental property that permits cats;
- a human-cat bond that is not established or disrupted (often due to health or behavioural issues) thereby devaluing the relationship;
- companion cats not being desexed and having litters of unplanned kittens which are then abandoned; and
- the cat is not microchipped and registered (i.e., the cat cannot be traced back to the owner).

4.1.2. Kittens

There are higher rates of kitten morbidity and mortality in high-density free-roaming cat populations (Izawa & Ono 1986; Gunther & Terkel, 2002; Gunther et al., 2011; Mirmovitch, 1995; Nutter et al., 2004a). Gunther et al. (2018) found that in free-roaming cat populations, kittens had a significantly higher prevalence of emaciation and thinness, the lowest body condition scores, and a higher prevalence of severe disability or injury compared to undesexed adult cats.

Kittens under six months of age made up the largest proportion of owner-surrender cats at a shelter in Australia (Marston & Bennett, 2009). Unplanned kittens that enter the shelter system can often be in a poor state of welfare, including disease and upper respiratory infections (Marston & Bennett, 2009). An average of 30% of kittens that came into SPCA Centres were categorised as not healthy at intake. Not healthy categories include Dead on Arrival; Unhealthy Not Treatable; Unhealthy Treatable (urgent); and Unhealthy Treatable (non-urgent) (SPCA Intake Health Data: Jan 2021-Jul 2023).

4.1.3. Health Risks for Undesexed Cats

Undesexed cats are at an increased risk of developing certain forms of cancers:

- 16.3% of all tumours are mammary gland tumours, making this the second most common tumour in cats (Vascellari et al., 2009). 8.2% of tumours in a Swiss feline cancer registry (1965-2008) were mammary gland tumours (Graf et al., 2016). Previously reports found a 2.5% incidence of mammary gland tumours in female cats and make up 12% of all tumours making this the third most common tumour (Dorn et al., 1968; Verstegen & Onclin, 2003).
- >90% of mammary gland tumours in cats are malignant (Dorn et al., 1968; Hampe & Misdorp, 1974; Hayes et al., 1981). A study with a Swiss feline cancer registry found that 83% of mammary tumours were malignant (Graf et al., 2016).
- Japanese and Siamese breeds are at increased risk of mammary tumours (Graf et al., 2016; Verstegen & Onclin, 2003).

Pyometra (infection in the uterus) risk increases significantly with age for female cats (Hagman et al., 2014; Potter et al., 1991).

Undesexed companion cats have significantly shorter lifespans than desexed companion cats (Hamilton et al., 1969; Kent et al., 2022; O'Neill et al., 2015). Being undesexed is a risk factor for cats developing degenerative joint disease (Lascelles

et al., 2010; Slingerland et al., 2011), which is considered a leading cause of chronic pain in cats (Robertson et al., 2010).

4.1.4. Free-Roaming Cats and Risks

Free-roaming companion cats

Cats face many risks to their health and welfare when allowed unrestricted roaming including disease transmission, injury or death from traffic, fighting, dogs and human cruelty (Bruce et al., 2019; Conroy et al., 2019; Loyd et al., 2013b; Machado et al., 2021; Rochlitz, 2003a, 2003b, 2004a, 2004b; Tan et al., 2020; Toukhsati et al., 2012b; Wilson et al., 2017).

New Zealand companion cat home ranges vary by sex, age, individual, desexing status, and degree or urbanisation (Hall et al., 2016b; Kays et al., 2020; Metsers et al., 2010; van Heezik et al., 2010). Companion cats in urban New Zealand have an average home range of 1.74 ha to 6.8 ha (Kays et al., 2020; van Heezik et al., 2010; Wood et al., 2016). Cats are observed to have larger home ranges at night than during the day (Metsers et al., 2010) and therefore may be more at risk if allowed to roam at night. In a New Zealand study, suburban-owned cats fitted with individual cameras were found to engage in a high frequency of potentially life-threatening behaviours including road crossings, encounters with other cats, consumption of potentially toxic substances, and exploration of storm drain systems and house roofs (Bruce et al., 2019). Similar risk behaviours have been documented for owned cats in the United States (Loyd et al., 2013b).

Stray cats

Anthropogenic pressures on free-roaming cat health, behaviour, and lifespan concern many cat welfare advocates (Calver et al., 2022; Crawford et al., 2019; Finkler et al., 2011b; Jessup, 2004; Levy et al., 2003b; McManus et al., 2014). Undesexed stray male cats are at higher risk of traffic accidents, injuries, bite wounds, and disease transmission compared to desexed males (Finkler et al., 2011b; Gunther et al., 2015; 2018). Gunther et al. (2015) raised concerns about the welfare of free-roaming cats living in highly developed and crowded cities in Israel based on the high number of public complaints related to cat injuries and distress. Higher incidences of welfare problems were associated with higher levels of breeding and numbers of kittens.

The presence of disease and parasites in cats varies with location (reviewed by Crawford et al., 2019). The baseline health status and infection rates of FIV (Feline Immunodeficiency Virus), FeLV (Feline Leukaemia Virus), *Cryptosporidium spp.*, *Giardia spp.*, and *Toxocara cati* of colony cats have been found similar for stray

and owned cats (Lee et al., 2002; Levy et al., 2006; Luria et al., 2004; Nutter, 2006). However, there is evidence that stray cats are at greater risk of infectious diseases and parasites including:

- A significantly higher percentage of stray cats living in colonies had cat flu compared to individual stray cats or owner-relinquished cats at shelter admission in Australia (Marston & Bennett, 2009).
- A higher incidence of FIV in stray cats (21-25%) compared to companion cats (8%) in Australia (Norris et al., 2007).
- A New Zealand study found FIV seroprevalence was 13.7% for all cats, with seroprevalence higher in stray cats (17.8%) compared to owner-relinquished cats (7.5%) (Gates et al., 2017).
- Stray cats had higher seroprevalence of *Bartonella henselae* and *Toxoplasma gondii* (*T. gondii*) compared to owned cats in some studies, likely related to greater exposure of stray cats to the vectors or hosts of these organisms (Dubey, 1973; Nutter, 2006).
- One study of stray cats in Brazil found fleas were present on 28% of the cats, and *Haemobartonella felis,* piroplasmas (*Cytauxzoon* spp. or *Babesia* spp.) and FIV infected 38%, 47% and 21% of the cats respectively. No cat was found to be infected with FeLV (Mendes-de-Almeida et al., 2004).

There are varying reports about the welfare of stray cats. It is important to distinguish stray cats that are desexed and provided care from those that are not. Calver et al. (2022) found that 21.9% of stray cats trapped in Auckland needed veterinary treatment. Zito et al. (2019) compared managed and unmanaged stray cats to companion cats and found these different groups of cats had comparable injury rates and had consistent assessments of good welfare, and unmanaged stray cats' quality of life scores were fair-to-good. Welfare concerns for stray cats have been voiced as an ethical concern with TNR (Calver et al., 2022; Crawford et al., 2019; Read et al., 2020). TNR and cat welfare are further discussed in section 4.2.2.

4.2. The Negative Impacts of Domestic Cats on Human Communities

4.2.1. Nuisance Behaviours

A strategic outcome of the National Cat Management Group is for nuisance behaviours of owned and stray cats in communities to be recognised, understood, and better defined.

Many normal cat behaviours, including defecation and digging in gardens, fighting, noise, spraying, and damaging property can be a source of nuisance. The presence of stray cats on private property can also be a source of nuisance.

Cat predation on wildlife can cause considerable community concern. Many communities take steps to protect native animals and invertebrates through the removal of predators; however, they are limited in preventing predation by companion cats. This is particularly a problem during the fledgling period for birds and when cats live near areas with wildlife vulnerable to cat predation. Small companion animals such as rabbits and guinea pigs, aviary birds and fowl can be stalked, disturbed, harassed and even killed by cats (e.g. Stewart, 2014).

Deterring cats from properties to reduce nuisance often falls on the person experiencing the nuisance and uses both evidence-based and anecdotal methods. Evidence-based approaches include:

- Physical excluders such as fencing can be effective when designed correctly (Moseby et al., 2006; Robley et al., 2007). Existing fences can be modified with attachments that exclude cats including roller bars, netting, and plastic or metal sheeting.
- Ultrasonic deterrent devices are available, but the effectiveness of these devices varies (Crawford et al., 2018; Mills et al., 2000; Nelson et al., 2006).

Anecdotal approaches to deter cats from digging include lining newly planted areas with chicken wire and laying large flat river rocks. Motion-activated sprinklers are considered effective at deterring cats, but there is no research available to support this claim. Chemical and spray deterrents are available in stores, but these options have not been well studied. At least one study in The Netherlands found seven different sprays to be ineffective in deterring toileting behaviour and acted as an attractant for some cats (Schilder, 1991). Mothballs are not recommended because they are toxic to cats (and dogs; Norkus, 2018), and may attract cats. Similarly, citrus peels are recommended as a deterrent (Mills et al., 2000), however, citrus may be toxic to cats (Plumlee, 2012).

4.2.2. Zoonotic Disease

A strategic outcome of the National Cat Management Group is for the impacts of cats on human health to be recognised, understood, and addressed.

Cats can have positive impacts on human health (see Section 2.2). However, cats can also be a risk to people through zoonotic disease transmission (diseases transmissible between humans and other animals; Dubey et al., 2009; Fakhri et al., 2018; Lappin et al., 2019).

Ringworm is a fungal skin infection transmitted from animals, including cats, to humans (Chermette et al., 2008), particularly children (Gräser et al., 2018; Havlickova et al., 2008). The most commonly transmitted ringworm species in cats is *Microsporum canis (M canis)* and transmission also occurs with *Trichophyton* species (Chermette et al., 2008; Moriello et al., 2017; Thompson, 1999). Cats with clinical lesions pose a risk of *M. canis* transmission to humans (Cafarchia et al., 2006; Ihan et al., 2016). Cats can be asymptomatic carriers of *M. canis* (Cafarchia et al., 2006; Ihan et al., 2016) with high variation (0-88%) likely related to environment and management factors (Mignon & Losson, 1997). Flea infestation in cats and subsequent environmental contamination with flea larvae and eggs can result in flea bites and flea bite allergy and disease in humans (Companion Animal Parasite Council, 2017).

Inadvertent ingestion of intestinal roundworm eggs (*Toxocara cati* or *T. cati*) from contamination of the environment by cat faeces (particularly sand pits and gardens where children play) can result in visceral larvae migrans (Fakhri et al., 2018; Woodhall et al., 2014). This is a syndrome of organ inflammation associated with the migration of worm larvae through the body. In some cases, migration of the larvae through the body can cause permanent loss of eyesight (Woodhall et al., 2014). Although extremely rare in New Zealand, the larval stages of some hookworm species infecting cats (*Ancylostoma spp., Uncinaria stenocephala*) can migrate through human skin resulting in cutaneous larva migrans (Bowman et al., 2010; Manning et al., 2006). Transcutaneous infection with hookworm usually causes localised irritation of the feet and, occasionally, more generalised illness (Bowman et al., 2010).

Humans can also be affected by mites (*Cheyletiella* spp.) from cats (Wagner & Stallmeister, 2008).

Cat bites and scratches can transmit feline oral bacteria in bite wounds creating localised pain and infection. Transmission of the bacteria, *Bartonella henselae* can cause cat scratch fever (or cat bite fever; Breitschwerdt et al., 2010). Infection from *Bartonella henselae* is most common in children and adolescents and can result in flu-like clinical signs, including fever, swelling in the lymph nodes and, in some cases, serious disease (Chomel et al., 2006; Florin et al., 2008).

Cats are the only definitive host of the protozoa *T. gondii,* responsible for causing the disease, toxoplasmosis (Stelzer et al., 2019). Cats become infected with *T. gondii* after ingesting infected prey animals (intermediate hosts). Stray and feral cats and companion cats with outdoor access generally have higher seroprevalence compared to indoor cats (see Roberts et al., 2021). Although disease from infection with *T. gondii* is rare in cats, infection in a pregnant cat can

cause foetal death, abortion, stillbirths, and more rarely death of young kittens (Calero-Bernal et al., 2019; Dubey et al., 2020).

Signs of illness from *T. gondii* infection in cats are not commonly observed. Breathing difficulty caused by pneumonia is the most common sign of disease, followed by fever, loss of appetite, weight loss, and lethargy (Calero-Bernal et al., 2019; Dubey et al., 2020). Less common signs of disease in cats from *T. gondii* include inflammatory eye problems (uveitis and retinitis), liver disease (hepatitis) causing jaundice, neurological (nervous) signs (e.g., tremors or seizures), lymph node enlargement, vomiting and diarrhoea, and muscle pain (Calero-Bernal et al., 2019; Dubey et al., 2020).

Cats can shed millions of infectious oocysts in their faeces into the environment, however, this only occurs during the first 2-3 weeks after the cat is initially infected or if an infected cat becomes immunocompromised later in life (Dubey et al., 2009). Oocysts can persist in the environment for 18 months or longer (Dubey et al., 2009).

Most toxoplasmosis infection in humans occurs through two main pathways: the ingestion of oocysts directly from the environment (for example, from garden soil, sand pits, and unwashed vegetables) or from tissue cysts in improperly cooked meat (Dubey, 2006). In most humans, infection is mild and self-limiting, but generalised infection can occur and lead to neurological disease in immunocompromised people (Dubey, 2006). Pregnant women with no previous exposure to *T. gondii* organism are at increased risk of complications of toxoplasmosis including foetal infection causing abortion, stillbirth, or birth of children with central nervous system defects and other permanent damage (Cook et al., 2000). The prevalence of human infection with toxoplasmosis has been reported as high as 100% in Brazil in some surveys, with infection more common in warmer climates (Dubey, 2021). Additionally, there are reported decreases in seroprevalence in the US and some European countries (Cressy & Lake, 2015; Dubey, 2021). Seroprevalence in New Zealand has been reported between 20-40% and is consistent with Australia, Chile, some parts of Europe, Africa, the Middle East, and India (Cressy & Lake, 2015).

Ingestion of *T. gondii* tissue cysts in improperly cooked meat is the most common mode of human toxoplasmosis infection, people preparing and eating meat should ensure that separate utensils and cutting boards are used to prepare raw meat and other foods, that the meat is thoroughly cooked and that any utensils, cutting boards, dishes, and other items that have been in contact with raw meat are thoroughly washed. Improvements in *T. gondii* control that can minimise harm to humans and other animals are discussed in section 3.2.

There are also gastrointestinal infections (for example, *Cryptosporidia, Campylobacter, Salmonella* etc.) and other infectious diseases (for example, *Chlamydia* spp.) that represent a zoonotic risk to those in contact with animals, including cats, or their faeces (Tzannes et al., 2008).

Cat zoonoses can be managed, therefore, emphasis should focus on educating people about who is most at risk of transmission of zoonotic disease, and how to reduce risk largely through simple husbandry and hygiene measures, and providing good health care to cats, including the following:

- parasite control for cats (including deworming and flea control) as directed by a veterinarian;
- vaccination of small ruminants to reduce the environmental load of *T. gondii* (European Food Safety Authority, 2013);
- good hygiene practices: particularly encouraging children to wash their hands after playing in sand pits, playgrounds, and the garden, and after touching cats;
- prompt collection and disposal of cat faeces from litter trays and the environment. Pregnant women should avoid emptying cat litter trays and wear gloves when handling litter or soil;
- covering sandpits and other play areas when not in use; and
- seeking veterinary advice for an unwell cat and immediate attention for urgent situations.

4.3. The Impact of Cats on Pastoral Industries

A desired outcome of the National Cat Management Group is for the negative impacts of cats on New Zealand's pastoral industries to be recognised, understood, and addressed.

The presence of cats (feral and domestic) in New Zealand impacts pastoral industries through the transmission of disease to grazing species. The most important disease of concern in New Zealand is the protozoal infection toxoplasmosis. *T. gondii* is one of the most successful parasitic organisms globally and is widespread throughout New Zealand. This protozoal parasite can infect all warm-blooded animals (reviewed by Stelzer et al., 2019).

Cats living on farms are considered a risk factor for transmission of toxoplasmosis to livestock including pigs, sheep, goats, chickens and other poultry, cattle, horses and other equids, and deer (Gotteland et al., 2014; Kijlstra et al., 2004; Simon et al., 2017; Stelzer et al., 2019). Faecal contamination of the environment by cats is the primary source of infection for pastoral species; these animals may ingest both oocyst-contaminated feed and water (Dubey, 2009; Stelzer et al., 2019). For

omnivorous species, such as pigs, consuming rodents infected with *T. gondii* is also a transmission pathway (Kijlstra et al., 2004; Stelzer et al., 2019).

Some studies have found no relation or a protective factor between the presence of cats and risks of *T. gondii* transmission, indicating that cats alone may not be a risk factor; rather preventing feed and water contamination through proper farm hygiene and rodent control is recommended to reduce transmission of *T. gondii* to farmed animals (Stelzer et al., 2019).

Globally, sheep are commonly infected with *T. gondii* (Dubey, 2009; Stelzer et al., 2109). In New Zealand, between 85% to 61% were positive for *T. gondii* depending on the titre concentration (Dempster et al., 2011). Although this study did not include a representative sample, authors found a high degree of exposure across flocks in all regions (the West Coast was not included in the study) and a higher level of exposure to *T. gondii* for flocks on the North Island compared to the South Island (Dempster et al., 2011).

The welfare problems related to toxoplasmosis are a result of physical health problems from infection and co-occurrence with other diseases (Stelzer et al., 2019). Based on the Five Domains Model, health is a functional aspect of welfare and poor health can lead to negative mental impacts on an animal (Mellor & Beausoleil, 2015). For example, respiratory problems from toxoplasmosis infection, including laboured breathing, can lead to a negative mental state of breathlessness (Beausoleil & Mellor, 2014). Table 1 lists studies describing the negative impacts of toxoplasmosis on animal health.

Table 1: Animal welfare-related impacts of *T. gondii* (adapted from Seltzer et al., 2019)

Study	Animal	Welfare-related problems
Basso et al., 2013; Hou et al., 2018; Jiang et al., 2013; Kim et al., 2009; Klein et al., 2010; Li et al., 2010; Olinda et al., 2016	Pigs	co-occurrence with other diseases, respiratory problems, multi-systemic wasting syndrome, fever, dyspnoea, subcutaneous haemorrhage, abortion, enlargement and necrosis of liver and spleen, neurological signs, depression, poor mental state, apathy, and poor general condition, anorexia, weight loss, mortality
Buxton et al., 1982; Buxton et al., 1988; Buxton & Losson, 2007; Castano et al., 2016; Dubey, 1981; Esteban-Redondo et al., 1999; McColgan et al., 1988	Sheep, lambs	fever, lack of appetite in ewe, weakness
Burrells et al., 2018; Costa et al., 1977; Esteban-Redondo et al., 1999; Munday, 1978; Stalheim et al., 1980; Wiengcharoen et al., 2011	Cattle	parasitaemia
James et al., 2017; Schale et al., 2018	Horses	co-occurrence with equine protozoal myeloencephalitis (EPM)
Dubey, 1985; Dubey & Desmonts, 1987	Horses, ponies	mild fever

Chickens, turkeys, ducks, and geese rarely show clinical signs or show no clinical signs of *T. gondii infection* (Stelzer et al., 2019).

Globally, toxoplasmosis has been linked with abortions in pigs, sheep, and goats (Dubey, 2009; Stelzer et al., 2019). Toxoplasmosis infection can result from a dam's ingestion of oocysts, from an infected dam to the foetus in utero, from an infected ram to dam through semen, and from an infected dam to offspring through milk (Stelzer et al., 2019). In New Zealand pastoral industries, toxoplasmosis infection poses economic impacts on livestock industries, related to abortion in sheep (Dempster et al., 2011) and deer (Patel et al., 2019). Infection with *T. gondii* is the second most common cause of abortion in sheep (Beef and Lamb New Zealand, 2016). In 2014, toxoplasmosis cost the sheep industry in the Hawke's Bay region of

New Zealand approximately $18 million (Walker, 2014). The costs of toxoplasmosis to the farming industry are incurred through:

- loss of lambs through abortion, either low-level insidious losses or large-scale abortion events;
- birth of weak non-viable lambs that fail to thrive and subsequently die;
- culling of fertile ewes that are assumed to be barren through undetected abortions;
- cost of vaccination of ewes to reduce the impact of the disease; and
- time spent managing all of the above.

A single-dose vaccine for toxoplasmosis available in New Zealand can help reduce ewe abortions and foetal loss (Dempster et al., 2011; Dubey, 2009). Vaccinating animals such as sheep may help reduce zoonotic transmission of toxoplasmosis to humans (Innes et al., 2019).

Removing feral and stray cats from farming communities may reduce the risk of toxoplasmosis, however, it will not prevent transmission altogether as companion cats will continue to act as reservoirs for the disease. Rodent population control is required to reduce the risk of toxoplasmosis on farms as rodents are an important link in the transmission of toxoplasmosis to previously uninfected cats or directly to animals such as pigs (Kijlstra et al., 2004). *T. gondii* highlights the interconnection between animal welfare, human well-being, and the environment. Improving control of *T. gondii* will benefit animals and reduce the risks to human health.

4.4. The Impact of Cats on Biodiversity

A desired outcome of the National Cat Management Group is for the negative impacts of cats on native biodiversity to be recognised, understood, and defined.

Cat predation on New Zealand's native species, including native birds, lizards, mammals, frogs, and invertebrates is well documented (see Doherty et al., 2016; Glen et al., 2023). Cats have a significant negative impact on rare and threatened native bat and bird species, particularly birds that rest, feed, or nest on the ground or in low vegetation, and across diverse habitats also including dense forests, braided riverbeds, alpine areas, and semi-urban and rural environments (Farnworth et al., 2013b; Fitzgerald et al., 1985; Gillies & Clout, 2003; Gordon et al., 2010; Kemp et al., 2023; Norbury & Heyward, 2008; van Heezik et al., 2010). Despite the accumulating evidence that cats negatively impact native wildlife, there remain many unknown questions about how cat density, individual behaviour and physical traits, and habitat complexity relate to impacts on wildlife, and how the removal of cats from an environment will impact native wildlife (see Glen et al., 2023).

Cat predation represents a significant cause of mortality for some bird and reptile species in urban locations (Baker et al., 2005; Borkin et al., 2022; Gartrell et al., 2023; Greenwell et al., 2019; van Heezik et al., 2010). Cats commonly kill sick, old, and injured birds, fledglings, and those that fall from nests (Baker et al., 2008; Møller & Erritzoe, 2000). As a result, cat predation may represent a compensatory rather than additive form of mortality in birds, although this likely varies with cat and prey density, prey species, and location (Baker et al., 2008). Where large numbers of birds are killed, cats likely kill a combination of individuals with poor and good long-term survival chances, not just those birds with poorer long-term survival chances (Baker et al., 2008).

Cats can have a sub-lethal effect on birds (primarily mediated through fear and competition) which can depress populations enough that low predation rates reflect low numbers of birds (Beckerman et al., 2007; Bonnington et al., 2013; Doherty et al., 2017). Indirect effects of cats are also seen in mammalian species (Eymann et al., 2006; Honnold et al., 2005; Pavey et al., 2008) and may also be the case with other vulnerable species such as lizards, frogs, and invertebrates.

Cat predation on introduced species of animals likely benefits native wildlife and cat management that reduces pressure on introduced species could negatively impact native wildlife (Morgan et al., 2009; van Heezik et al., 2010). Cat populations are driven by prey species population dynamics and managing prey species in addition to cats can potentially effectively reduce the impacts of cats (see Glen et al., 2023). Additionally, environmental conditions are an important aspect of the cat/prey relationship (see Glen et al., 2023). Therefore, the cat/prey dynamic and the specific ecological context should be addressed when planning cat management programmes (Farnworth et al., 2013b; Glen et al., 2023).

Any cat with outdoor access may prey on wildlife but their prey varies depending on location (Farnworth et al., 2013b; Gillies & Clout, 2003; van Heezik et al., 2010). Regardless of whether the species targeted is native or non-native and the effect on the population, there can be negative welfare impacts on individual predated wildlife (Jessup, 2004).

T. gondii transmission also impacts New Zealand's native wildlife. *T. gondii* infection is a known cause of mortality of the Hector's and Māui dolphins (Roe et al., 2013; Roberts et al., 2019) and is actively managed by DOC under the Hector's and Māui Dolphin Threat Management Plan (2020). *T. gondii* has been implicated in the death of at least one New Zealand sea lion (Roe et al., 2016) and is a potential factor influencing reproductive failure in New Zealand sea lions (Michael et al., 2016).

Cases of toxoplasmosis causing or contributing to death in native New Zealand birds are not common (Roberts et al., 2021):

- *T. gondii* has been determined as the cause of death in four cases of native New Zealand birds including kererū, North Island kiwi, and North Island kākā (Howe et al., 2014), paradise shelduck, and red-crowned kākāriki (Hunter & Alley, 2014).
- *T. gondii* has been found in shellfish (Putignani et al., 2011) but the significance is unclear.

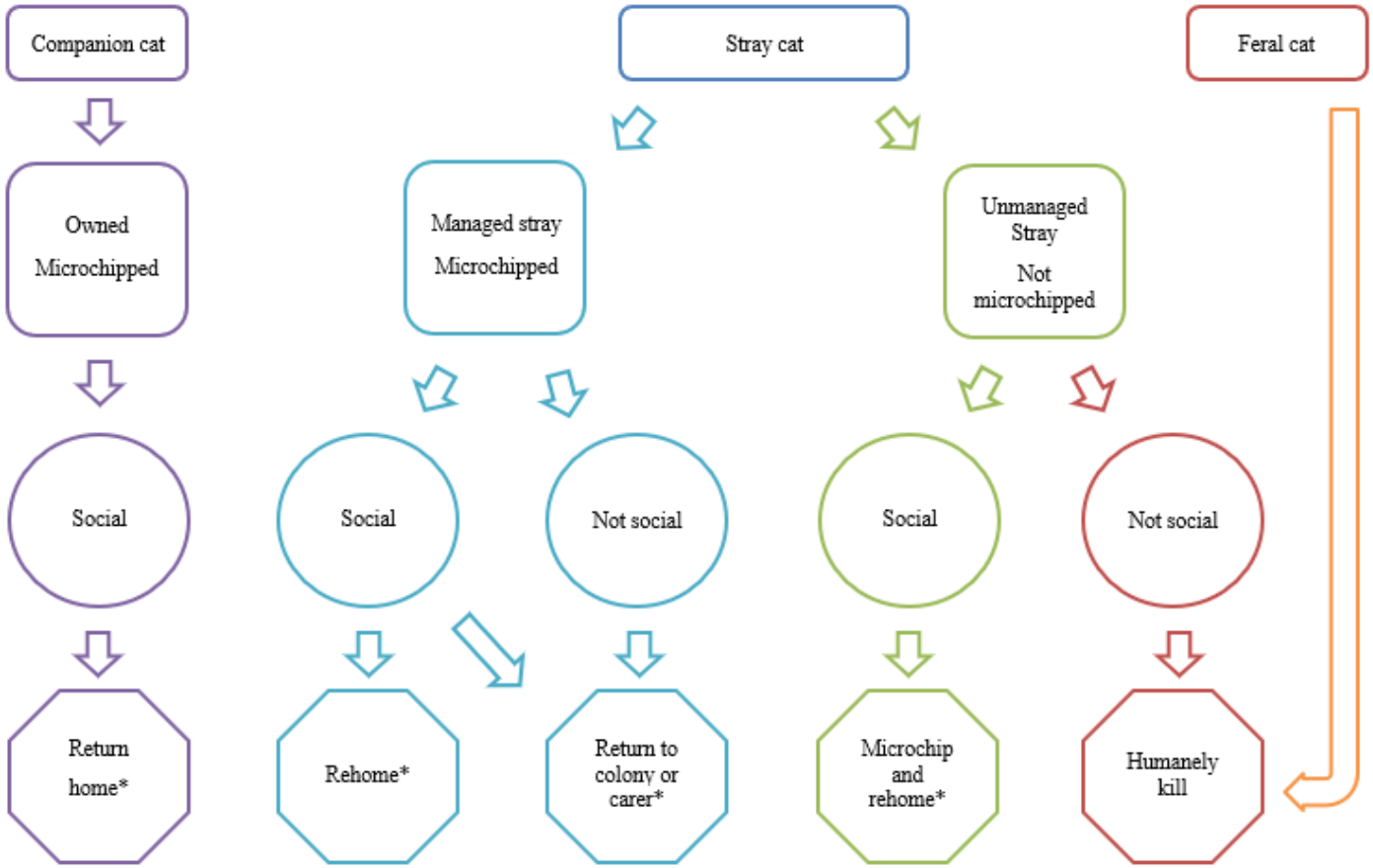
Effective management of the negative impacts of domestic and feral cats on native wildlife is an important component of maintaining New Zealand's native biodiversity.

5. Approaches to Effective and Humane Cat Management

A strategic goal of the National Cat Management Group is that humane cat management is achieved through a multifaceted and integrated national management plan.

Effective and humane cat management will require an approach that considers the type of cat, the context requiring management, and the people involved. Figure 1: Cat management flow chart for cats found free roaming based on proposed cat population categories describes the different approaches to managing free-roaming cats that are feral, stray, or companion.

Figure 1: Cat management flow chart for cats found free roaming based on proposed cat population categories



*Indicates all options should require containment in sensitive ecological areas.

5.1. Managing Companion (Owned) Cats

An outcome of the National Cat Management Group is that all owned cats are responsibly owned, including being desexed, microchipped, and kept at home (i.e., containment, confinement, restricting roaming).

5.1.1. Responsible Cat Ownership

Responsible owners acknowledge 'ownership' of their cat and provide care that fulfils the Five Domains of animal welfare (see Mellor, 2015; Mellor et al., 2020) which link a cat's mental state with the provision of care related to nutrition, environment, health, and behavioural interactions with the environment and people.

Companion cat owners sit along an ownership spectrum from casual to responsible with 'casual cat owners' engaging in fewer management practices than 'responsible owners' (Centonze & Levy, 2002; Toukhsati et al., 2007). Effective companion cat management should include strategies that promote and facilitate components of responsible cat ownership that positively impact the cat meta-population including:

- reduction in surrender and abandonment of companion cats
- limits on the number of cats owned
- keeping cats at home (i.e., containment, confinement, restricting roaming)
- enriched home environments
- identification (e.g. microchipping)
- registration (where required)
- desexing

5.1.2. Reducing Cat Surrender and Abandonment

Internationally, many animal welfare organisations have made significant progress in reducing surrender and abandonment through initiatives including, adoption counselling incorporating advice on pet-friendly accommodation (e.g. Royal Society for the Prevention of Cruelty to Animals Queensland [RSPCA Australia, 2016]), provision of financial aid such as food banks for companion animals (e.g. the Sacramento Pet Food Bank, Bi-state Pet Food Pantry, Project Maddie [Bi-state Pet Food Pantry, 2014; Project Maddie, 2014; Sacramento Pet Food Bank, 2011]; community-centric sheltering [Human Animals Support Services, 2024]; and low-cost cat health care (e.g. from organisations such as the Lort Smith Animal Hospital in Australia and Humane Society of the United States HSUS [Lort Smith, 2014; The Humane Society of the United States, 2014]).

Further guidance on factors of responsible cat ownership can be found in the Code of Welfare: Companion Cats (2018) on the Ministry for Primary Industries website.

It is an offence under the Act to desert an animal in circumstances in which no provision is made to meet its physical, health, and behavioural needs.

5.1.3. Limits on Cat Numbers Per Household

Cats can benefit from living with other cats. Restricting cat numbers per household can be beneficial if there are too many cats living at one location which can increase the stress for individual cats and make it more difficult to promote positive cat welfare through the provision of adequate space, places to hide, and important resources such as food, water, and litter trays. Multi-cat settings may be stressful for some cats; therefore, considerations of their prior socialisation should be factored into decisions to house cats together (Finka et al., 2014; Foreman-Worsley & Farnworth, 2019; Wagner et al., 2018a). Cats living in multi-cat settings will benefit from additional provisions to meet their physical, health, behavioural, mental, and emotional needs (Ellis et al., 2013; Foreman-Worsley & Farnworth, 2019; Ramos et al., 2013). The need for personal space and furnishings that enable climbing, perching, and hiding is recommended for communal housing (Ellis et al., 2013; Gourkow & Fraser, 2006).

5.1.4. Desexing

Surgical ovariohysterectomy (or ovariectomy) and castration remain the mainstay and gold standard for inducing permanent sterility in cats to manage cat populations and provide other health and behavioural benefits (Murray et al., 2008). Vasectomy/hysterectomy is a theoretical alternative to castration/ovariohysterectomy (McCarthy et al., 2013), but there is not yet adequate field evidence to support the use of vasectomy/hysterectomy alone in cats. Cats that have undergone vasectomy/hysterectomy compared to gonadectomised cats are still hormonally intact and are more likely to fight and roam resulting in injury, disappearance, or death, and are more prone to display the nuisance behaviours that can result in cat impoundment and euthanasia (Nutter, 2006; Romagnoli et al., 2024). The World Small Animal Veterinary Association (WSAVA) recommends that hysterectomy and vasectomy as an appropriate option where stray cats do not live in close proximity to people and there is little risk of nuisance (Romagnoli et al., 2024). Vasectomised male cats will continue breeding (unsuccessfully) with intact females whilst also deterring the immigration of intact male cats through the expression of dominance behaviours associated with hormones (Romagnoli et al., 2024). Similarly, hysterectomised female cats will encourage (unsuccessful) breeding which can preoccupy intact males who otherwise would breed with newly immigrated undesexed female cats (Romagnoli et al., 2024).

Welfare benefits

The welfare-related benefits of desexing cats include:

- Desexing before one year of age protects against mammary carcinoma: 91% risk of reduction if desexed before six months, 86% reduction if before one year (Overley et al., 2005).
- Desexing protects against ovarian, uterine, and testicular disease in cats (Romagnoli et al., 2024).
- Desexed cats live longer:
    - For cats in a United States database (Banfield Pet Hospital, 2013):
        - desexed male cats live a mean of 62% longer than undesexed male cats; and
        - desexed female cats live a mean of 39% longer than undesexed female cats.
    - For companion cats over 1 year of age in a California teaching hospital database (Kent et al., 2022):
        - Desexed females had a median lifespan of 10.48 years, compared to undesexed females that had a median lifespan of 4.68 years.
        - Desexed males had a median lifespan of 9.84 years, compared to undesexed males who had a median lifespan of 3.67 years.
    - For companion cats over the age of five years of age in a Pennsylvania database (Hamilton et al., 1969):
        - Desexed male cats lived a median of 10.8 years compared to undesexed males who lived a median of 8.6 years. Deaths from trauma and infections were less common in desexed males.
        - Male cats desexed before the age of five months, had a median lifespan of thirteen years compared to male cats desexed at six to seven months who had a median lifespan of eleven years.
    - For companion cats over five years of age in an English veterinary database (O'Neill et al., 2015):
        - Desexed female cats lived 0.6 years longer than undesexed female cats.
        - Desexed male cats lived 1.8 years longer than undesexed male cats.
- Desexing decreases (but may not eliminate) urine marking in both male and female cats (Cafazzo et al., 2019; Goericke-Pesch et al., 2011; Goericke-Pesch, 2017; Horwitz, 2019; Spain et al., 2004b). Following prepubertal gonadectomy, urine marking was observed in 10% of male and 5% of female cats (Hart & Cooper, 1984).
- Desexing reduces activity related to territorial behaviour. Authors note cats are less active, which they do not specify includes roaming (Cafazzo et al., 2019).

Overall, the desexing of companion cats is a benefit to the individual, as well as to the larger cat population. However, there are some risks associated with desexing, and cat owners are encouraged to discuss concerns with their veterinarian before desexing. Desexed cats are at increased risk of being overweight and obese (Chiang et al., 2022; Gates et al., 2019;

Fettman et al., 1997; Kanchuk et al., 2002; Nguyen et al., 2004). Desexed cats are also at increased risk of developing diabetes mellitus (Panciera et al., 1990; McCann et al., 2007; Niaz et al 2018; Prahl et al., 2007). The relationship between these potential health problems and desexing is not clear, however, controlling a cat's weight with diet and exercise can help reduce these risks (Backus et al., 2007; Nguyen et al., 2004).

Desexed male cats may be at increased risk of epiphyseal fractures, but this is associated with obesity and the relationship is not fully understood (Craig, 2001; Fischer et al., 2004; McNicholas et al., 2002).

Reichler, (2010) reported that the literature on the association between lower urinary tract disease and desexing is not clear for cats. At least one US and Canadian study has found that desexed male and female cats are at increased risk for lower urinary tract disease, with a significant reduction in risk for undesexed females (Lekcharoensuk et al., 2001). Ferré Dolcet et al. (2023) recently reported an increased risk of some cancers in cats that have been desexed, however, it is not clear if the study controlled for age.

See the World Small Animal Veterinary Association 2024 Guidelines for the control of reproduction in dogs and cats (Romagnoli et al., 2024) for recommendations and a more in-depth review of the benefits and risks of desexing cats.

Population-level benefits

The population-level benefits of desexing companion cats include a reduction of unplanned litters of kittens that require care from animal welfare and rescue organisations or end up repeating the cycle of unplanned breeding and contributing to stray cat populations (see Section 4.2.2 for more discussion).

Pre-pubertal desexing

The traditional age at which veterinarians commonly desex cats has been reported as six months with a range from five to nine months of age (Root Kustritz, 2007), which is also the age range at which cats typically enter puberty (Farnworth et al., 2013b; Little, 2001a, b). However, cats can reach puberty as early as 3.5 months (Beaver, 2003; Little, 2001a, b). Therefore, waiting to desex cats until the more traditional age of five to nine months can result in unintentional pregnancies (Alberthsen et al., 2013; Clark et al., 2012; Joyce & Yates, 2011; Zanowski, 2012). The mean age at which cats are reported to be desexed in New Zealand is 3.4 months for female cats and 3.2 months for male cats (Farnworth et al., 2013b).

Pre-pubertal desexing is performed before the onset of puberty ('early-age desexing' is performed at 6 to 12 weeks of age) (Alberthsen et al., 2013; Fournier & Gellar, 2004; Johnson & Calver, 2014; Manning & Rowan, 1992; Orr & Jones, 2019; RSPCA, 2021). Cats are prolific

breeders, and many owners are unaware that their cats may reach puberty by four months of age (Jupe et al., 2017). A high number of well-socialised kittens from owned litters are surrendered to shelters (Animal Welfare League of Queensland, 2010; Marston & Bennett, 2009; New et al., 2000). Many kittens surrendered to shelters are from stray cats with care providers, however, a proportion are from owned companion cats producing kittens before they are desexed (Marston & Bennett, 2009).

Pre-pubertal desexing is a routine procedure for animal shelters. Kittens are commonly desexed between six and eight weeks of age and when they are over one kilogram in body weight (Root Kustritz, 2007; Looney et al., 2008). Pre-pubertal desexing of companion cats is normally carried out as early as three months of age (Leung et al., 2016). Efforts should be made to desex companion cats once a complete course of vaccines has been administered (The Cat Group, n.d.).

When compared to the more traditional age of desexing, early-age desexing has not been found to adversely affect the physiological or behavioural development in cats other than male cats may be more likely to hide and both male and female cats are more likely to be shy (Spain et al., 2004). Other potential health risks such as epiphyseal fractures and the persistence of penile frenulum have been suggested but not substantiated in the literature (Romagnoli et al., 2024).

Desexing at a younger age is a faster procedure and has a quicker recovery time for the kitten (Aronsohn & Faggella, 1993; Bushby & Griffin, 2011; Howe, 1997; Porters et al., 2015) and it reduces the likelihood of some cat behaviours such as spraying, straying, and vocalising (Spain et al., 2004). Pre-pubertal desexing also has benefits in terms of cat population management by reducing the number of unplanned litters of kittens and euthanasia (Farnworth et al., 2013a; Joyce & Yates, 2011; McDonald et al., 2023; Root Kustriz, 2007; Porters et al., 2014; Spain et al., 2004; Yates et al., 2013). Other benefits include decreased risk for mammary carcinoma (Overley et al., 2005), elimination of reproductive emergencies such as pyometra and dystocia, and potential decrease in behavioural problems linked with cat relinquishment (Veterinary Task Force on Feline Sterilization Recommendations for Age of Spay and Neuter Surgery, 2016).

5.1.5. Identification

Animal identification is a fundamental tool of animal management at a community level. A microchip is an electronic chip inside a small, glass or surgical acrylic cylinder that is approximately the size of a grain of rice. Microchips are designed to generate electricity in the antenna by electromagnetic induction using a low radio frequency signal provided by a microchip scanner (i.e., Radio Frequency Identification (RFID) (Saito et al., 2010; Lord et al., 2010). A microchip activated by a scanner will transmit a unique, pre-programmed, 15-digit identification number, which can be used to look up owner information in a database.

Microchipping is preferred over other identification methods because the chip cannot be removed, dislodged, or lost without surgical intervention (Goodwin et al., 2018).

The benefits of effective identification (microchipping) include:

- An owner of a lost cat can be identified and contacted so the cat can be reclaimed.
- An owner of an injured cat can be identified so that prompt and appropriate decisions can be made about the cat's medical treatment.
- An owner of a roaming cat causing nuisance can be identified and educated about their responsibilities, warned, or penalised (subject to the local legislation and policies).
- Where microchipping is mandatory, a cat without a microchip may be assumed to be an unmanaged stray. Appropriate decisions can be made according to the relevant legislation if the cat is injured or displaced.
- Microchipping allows for the identification of cats during a natural disaster or disease outbreak.

Microchipping may be used to distinguish owned or managed stray cats from feral cats in pest management plans at a local and regional level across New Zealand (see Appendix B: New Zealand Regional Pest Management Plans – Summary for Cats) (Sumner et al., 2022).

Microchipping increases the success of reuniting lost or stolen cats with their owners. In a US study, 38.5% of microchipped cats were returned to their owners, compared to only 1.8% that were not microchipped (Lord et al., 2009). An Australian study found return-to-owner rates were 51% for microchipped cats compared to only 5% for non-microchipped cats (Lancaster et al., 2015). During the 2011 Christchurch earthquake, 85% of owners of microchipped animals were able to be contacted within 3 hours by the New Zealand Companion Animal Register (NZCAR) (the only private database in New Zealand to register microchips), compared to only 25% of non-microchipped animals were reunited with their owners within a 7-day period (CANZ, 2018).

Solely relying on microchipping as the only form of identification may limit the efficiency of locating owners. Microchips are not visible, require access to a microchip reader, and rely on accurate owner information linked with the microchip. Lost cats entering shelters with inaccurate data associated with their microchip is a common reason for difficulties in reuniting cats and their owners (Alberthsen, 2014; Alberthsen et al., 2013). An Australian study found that 37% of stray but microchipped cats entering the Royal Society for the Prevention of Cruelty to Animals Queensland [RSPCA QLD] had inaccurate data associated with their microchip (Lancaster et al., 2015). Nearly half of the cats were registered to a previous owner and one-third had incorrect or disconnected contact phone details associated with their microchip.

The addition of a collar and tag for companion or managed stray cats is of great benefit as they give a visual indication of a cat's ownership/management status and successfully help to reunite lost cats with their owners/care providers before, or following, shelter admission (Alberthsen et al., 2013; Lord et al., 2007; Lord et al., 2010).

5.1.6. Keeping Cats at Home (i.e., containment, confinement, restricting roaming)

Keeping companion cats at home is important for preventing cats from roaming and unwanted reproduction, minimising wildlife predation and community nuisance, and reducing the risk of disease transmission, injury or death from traffic, fighting, dogs or human cruelty (Loyd et al., 2013b; Toukhsati et al., 2012b). Keeping cats fully contained (inside the house +/- a fully contained outdoor enclosure) is common in the United States (Foreman-Worsley et al., 2021; Hall et al., 2016b) and increasing in Australia (e.g. Elliot et al., 2019 report 46.5% of owners engage 24 hr containment).

New Zealand has one of the highest rates of owners who allow their cats unrestricted access outdoors. Only 7.8% of cats are estimated to be confined indoors (Gates et al., 2019) and 67% of owners allow unrestricted access outdoors (Hall et al., 2016b).

Recent surveys from Companion Animals New Zealand indicate a shift in cat owner behaviour with respect to providing outdoor access. In 2024:

- 7% of owners reported keeping their cats indoors at all times, a decrease from 11% in 2020.
- 79% reported allowing their cats indoors and outdoors, a decrease from 83% reported in 2020.
- 3% of owners reported keeping their cat fully outdoors, a decrease from 5% reported in 2020.

There is no comparison for 2020, however, in 2024, 11% of owners reported keeping their cats indoors with controlled outdoor access (e.g., catio, leash) (CANZ, unpublished; see Technical Note 6).

Cats can be kept in restricted indoor and outdoor environments and maintain good welfare (de Assis & Mills, 2021), however, owners need to be aware of the risks of negative health and welfare problems such as obesity, urinary tract disease, and other stress-related health and behavioural issues (Herron & Buffington, 2010; Lawson et al., 2020; Sandøe et al., 2017; Tan et al., 2020; Zoran & Buffington, 2011). Owner-perceived behavioural issues such as scratching furniture, soiling in the house, and excessive vocalisation are higher in confined cats (Sandøe et al., 2017; Schubnel & Arpaillange, 2008) and should be cause for concern in promoting more confined lifestyles for cats. Indoor cats require the provision

of appropriate resources and strategies to ensure they have opportunities to display normal behaviours such as hunting and exploring to mitigate some of these problems. See Section 6.1.1 for more information.

Transitioning cats from an outdoor lifestyle to an indoor lifestyle can be challenging, whereas anecdotally, owners that habituate their cats to an indoor or contained lifestyle from an early age seem to have better success in ensuring their cat's needs are met and they experience positive welfare. More evidence to help determine how best to help cats and cat owners transition to and manage containment and ensure good cat welfare would be of great benefit (de Assis & Mills, 2021; Ovenden et al., 2024). There is a study being undertaken by Companion Animals New Zealand with results pending, to help with developing guidance for New Zealand Cat owners (personal communication, CANZ, 2024).

Where owners cannot confine their cats, using effective methods to reduce predation is of benefit. Collars that are designed as anti-predation devices including those with bells, warning systems, or are large and brightly colour (i.e., 'clown collars') can also help reduce the impact cats have on wildlife to varying degrees (Calver et al., 2007; Calver & Thomas, 2011; Cecchetti et al., 2021b; Crowley et al., 2019; Gordon et al., 2010; Hall et al., 2015, 2016a). A recent UK study found that provisioning meat in a companion cat's diet and playing with toys that simulate hunting may reduce predation (Cecchetti et al., 2021a).

5.1.7. Responsible Breeding

A person should carefully consider deliberately breeding cats. The European Platform on Animal Welfare (2020) considers the breeder to have an obligation to ensure the availability of new homes for kittens before breeding is allowed. Ensuring there are homes for the offspring of a cat purposely bred will reduce the risk of unwanted litters. Undesexed adults and undesexed kittens that have reached three months of age should be separated to ensure that unintended breeding does not occur (see more information in Section 4.1.4).

5.2. Managing Stray Cats

An outcome of the National Cat Management Group is that there are no stray cats in New Zealand.

Stray cats include a broad group of cats living in and around human habitation. Cats are considered stray for different reasons. Stray cats may have been born from unowned cats, whereas others were born as an unplanned litter to a companion cat. Some stray cats are lost or abandoned companion cats (Casey et al., 2009; Marston & Bennett, 2009).

Stray cats may or may not be socialised with people and range in their dependency on people to meet their needs. Stray cats often depend on resources such as food supplied

indirectly and unintentionally by humans (Aguilar et al., 2012; Alberthsen 2014; Finkler et al., 2012). Stray cats are a significant proportion of unwanted cats in urban areas and cats that enter animal shelters (Alberthsen, 2014; Marston & Bennett, 2009; Zito, 2015).

There is no reliable number of stray cats in New Zealand, however, the density of stray cats increases with the increased density of people (Aguilar & Farnworth., 2012, 2013; Aguilar et al., 2015). Stray cats may be estimated using human density such as cats per 1,000 people (see Zito et al., 2018).

Stray cat populations can be reduced by the following methods:

- limiting the flow or contribution of cats from the owned and feral cat populations to the stray cat population through desexing and humane destruction, respectively;
- reducing the number of stray cats through the removal of cats (by non-lethal or lethal methods); and
- reducing the number of stray cats by controlling their reproduction.

Limiting access to food resources (intentionally provided food and unintentionally provided food such as rubbish) will also assist in the control of stray cat populations.

5.2.1. Limiting Flow of Cats into the Stray Cat Population

Significantly reducing or eliminating the contribution of feral cats to the stray cat population can likely only be achieved through greatly reducing the number of feral cats or eliminating feral cats. Control methods and management strategies for feral cats are described in detail elsewhere (Biosecurity Tasmania 2016; Commonwealth of Australia 2015 a,b; Denny & Dickman, 2010; Sharp & Saunders, 2012) and in the next section of this report (Control of feral cats).

Limiting the flow of companion cats into the stray cat population can be achieved by preventing unplanned reproduction, supporting long-term responsible care of cats, reducing cat abandonment, and preventing cats from roaming which can subsequently lead to straying and becoming lost.

5.2.2. Reducing the Number of Stray Cats

Permanent removal of cats from the stray cat population

Adoption

Adoption programmes for stray cats involve removing the cats from the stray population by either trapping (trap and remove) or capturing without a trap (usually for more social cats) and then finding permanent homes through informal channels or formal adoption

programmes with cat rescues and welfare organisations (see CANZ, 2020). There can be limited capacity to absorb stray cats into the companion cat population because of the oversupply of surrendered companion cats and kittens needing adoption and easily obtained cheap or free cats from other sources. Some stray cats are not of suitable temperament or socialisation status for rehoming to 'normal' domestic homes (Hurley, 2013a, b; Levy, 2012), and alternative rehoming routes (for example, barn or farm cat placements) or other options (for example, managed, targeted, trap-neuter-return programmes) should be explored for these cats.

Increased adoptions of cats, including stray cats, can be achieved through measures such as creative marketing and advertising campaigns, off-site adoption centres, adoption drives, and improving the accessibility and attractiveness of adoption centres (Fournier & Gellar, 2004; Lord et al., 2014; Marsh, 2010; Zito et al., 2015a).

Cat sanctuaries

Cat sanctuaries provide long-term homes for stray cats in confined areas. Cat sanctuaries are expensive to build and maintain, tend to fill up very quickly, and can only care for a relatively small number of animals for an extensive period (Loyd & Hernandez, 2012; Slater, 2007). Sanctuaries and other long-term animal sheltering facilities generally result in poor animal welfare. The confinement of large numbers of cats in small rooms or areas leads to physical and psychological stress and puts cats at high risk of disease (Finka et al., 2014; Foreman-Worsley & Farnworth, 2019; Wagner et al., 2018a; Gourkow & Fraser, 2006). Most sanctuary programmes that permanently house many cats also have an active TNR programme because the sanctuaries are filled (Levy & Crawford, 2004).

Trapping programmes

Stray cats may be trapped and permanently removed from a population resulting in a live outcome such as rehome through adoption or a lethal outcome such as death. Calver et al. (2022) analysed data from a 25-year programme in Auckland, New Zealand that uses a 'Trap Assess Resolve (TAR)' approach in which cats are trapped and either rehomed (where appropriate), euthanased if needed, humanely killed if unsocialised, and in some instances released. Cat adoptions increased and euthanasia decreased during the 25 years. Cats under one year of age represented 80% of the animals trapped, which remained stable over the 25 years, which the authors attribute to high abandonment, small numbers not removed, or that the number removed was a small proportion of the population (Calver et al., 2022).

Trapping with cage traps and subsequent humane killing are generally considered to be a relatively humane method of controlling cat populations compared to other lethal methods. Live trapping and killing of cats have minimal impact on non-target species and

pose less danger to humans and pets than other lethal methods (Palmer, 2014). Using more humane live traps cannot fully alleviate the welfare risks of trapping cats. Welfare outcomes for trapped cats are affected by a range of factors including the type of trap used, environmental exposure, frequency of checking, potential for injury during escape attempts, and distress caused by containment (Robertson, 2007). At minimum, trapping activities in New Zealand must comply with obligations under the Animal Welfare Act which stipulates the types of traps that can be used, the maximum length of time a trap can go unchecked, and how an animal is treated if found in a live trap. Any trapping should comply with an agreed code of practice and standard operating procedures.

Section 121 of the Animal Welfare Act 1999 allows the Minister to declare approved organisations. For an approved organisation (e.g., SPCA), there is a statutory seven-day holding period for stray cats, unless an animal welfare inspector considers welfare is so seriously compromised (e.g., through distress, injury, or illness) that the cat requires immediate euthanasia. The stress of confinement in an animal shelter for unsocialised cats may be considered unacceptable. Cats may also be humanely killed before completion of the statutory seven-day holding period if there are immediate health or welfare issues for the cat, they are unsocialised or aggressive, which makes treatment or care unreasonably stressful for the cat and dangerous for personnel (AWA, 1999; NZVA, 2018).

The Department of Conservation [DOC] (2024) and the National Pest Control Association [NPCA] (2015c) provide guidelines for monitoring and control of feral and stray cat trapping (however, these are best practice guidelines and are not mandatory nor enforceable). The NPCA (2015d) provide a user guide to legislation relating to terrestrial pest control to help contractors and control agency staff understand their statutory responsibilities. In contrast to New Zealand, some councils in Australia require trapping to be conducted by authorised officers who set up, monitor, and remove trapped cats (usually individual cats that cause nuisance) to a local cat management facility (RSPCA Australia, 2017). There are benefits in adopting a similar approach to achieve consistency and minimise welfare risks associated with trapping which may help gain greater community acceptance for trapping programmes.

Many approaches to trap and kill result in minimal overall reduction in cat numbers, because a small percentage of cats are affected by these programmes, and the limited capacity of shelters and pounds to remove unwanted cats (Calver et al., 2022; Hatley, 2003; Levy, 2012; Wald et al., 2013). Low-level culling and one-time trap and kill of feral cats can lead to a temporary decrease in cat numbers, but an overall increase in cat numbers (Lazenby et al., 2015; Niebuhr & Norbury, 2020; Palmas et al., 2020). Similarly, traditional trap and kill efforts (undertaken by animal control agencies or through animal welfare organisations, when members of the public trap and bring unowned cats into animal shelters) are effectively low-level culling, and unlikely to result in significant long-term improvement in wildlife predation, spread of disease, public health, or cat welfare.

Computer-based modelling consistently predicts the failure of lethal control methods to eliminate cat populations unless high removal rates are achieved for long periods; these conditions are considered unrealistic in urban areas (Andersen et al., 2004; Budke & Slater 2009; Foley et al., 2005; McCarthy et al., 2013; Schmidt et al., 2009). One simulation model estimated that over 82% of cats in a population of 200 cats would need to be removed over 4,000 days to eliminate a population (McCarthy et al., 2013). Other estimates for effective removal rates range from over 50% of the female population (Andersen et al., 2004), or 55-60% in the absence of immigration (Nutter, 2006). Models predict that colonies can be kept small by very high-level culling every one or two years, but that this will not lead to a long-term reduction in the numbers of cats as colonies will re-establish due to immigration (Nutter, 2006).

Eliminating the source of food on which cats rely is an important component for the success of a lethal cat removal programme. Removing the source of food reduces the likelihood of immigration into the area which stymies colony reduction (Winter, 2004).

Some trapping programmes include rehoming of suitable cats on a small scale (e.g. individual trapping of nuisance cats), but this may be a challenge on a large scale due to extra resources required unless local community support is available (Calver et al., 2022; RSPCA Australia, 2017).

Successful trap-and-kill programmes can be difficult to implement and involve a significant investment of resources. The effort required to eradicate cats from geographically isolated islands with intensive lethal control methods including trapping, shooting and poisoning is high. The mean effort to eradicate feral cats from six large islands was 543 ± 341 person-days per 1000 ha of island over 5.2 ± 1.6 years (Lohr et al., 2012; Parkes et al., 2014).

Trapping activities in peri-urban and urban areas should consider the difficulty of implementing a programme that can remove enough cats and the evidence that less than optimum removal rates may increase cat numbers (Lazenby et al., 2015). Eradication methods should be continuously applied due to the immigration and introduction of cats into the population through abandonment and new litters from remaining cats (Castillo & Clarke, 2003; Gunther et al., 2022; Hatley, 2003; Natoli et al., 2006).

Controlling the reproduction of stray cats

Non-surgical desexing

Developing a successful, safe, low-cost, single-dose, lifelong, non-surgical sterilant that is effective for cats of both sexes and is amenable to delivery in a field setting would revolutionise cat population management. There have been many advances in this area

over the last ten years and active research continuing into potential methods including immunocontraception with a single-administration vaccine against gonadotropin-releasing hormone (GnRH), long-term therapy with GnRH agonists administered in controlled-release devices, targeting cells in the brain or gonads with cytotoxins, gene therapy which leads to protein expression that suppresses reproduction and gene silencing of peptides essential to reproduction (Johnston et al., 2015). In 2023, a research group in the United States demonstrated that a single injectable dose of a gene therapy-based treatment induced multi-year inhibition which is effective contraception in female domestic cats (Vansandt et al., 2023).

Trap neuter and return (TNR) programmes

Trap-neuter-return (TNR) programmes involve trapping, desexing, vaccinating (sometimes) stray cats and then returning them to where they were trapped. TNR is a non-lethal option for managing healthy unsocialised adult stray cats that are not good candidates for rehoming and otherwise killed.

TNR is considered a humane method for cat population management by many organisations (American Veterinary Medical Association [AVMA], 2017; British Columbia Society for the Prevention of Cruelty to Animals [BC SPCA], 2017; Levy et al., 2003a; Royal Society for the Prevention of Cruelty to Animals United Kingdom [RSPCA UK], 2014; RSPCA Australia, 2017).

TNR can improve cat health and reduce cat-related conflict with the local community by reducing cat nuisance behaviours (e.g. aggression) in desexed animals (Finkler & Terkel, 2010; Gunther et al., 2016; Kilgour et al., 2017). Maintaining a small number of desexed cats in a community can be beneficial for controlling rodents (Kilgour et al., 2017), as rats and mice represent a high proportion of urban cat prey in some countries (Barratt, 1997; Tschanz et al., 2010).

Health risks to cats and TNR

Cat populations can be contiguous groups where individuals may transition from one group to another (Kikillus et al., 2017; Gunther et al., 2022). The variability of infectious conditions of cats in different countries and locations requires careful evaluation for a TNR programme. The environmental accumulation and effect of ectoparasites and other pathogens carried by cats and other species including fleas, *Haemobartonella felis, Ricksettia* spp, *Coxiella* spp (Akucewich et al., 2002; Chomel et al., 1996; Shaw et al., 200), hookworms, roundworms (Anderson et al., 2003; Dubn´a et al., 2007; Uga et al., 1996) and *T. gondii* (Dubey, 1973) must also be considered (Longcore et al., 2009).

TNR and welfare

Capture, transportation, and surgery for TNR will likely cause stress to cats and, some cats will be pregnant when desexed. Stress can be minimised during the TNR procedures and pregnant cats can be safely desexed (Association of Shelter Veterinarians' Veterinary Task Force to Advance Spay-Neuter, 2016; Levy et al., 2012).

Improved health for both male and female cats in managed colonies may be related to decreased risk of infectious disease, nutritional deficiencies, and stress associated with reproduction (Gilhofer et al., 2019) and reduced reproduction-related aggression in males (Cafazzo et al., 2019; Finkler et al., 2011b; Gunther et al., 2018). Rehoming kittens and euthanasing sick or injured cats as part of a TNR programme removes the animals most vulnerable to welfare harm from free-roaming cat populations.

Zito et al. (2019) assessed free-roaming cats (managed and unmanaged) from a distance and found that most cats were in ideal body condition, had good or excellent coat condition, and had no eye or nose discharge or injuries. Stray cats in managed cat colonies were assessed as having good welfare comparable to owned cats, and unmanaged stray cats' quality of life scores were fair-to-good (Zito et al., 2019). Injuries were only observed in 8.9% of the managed stray cats, and 7.5% of the unmanaged stray cats, compared to 5.6% of free-roaming companion cats (Zito et al., 2019).

Gunther et al. (2018) found that desexed adult cats were more likely to be obese and have a lower prevalence of skin lesions and severe disability or injury. However, desexed adult cats had a higher prevalence of permanent disability. Desexing was correlated with a reduced prevalence of emaciation and thinness.

In several studied TNR colonies, only a small proportion of the cats trapped needed to be euthanased due to debilitating conditions (Wallace & Levy, 2006; Zito et al., 2018). In addition, desexed free-roaming female cats have been found to have reduced cortisol levels and aggression compared to intact free-roaming female domestic cats (Finkler & Terkel, 2010).

Other evidence has shown that desexed cats living in colonies had significantly longer lifespans compared to their non-desexed counterparts (Nutter, 2006), and the morbidity rate for cats in colonies significantly decreased with increased desexing rate (Gunther et al., 2016). The welfare of free-roaming cats has been associated with the amount of care provided to them (Gunther et al., 2015; Slater, 2007).

The authors suggested that controlling the reproduction of the cats, thereby reducing the number of births (and associated parturition dangers) and number of kittens (as kittens tend to experience high mortality), could reduce the negative welfare issues with free-roaming cats (Gunther et al., 2015). The location of the cat colony and its proximity to areas

that are high-risk environments for cats (such as busy roads) could affect the morbidity, mortality and quality of life of the cats in the colony (Gunther et al., 2015). The two most common outcomes for colony cats are disappearance from the colony or death, most often due to motor vehicle trauma (Nutter et al., 2006). Therefore, the colony location should be considered when assessing its suitability for a TNR programme.

TNR and costs

Cost is another frequently cited concern about TNR programmes (Calver et al., 2022; Lohr et al., 2012; Loyd & Devore, 2010; Nutter et al., 2004b). These programmes require substantial investments of time and money, but these costs diminish over time as the proportion of desexed cats in the colony increases and fewer cats require desexing (usually only new immigrant arrivals; Hughes & Slater, 2002). Trap and euthanase were more cost-effective than TNR in one study that modelled the costs of the different management approaches (Lohr et al., 2012). However, the ongoing abandonment of cats reduced the cost-effectiveness of both trap and euthanase and TNR (Lohr et al., 2012).

There are different ways to carry out TNR (Stoskopf & Nutter, 2004). TNR that only involves the trapping, desexing, and returning of cats to an area may be done as an ad hoc approach used to address individual cats in a specific circumstance. Trap-neuter-return programmes may be carried out on a specific population of cats in the community (i.e., targeted TNR) or may be carried out on stray cats that are brought to an animal welfare centre or shelter (e.g., return-to-field).

There are varying reports of the success of TNR as a cat management tool (Jones & Downs, 2011; Kilgour et al., 2017; Levy et al., 2014; Slater 2015). Some cat colonies managed with TNR have declined (Levy et al., 2003a; Natoli et al., 2006), but others have increased in cat numbers over time (Castillo & Clarke, 2003; Gunther et al., 2011). An increase in population is particularly evident when there are high immigration rates into the colony from strays or abandoned owned cats (McCarthy et al., 2013; Miller et al., 2014, Natoli et al., 2006). In many places, legislation is already in place to discourage abandonment, but enforcement is difficult to achieve (Robertson, 2007).

Some studies have looked at changes in the intake of stray cats at local shelters as an indirect measure and show TNR can help reduce local shelter euthanasia rates, impoundments, and overall intake of stray cats. (Hughes & Slater, 2002; Hughes et al., 2002; Johnson & Cicirelli, 2014; Levy et al., 2014; Spehar & Wolf, 2018b, 2019; Zito et al., 2018).

Managed, targeted, Trap-Neuter-Return (mtTNR)

Managed, targeted TNR (mtTNR) is a systematic approach to stray cat management that addresses the population of stray cats in a defined geographical area and includes

management protocols for desexing, trapping, returning, providing veterinary care as needed, rehoming when appropriate (e.g., young kittens and socialised adult cats) and ongoing monitoring of the population to ensure a sufficient number of reproductively active cats are desexed (Kortis, 2014; Wolf & Hamilton, 2022; Zito et al., 2018).

An mtTNR programme is designed to systematically and comprehensively desex most stray cats in the targeted area with the goal of colony reduction and extinction. mtTNR programmes may be a useful cat management tool in urban areas where time and resources will allow the long-term reduction and eventual extinction of cat colonies (Stoskopf & Nutter, 2004).

Public education and stakeholder involvement are critical components of mtTNR programmes (Flockhart et al., 2022; International Companion Animal Management Coalition, 2011; Kortis, 2014).

An increasing body of evidence suggests that long-term, mtTNR programmes can effectively reduce free-roaming cat populations when they include an adoption program, monitoring, and desexing of new cats arriving at the colony (Hughes & Slater 2002; Kreisler et al., 2019; Levy et al., 2003a; Spehar & Wolf, 2019; Stoskopf & Nutter, 2004; Swarbrick & Rand, 2018). See Appendix D for a review of TNR studies and outcomes.

mtTNR should include the following practices.

1. A sufficient number of reproductively active cats are desexed.
    a. Population modelling suggests that 75-80% of adult breeding cats in a colony need to be desexed to result in a decrease in the cat population (Foley et al., 2005; McCarthy et al., 2013; Miller et al., 2014). However, the percentage of cats that need to be desexed to result in population reduction will depend on many factors including the mean lifespan of cats in the colony, migration rates, population density, urbanisation, climate, availability of resources, and other environmental factors (Boone, 2015; Kilgour et al., 2017; Miller et al., 2014; Schmidt et al., 2009).
2. The cat population is continuously monitored.
    a. Immigration into the colony should be prevented or reduced to control cat numbers. Failure to decrease colony size or an increase in colony size is more likely when there are high rates of stray or abandoned cats immigrating into the colony (McCarthy et al., 2013; Miller et al., 2014, Natoli et al., 2006). Cats that join the colony should be desexed or adopted before they can reproduce (Gunther et al., 2016; Guttilla & Stapp, 2010; Natoli et al., 2006; Paterson, 2014).
    b. Immigration can be minimised by implementing public education programmes aimed at improving responsible cat ownership and

implementing mtTNR programmes where geographical boundaries prevent the introduction of cats into the programme area.

3. Researchers are active participants.
    a. Dedicated teams to implement mtTNR programmes with strict attention to detail are important for success. Successful stray cat management programmes have been implemented with the participation of a research team (Hughes & Slater, 2002; Levy et al., 2003a).
4. Cat adoption is an integral part of the programme.
    a. Adoption is an important part of successful stray cat management programmes (Levy et al., 2003a; Stull, 2007). Adopting rehomable cats can offset immigration into colonies and help reach the removal threshold necessary for population decline (Andersen et al., 2004).
5. Semi-owners/ Stray cat care providers are involved.
    a. Involving cat semi-owners/stray cat care providers in a stray cat management plan can provide support and access to cat colonies, help to maintain positive public perceptions of a programme, and encourage community support and engagement (Ash & Adams, 2003; Centonze & Levy, 2002; Haspel & Calhoon, 1990; Kilgour et al., 2017; Zito et al., 2015b).
6. The cat colony is well-managed, and the programme is adequately resourced over the long term.
    a. Successful cat colony management requires good communication and trust-building with all stakeholders, and the engagement and involvement of all participants (Gunther et al., 2016; Kilgour et al., 2017). mtTNR programmes require a long-term commitment and resources to achieve their aims (Kilgour et al., 2017; Levy et al., 2003a). Colony selection for mtTNR should assess the risk to cat welfare and communities related to infectious diseases and environments.
7. Colony management should include certain practices.
    a. Best practice mtTNR guidelines are followed. A list of resources for best practice mtTNR is available in Appendix C.
    b. Desexed cats are ear-tipped and identified with a microchip and (where possible and practical) external identification.
    c. Cats are returned to a person or group who takes responsibility for their care.
    d. Cats are registered on a stray cat register.
    e. Provision of food, water, shelter, and access to veterinary care.
    f. Management plan for continuity of care.
8. Stakeholders understand the programme and its aims.
    a. Successful mtTNR includes the public having access to information about the impacts of cats on wildlife and human health, the need for mtTNR, and how mtTNR works.

9. Programme outcomes are properly evaluated and reported.
    a. Assessment of a stray cat management programme should include accurate documentation of the targeted cat population before management efforts and throughout the study (Flockhart et al., 2022; Kilgour et al., 2017).
10. The programme does not conflict with wildlife management priorities.
    a. mtTNR programmes (and TNR programmes) are unsuitable in locations adjacent to sensitive wildlife areas where wildlife protection is a priority. Stray cat management can lead to stabilisation and extinction of a cat colony over time, but there is considerable variation in how long it may take due to multiple factors (Stoskopf & Nutter, 2004; see Appendix D). Therefore, mtTNR or TNR is unsuitable when acute issues (e.g. significant cat impacts on threatened or endangered species) require rapid extinction of a cat colony (Guttilla & Stapp, 2010; Stoskopf & Nutter, 2004), and there are other humane options.
    b. Common indicators used to evaluate an mtTNR programme include:
        i. decrease in cat colony size
        ii. extinction of cat colonies
        iii. reduction in nuisance complaints relating to the cats
        iv. reduction in stray cat intakes into local animal shelters and animal control facilities (referred to as Return-to-Field (RTF))
        v. population demographics including the age of cats, kitten-to-cat ratio, and male-to-female ratio
        vi. immigration and emigration of cats

5.3. Managing Feral Cats

An outcome of the National Cat Management Group is that there are no feral cats in New Zealand.

Feral cats live in a wild state, are self-sustaining, and have none of their needs provided for by humans. Feral cats are found in most terrestrial habitats from sea level to alpine areas but generally do not live around centres of human habitation (Alberthsen, 2014; Gillies & van Heezik, 2021; Webb, 2008). Feral cats are distributed throughout all main islands of New Zealand and are also present on several outlying islands (Parkes et al., 2014). Feral cat densities vary widely and are largely dependent on the availability of prey (Gillies & van Heezik, 2021). Feral cat home ranges vary by sex of the cats, season, competitors, habitat type, land use, prey availability and type (Nottingham et al., 2022).

Feral cats are generalist predators (Nottingham et al., 2024) and, while they predominantly prey on rats and rabbits (Gillies & van Heezik, 2021), they may also prey upon native bats, birds, reptiles, insects, and amphibians (Farnworth et al., 2013b; Glen et al., 2022; Harper, 2010; Massaro & Blair, 2003; Mills et al., 2018; Tocher, 2006). New Zealand's native species

are poorly adapted to respond to cat predation because they evolved in the absence of mammalian predators. Consequently, low numbers of feral cats can significantly impact native species (Farnworth et al., 2011).

Feral cat control to protect New Zealand's native species falls under two broad categories:

- Sustained control is done as part of wider predator control programmes (mustelids, possums, hedgehogs and rodents): this type of control occurs on an annual basis to keep populations at a lower number or manage ongoing reinvasion of feral cats living outside the area. Examples of sustained feral cat control operations include kiwi protection in Northland, shorebird protection at breeding sites (e.g. Chatham Islands), and Otago and Grand skink protection (e.g. Otago).
- Specific eradication of feral cats is done from offshore islands and fenced sanctuaries: examples include the eradication of feral cats from Raoul Island, Rangitoto & Motutapu Islands and Little Barrier Island (Campbell et al., 2011), and from the Zealandia and Maungatautari fenced sanctuaries (Burns et al., 2012).

The techniques used to control feral cats in both situations are similar, but control efforts undertaken during eradication campaigns are more intensive. Adequate high-level resourcing and financing are required for successful intensive predator management programmes.

5.3.1. Techniques Used to Control Feral Cats

Cats that are lethally controlled must be humanely treated and killed using effective and generally accepted strategies. Although considered pests, feral cats are covered by the same declaration of sentience under the Animal Welfare Act 1999 as companion cats. There are offences for wilful and reckless ill-treatment of wild animals or animals in a wild state under the Act that could be applied if a feral cat is treated inhumanely.

Lethal control techniques currently used to control feral cats in New Zealand include poisoning, trapping, and shooting. The relative humaneness, effectiveness, and practicality of all methods of feral cat control should be considered using the most current science and best practices. A brief explanation of techniques is given below. Detailed and up-to-date information is produced and regularly updated by DOC (Department of Conservation [DOC], 2024) and PestSmart (Centre for Invasive Species Solutions, 2016), and by the defunct National Pest Control Agencies (NPCA) (National Pest Control Agencies 2015a,b,c,d; see https://www.bionet.nz/library/npca-publications/ for these publications). For all techniques listed below, the variability within and between methods for how humane they are in controlling feral cat populations is discussed in each section.

Shooting

Lethally controlling animals by shooting is often considered a relatively more humane practice than other methods of control (Fisher et al., 2015; Littin et al., 2014). A humane shooting should result in the least amount of time between when the animal is shot and until it is insensible and dead (Aebischer et al., 2014; Sharp, 2012; Stokke et al., 2018). Evaluating the humaneness of shooting in the field is challenging because a shooter must assess the time to death from a distance (Hampton et al., 2015), animals vary in size which affects the time to death, and animals flee after being shot (Stokke et al., 2018).

An animal's flight distance after it has been shot is often used as a measure of the accuracy of a shooting (Hampton et al., 2015; Stokke et al., 2018). At least one study has attempted to define the relationship between time of death and flight distance to develop practical guidelines that hunters can use in the field to evaluate if they have humanely killed an animal (Stokke et al., 2018). However, these types of evaluation tools are new and not well-tested in the field, therefore, hunters should rely on current best practices for humanely shooting animals. Targeting an animal's brain, or lungs and heart is considered to bring about the quickest death (Sharp, 2012; Stokke et al., 2018). However, the distance between the shooter and the animal impacts the probability that an animal is killed when shot (e.g. the closer the distance, the higher the probability of a more humane kill; Aebischer et al., 2014; Hampton et al., 2015). Additionally, the more comfortable and less rushed a shooter feels increases the probability a shot will kill an animal (Aebischer et al., 2014). Best practices for ensuring a more humane shooting include:

- shooting is performed by trained, experienced, and skilled shooters;
- the animal can be identified clearly and seen before being shot;
- the correct firearm, ammunition, range, and shot placement are used;
- any wounded animal is promptly killed (Sharp, 2012); and
- if lactating cats are killed, then efforts should be made to find and humanely kill the surviving offspring (Sharp, 2012).

Due to a feral cat's behaviour to avoid humans, shooting them as a management technique is more likely to be successful when the cat is unaware of the person (Fisher et al., 2015). Shooting feral cats tends to be either opportunistic (during the day) or by spotlighting (at night) and can supplement trapping by targeting specific trap-shy animals (Parkes et al., 2014) or killing cats caught in traps (Fisher et al., 2015; Sharp & Saunders, 2012).

Trapping

Trap use in New Zealand is regulated by the Animal Welfare Act 1999 (New Zealand Government 1999). The Act sets out specific requirements for the sale and use of traps and devices. For example, traps intended to live-capture must be inspected every 24

hours and within 12 hours of sunrise each day the traps are set beginning immediately after the day the traps are first set. Traps are not required to be approved under the Animal Welfare Act. A trap can be developed and sold until it is regulated against (if required) – examples of such regulations are the Animal Welfare (Leg-hold Traps) Order 2009 and the Animal Welfare (Glueboard Traps) Order 2009.

Trappers should aim to minimise pain and distress when determining a method of killing cats following live trapping or in determining a choice of lethal trap. The method used should cause irreversible loss of consciousness and death as quickly and painlessly as possible. The choice of method depends on the confidence and skill of the operator, the species and age of the animal, and the situation (NPCA 2015a).

Three types of traps commonly used in New Zealand to manage feral cats include:

- Kill traps use bait to lure a cat into the trap; the trap is triggered when the cat touches the bait. The trap kills a cat without human intervention.
- Leg-hold traps catch and hold a cat by their leg until the cat is killed by a trap operator. An effective leg-hold trap must catch and restrain a cat while minimising injuries. The use of leg-hold traps is restricted through the Animal Welfare Act 1999 and the Animal Welfare (Leg-hold Traps) Order 2007.
- Cage traps use bait to lure a cat into a device from which they cannot escape; the cage door closes when a cat touches the bait or steps on a treadle. The cat remains in the cage until released or killed by the trap operator.

If a person is required to kill an animal that has been trapped, methods used should ensure the death is as quick and humane as possible to minimise welfare harms to the animal (AVMA, 2020; 2019; DOC, 2024; NPCA, 2015d). Human safety concerns should also be considered with any method chosen. In all cases, death should be confirmed afterwards and, if there is any doubt that the animal is dead, all methods should be followed by a secondary method to ensure death occurs. Drowning is never an acceptable killing method and is an offence under the Animal Welfare Act.

The Animal Welfare Act 1999 gives the National Animal Welfare Advisory Committee (NAWAC) a role in outlining and promoting best practices in the hunting and killing of wild animals (including pests). NAWAC can also recommend the issue of regulations to restrict or prohibit certain traps or devices on animal welfare grounds. NAWAC has developed a guideline for assessing the animal welfare impacts of traps (NAWAC, 2019) and manufacturers can opt to have their traps tested for welfare performance. The NPCA provides best practice guidelines for the use of kill traps to help trap operators undertaking feral cat control (NPCA, 2015a) or with leg-hold traps (NPCA, 2015b).

Traps can be assessed for their welfare performance to determine if they result in a more humane death (for lethal traps) or capture (for non-lethal traps). NAWAC has created

assessment guidelines using criteria that evaluate traps based on time to insensibility and death (lethal traps) and severity of injury (non-lethal traps); traps either pass or fail assessment (NAWAC, 2011). These assessments are available to inform trap operators of which traps will minimise the negative welfare impacts (Bionet, n.d.).

Poisoning

This technique involves placing poison bait on the ground by hand or into a bait station or broadcasting aerially. Poison can be used for all feral cat densities and in all habitat types. The use of poisons to control cats is strictly regulated in New Zealand. Currently, there are two poisons (Vertebrate Toxic Agents) registered for use in the control of feral cats in New Zealand: sodium fluoroacetate (1080) and para-aminopropiophenone/4-aminopropiophenone (PAPP). The use of poisons can be effective in reducing feral cat populations; however, the relative humaneness of this technique varies due to the severity and duration of what a cat experiences after ingestion (Littin et al., 2014; MAF, 2010).

Feral cat management will likely require ongoing attention due to the potential for cats to repopulate an area (Lazenby et al., 2015; Palmas et al., 2020).

5.3.2. Identifying and Protecting Sensitive Wildlife Areas from Cats

A strategic outcome of the National Cat Management Group is that sensitive wildlife areas are identified and protected from negative impacts from cats.

Identifying sensitive wildlife areas will help determine where cat management will be most ecologically valuable. Organisations such as DOC, Queen Elizabeth II Trust, and local authorities have programmes that identify and protect sites of high biodiversity (Predator Free New Zealand, 2016). The Greater Wellington Regional Council Key Native Ecosystems programme manages pests and threats at high biodiversity sites across the Wellington region, many in urban areas. The growing abundance of native species in those urban areas (Landcare Research, 2015) demonstrates the benefits of local pest control. The management of cats would complement existing pest control in these areas and greatly reduce the risk of predation for vulnerable native species.

Islands from which feral cats and other predators have been eradicated provide examples of what can be achieved when the impacts of introduced predators on native species are removed.

- Within six years of the eradication of feral cats and rats from Raoul Island, five locally extinct seabird species were breeding again on the island (black-winged petrel; Kermadec petrel; wedge-tailed shearwater; sooty terns; red-tailed tropicbird). Spotless crakes and the Kermadec parakeets had recolonised the island from nearby predator-free islands (Bellingham et al., 2010; Veitch et al., 2011).

- After cats were removed from Mangere Island in the Chatham Islands, Forbes parakeets and white-faced storm petrels recolonised the island (Bell & Bell, 2003; DOC, 2001). Chatham Island snipes were successfully reintroduced from Rangatira Island (Dowding et al., 2001).
- After cats were eradicated from Motuihe Island in the Hauraki Gulf tuatara were successfully introduced to the island (DOC, 2016).
- On Hauturu (Little Barrier Island), kokako, and tieke (saddleback) were released following cat eradication and have subsequently bred successfully (Bellingham et al., 2010). There was also an increase in the number of black petrels breeding on the island (Bellingham et al., 2010). However, the eradication of cats from Hauturu also highlighted the need to control other predators. Whilst the eradication of cats reduced cat predation of adult Cook's petrels, there was an increase in predation of Cook's petrel chicks and eggs by kiore (Polynesia or Pacific rat; Imber et al., 2003). Cook's petrel breeding success increased after kiore were eradicated from the island in 2004 (Bellingham et al., 2010).
- Following the eradication of cats and rats from Tuhua in 2000 the island has become a haven for threatened bird species from the mainland. North Island robins, pāteke (brown teal) and North Island brown kiwi have been released on the island, and all appear to be establishing successful breeding populations (Bellingham et al., 2010). Orange Fronted Parakeets/ kākāriki were also successfully introduced during 2009/10 (DOC, 2011).

The removal and exclusion of predators from sensitive wildlife areas ensures the safety of vulnerable native species in that area. Maintaining low numbers of cats or total elimination requires ongoing management at such sites. For example, 479 cats have been removed from the 1700 ha Pukaha/Mt Bruce buffer area in the northern Wairarapa since 2008. With continued intensive management of the site, the total number of captured cats fluctuates between 50 to 90 cats per annum, with a total of 79 captured and humanely killed in 2014/15 (pers comm Simon Kelton, DOC, 2016). Predator exclusion fences such as the fence surrounding Wellington's urban sanctuary Zealandia can be useful in preventing the reinvasion of excluded species, however, they are expensive to build and maintain and are restricted by land use and geography. Unfenced mainland islands such as Pukaha, which use intensive trapping and poisoning to protect the site, struggle with re-invasion (pers comm Simon Kelton, DOC, 2016).

Urban and suburban habitats are important habitats for birds and other native animals (Angold et al., 2006; Longcore et al., 2009; Pennington et al., 2008; Seewagen & Slayton 2008; Tratalos et al., 2007). Sites that retain native species (such as bush, wetland or coastal remnants) are often found on urban fringes and in rural locations and may also be near housing and development (Farnworth et al., 2013b). Introduced birds and mammals are prevalent in built-up areas and some of these species such as rats, mice, rabbits, and introduced bird species are commonly targeted by cats (Farnworth et al., 2013b; Gillies &

Clout, 2003). The presence of cats will likely exacerbate local species decline in areas where vulnerable, native wildlife persist, and, consequently, cat management is necessary to mitigate these negative effects. Managing cats to protect native wildlife should be part of a comprehensive predator control programme that targets multiple species of mammalian predators (Farnworth et al., 2013b; Glen et al., 2023; Mills et al., 2018; Monks et al., 2023).

6. Humane and Effective Legislative and Regulatory Framework for Cat Management in New Zealand

A strategic goal of the National Cat Management Group is to support humane and effective cat management through an appropriate legislative and regulatory framework.

6.1. Current Framework

A strategic outcome of the National Cat Management Group is for responsible agencies to be identified to implement legislative and regulatory requirements.

The Animal Welfare Act 1999 (the Act) is the main piece of legislation relating to the welfare of animals in New Zealand. It establishes the fundamental obligations relating to the care of animals. Under the Act, owners and persons in charge of animals are required to meet the physical, health, and behavioural needs of the animals in their care in accordance with good practice and scientific knowledge.

The codes of welfare expand on the basic obligations of the Act by setting minimum standards and recommending best practices for the care and management of animals. Codes of welfare also reference regulations issued under the Act. Regulations impose enforceable requirements on owners and persons in charge of animals.

The current key legislation relating to cat management in New Zealand are:

- Animal Welfare Act 1999
    a. Code of Welfare: Companion Cats 2018
- Biosecurity Act 1993
- Conservation Act 1987
- Wildlife Act 1953
- National Parks Act 1980
- Local Government Act 2002

The New Zealand Council Bylaws that include cats are summarised in Section 5.2.2. Please see Gepp, (2019) and Sumner et al. (2022) for a more in-depth discussion of legislation and cat management in New Zealand.

6.2. Improving the Legislative and Regulatory Approach

6.2.1. National Cat Act

A strategic outcome of the National Cat Management Group is the implementation of a National Cat Management Act.

This will allow for mandated, comprehensive, and consistent implementation of nationwide humane management of all cat populations in New Zealand. An appropriate national legislative framework should include measures to:

- protect the welfare of cats (particularly where lethal management methods are used); and
- mandate responsible cat ownership and caretaking to minimise the impacts of cats on native wildlife and nuisance in communities.

Most surveyed members of the New Zealand public (78%) support a national cat management strategy (Walker et al., 2017).

There have been efforts to progress national cat legislation in New Zealand. In 2017, Local Government New Zealand (LGNZ) passed a remit (51% in favour) supporting lobbying Government for a national cat management plan and allowing territorial authorities regulatory power to protect native wildlife by promoting responsible cat ownership, including desexing (LGNZ, 2017). However, Government failed to progress national cat management.

More recently, in response to a petition by a member of the public, the Environment Select Committee released their report in August 2023 recommending Parliament to develop legislation for nationwide cat management including requiring companion cats to be desexed, microchipped, and registered with appropriate exemptions (Environment Committee, 2023). In October of 2024, the Government responded to the Environment Committee report that whilst it acknowledges the growing interest in cat management, it would not pursue national legislation at this time (Parliament, 2024, Sept 27).

In December 2024, the Domestic Cat Microchipping Bill was launched as a cross-party bill, that would require all cats in New Zealand to be microchipped, and their microchip registered on a national database (Sharpe, 2024). It remains to be seen how this bill will progress through parliament.

It is beyond the scope of this report to review the international legislation related to cat management. Appendix E provides further information and related links.

6.2.2. Bylaw Alignment with National Legislation

A strategic outcome of the National Cat Management Group is for local legislation to support national legislation for cat management.

Nuisance is the main mechanism used by Local Authorities to manage cat numbers under existing Animal Bylaws (See Section 3.1.2 for further discussion). Local Authorities that do not manage cats have said that the lack of complaints about cats indicates action is unnecessary. In areas where complaints to local councils are low, it could be that these complaints are received by animal welfare organisations rather than local councils.

Currently, the ability to enforce bylaws related to cat management is difficult. Council bylaws have limitations upon the detection of noncompliance as the penalty is upon conviction in court. Enforcement begins with advice to the owner from a compliance officer that a breach of the bylaw has been detected, and in some cases the issuing of a notice to comply within a given timeframe. If this timeframe is not met and the owner is still non-compliant, the enforcement officer can continue to request that the owner comply with the bylaw or can escalate to prosecution in court where upon conviction, the owner can be fined $20,000. Prosecution at court is costly in time and money for councils; therefore, it is extremely unlikely to be pursued.

The penalty for non-compliance with the animal bylaws made by New Zealand councils is set in Section 239 of the Local Government Act and currently sits at a fine, upon conviction, not exceeding $20,000. A fine of $20,000 for failing to desex or microchip your cat seems excessive, but there is no middle ground available to councils for enforcement.

Limits on the number of cats

Limiting the number of cats that can be kept at a residence attempts to reconcile the conflicting interests of companion cat owners with property owners and cat nuisance issues. It is also sometimes discussed as a measure to manage overall cat numbers.

New Zealanders show a high level (70%) of support for limits to be placed on the number of cats owned per household (Walker et al., 2017) and many local councils impose a standard maximum limit of two to five cats per household. Table 2 outlines Local Authorities with bylaws that limit cat numbers allowed to be kept on a property or by an individual in place.

Table 2: Local Authority Bylaws limiting the number of cats allowed to be kept on a property or by an individual.

Local Authority	Number of Cats
Buller District Council	2
Carterton District Council	3
Hastings District Council	2-4 (depending on residence type)
Invercargill City Council	3 (if creating a nuisance)
Kaipara District Council	5
Mackenzie District Council	2
Manawatū District council	4
Marlborough District Council	4
Masterton District Council	3
New Plymouth District Council	3
Palmerston North City	3
Rangitikei District Council	3
Ruapehu District Council	4
South Waikato District Council	5
South Wairarapa District Council	3
Southland District Council	5 (if creating a nuisance)
Tararua District Council	3 (if creating a nuisance)
Wairoa District Council	3
Whanganui District Council	3

Restrictions on the number of cats allowed per household may also assist in preventing cases of animal hoarding and help prevent the establishment of kitten farms/mills. Where there are no strict cat containment regulations, having fewer cats should also result in lower predation (van Heezik et al., 2010). There are no reports of assessment of specific outcomes for the restriction on the number of cats that can be kept.

Mandatory identification

Requiring cats to be microchipped through a bylaw was first introduced in New Zealand, in Wellington City, where all cats over the age of 12 weeks are required to be microchipped and registered on the New Zealand Companion Animal Register (Wellington City Council, 2024b). Since then, there has been a steady increase in councils that require cats to be microchipped. See Table 3 for a list of local council bylaws that require companion cats to be microchipped.

Table 3: Local councils with bylaws requiring cats to be microchipped.

Council (year)	Microchipping requirements
Wellington City (2024)	All cats over the age of twelve weeks must be microchipped and registered on the New Zealand Companion Animal Register.
Palmerston North City (2024)	All cats over six months of age and born after the 1st of July 2018 must be microchipped and registered on the New Zealand Companion Animal Register.
Whanganui District (2020)	Any cat over four months of age is required to be microchipped and registered with the New Zealand Companion Animal Register.
Selwyn District (2021)	Every person who keeps a cat over the age of four months is required to microchip and register the cat with the New Zealand Companion Animal Register or other approved registry.
Whangārei District (2022)	Any cat over six months of age must be microchipped, and the microchip registered on the New Zealand Companion Animals Register.
Ruapehu District (2022)	Every person who keeps a cat that is over six months must ensure they are microchipped, and the microchip is registered on the New Zealand Companion Animal Register or other Council approved microchip registry.
Buller District Council (2023)	Any cat over six months of age must be microchipped, and the microchip registered on the New Zealand Companion Animal Register.
Hutt City Council (2024)	Every person who keeps cats must ensure they are microchipped by twelve weeks of age or older and registered on the New Zealand Companion Animal Register.
Tararua District Council (2024)	Every cat over four months old must be microchipped and the microchip registered on the New Zealand Companion Animal Register.
Tasman District Council (2024)	Domestic cats over the age of six months must be microchipped and registered with the New Zealand Companion Animal Register.
Nelson City Council (2024)	Any cat over four months must be microchipped and the microchip registered with the New Zealand Companion Animal Register.

The presence of a microchip may be used as a determinant of ownership in an area where there are bylaws related to managing cats. Auckland Council's Regional Pest Management Plan defines an unowned cat as not microchipped or otherwise identifiable as owned and found at sites with native wildlife with a threatened species status (Auckland Council,

2020). Gisborne Council's Regional Pest Management Plan distinguishes a feral cat as one without a microchip (or collar/harness) found outside of the urban area or rural township (Gisborne Council, 2017). The Greater Wellington Regional Council's Regional Pest Management Plan defines a pest cat as not microchipped in areas where it is compulsory or not registered on the New Zealand Companion Animal Register and is free-living (Greater Wellington Regional Council, 2019). Wellington City Council's recently passed Animals Bylaw includes a provision that stray cats found freely roaming may be humanely captured by an Authorised Officer and held for seven days, after which, the cat may be microchipped (Wellington City Council, 2024b).

A survey with the New Zealand public found that 66% supported mandatory microchipping of cats (Walker et al., 2017). Potential issues that need consideration before introducing mandatory identification include:

- the (usually unintended) effect of an increase in the killing of stray cats and cats with owners who do not comply with the law if they are trapped in areas where pest management occurs, and microchips are used to distinguish unowned cats from owned cats; and
- the need to ensure the bylaw is worded to make it illegal for someone to care for a stray cat without taking full ownership (for example, by registering and microchipping the cat). This discourages people from caring for stray cats and, if the person knows that the cat is likely to be killed if taken to a shelter, they may opt to do nothing (Zito, 2015).

Bylaws requiring cats to be microchipped are relatively new, and it will take time to see how they motivate cat owners. However, the recent Companion Animals in New Zealand Report indicates that 6% of survey respondents who have microchipped their cat have done so because there is a new bylaw requiring the practice (CANZ, 2024).

Mandatory desexing

Mandatory desexing helps reduce cat overpopulation related to the unplanned breeding of companion cats. The New Zealand public's support for implementing mandatory desexing is reported to be greater than 58% (Walker et al., 2017).

Mandatory desexing of cats is primarily regulated through local bylaws, with Southland Regional Council using their Regional Pest Management Plan to require the desexing of all companion cats on Stewart Island and all Bengal cats kept as companions in the Southland Region (Environment South, 2019). In July 2018, mandatory desexing was implemented for the first time in New Zealand by the Palmerston North City Council and applies to all cats over four months of age, born after the 1st of July 2018: exemptions are in place for registered breeders (Palmerston North City Council, 2024). Since then, there has been a

steady increase in councils that require cats to be desexed. See Table 4 for a list of local council bylaws that require companion cats to be desexed.

Table 4: Local councils with bylaws requiring cats to be desexed.

Council (year)	Desexing requirements
Wellington City (2024)	All domestic cats over six months must be desexed (exemptions for registered breeders or to protect the cat's health and/or welfare).
Palmerston North City (2024)	All cats over four months of age, born after the 1st of July 2018 must be desexed (exemptions in place for registered breeders).
Manawatu District (2019)	Every person who keeps cats must ensure cats over six months are desexed (exemptions for registered breeders).
Whanganui District (2020)	Any cat over four months of age is required to be desexed (exemptions for registered breeders or to protect the cat's health and/or welfare).
Whangārei District (2022)	Any cat over six months of age must be desexed (exemptions for registered breeders or to protect the cat's health and/or welfare).
Ruapehu District (2022)	Every person who keeps a cat that is over six months must ensure the cat is desexed (exemptions for registered breeders or to protect the cat's health and/or welfare).
Buller District Council (2023)	Any cat over six months of age must be desexed (exemptions for registered breeders or to protect the cat's health and/or welfare).
Hutt City Council (2024)	Every person who keeps cats must ensure they are desexed by twelve weeks of age or older (exemptions for breeders or to protect the cat's health and welfare).
Tararua District Council (2024)	Every cat over four months old must be desexed.
Tasman District Council (2024)	Domestic cats over the age of six months must be desexed (with exemptions in place for registered breeders or to protect the cat's health or welfare).
Nelson City Council (2024)	Any cat over four months of age must be desexed (with exemptions for registered breeders or to protect the cat's health or welfare).

Mandatory desexing legislation has predominantly been enacted in the USA and Australia where requirements differ in the various localities (see Appendix E for more information). Some localities in the USA require that rehoming agencies (e.g., pounds, animal shelters) desex cats and kittens before placement in a new home (Hodges, 2010).

It is difficult to find evaluations of mandatory desexing legislation or regulations. Data from the RSPCA Australian Central Territory [ACT] from 2001–2007 showed no positive impact associated with introducing mandatory desexing in the Australian Capital Territory (Hayward, 2007). Trends in cat intake and euthanasia in the RSPCA ACT shelter paralleled those in New South Wales [NSW] (which has no mandatory desexing legislation) and Australia as a whole (Hayward, 2007).

Bylaws requiring a cat to be desexed are relatively new, and it may take time to observe their impact in motivating owners. However, the recent Companion Animals in New Zealand Report indicates that 2% of survey respondents who have desexed their cat have done so because there is a new bylaw requiring the procedure (CANZ, 2024).

Concerns with mandating desexing include:

- The legislation is difficult to enforce or inconsistently enforced (ASPCA, n.d.; AVA, 2017).
- It does not address the root causes of animals ending up in shelters (ASPCA, n.d.; AVA, 2017; AVMA, 2019).
- Desexed animals are difficult to identify (ASPCA, n.d.).
- There are decreasing numbers of cats in these countries (indicating other mechanisms are working) (ASPCA, n.d.; AVA, 2017).
- There are increases in the number of animals surrendered to shelters and disproportionately target owners or lower economic status (ASPCA, n.d.; Crawford, 2019; Romagnoli et al., 2024).

A lack of enforcement is one of the main reasons why mandating the desexing of cats would not lead to the intended outcomes of reducing the number of unplanned litters of kittens born to companion cats (Fossati, 2022).

Mandatory desexing is considered beneficial in areas where a high number of cats entering animal shelters/pounds are unwanted kittens from owned cats or owned adult cats surrendered because of unplanned breeding. Concern has been expressed that there is no evidence to support current mandatory desexing laws leading to a reduction in the number of cats entering shelters (AVA, 2017; ASPCA, n.d.). However, Zanowski (2012) discussed that mandatory desexing laws have led to success in reducing the number of cats entering shelters, but only when coupled with licensing requirements that provide incentives to desex. The cost of the procedure is the primary reason for owners not desexing their companion cats in New Zealand (see CANZ, 2025), hence coupling legal requirements with financial support is more likely to effectively address cost as a barrier.

Registration

Registering cats allows local governments to monitor and enforce animal-specific laws such as limits on cat numbers, breeding regulations, mandatory identification, and desexing (Gepp, 2019). Registering cats also provides a cost-recovery for the enforcement of cat-related bylaws.

At least one study has shown that 61% of New Zealanders consider registration important for owned cats, although cat owners are generally less supportive than non-owners (Walker et al, 2017). Another study found registering cats (like dogs) was less likely to be adopted by cat owners, thought to have only an intermediate impact on cat welfare, and thought to have trivial conservation value compared to other behaviours such as keeping cats inside at night (Linklater et al., 2019). The benefits of mandatory registration may not be clear if it is implemented in addition to mandatory identification (e.g., microchipping). On the other hand, income from cat registrations could be allocated to support community initiatives such as desexing, microchipping or cat containment. Uptake of these initiatives could then provide useful measures to assess the impact of registration.

Breeding regulation

Cat breeding regulation allows for the mandatory registration of breeders and the need for breeders to comply with a breeder welfare code (European Platform on Animal Welfare [AW Platform], 2020; Fossati & Ruffo, 2021). Breeding regulations may assist in addressing the problem of kitten farming/ kitten mills and other poor practices that compromise cat welfare and health. Breeding regulations can require breeders to meet minimum standards of care and containment for cats and limit the number of cats kept for breeding and litters born (European Platform on Animal Welfare [AW Platform], 2020; Fossati & Ruffo, 2021; Zanowski, 2012). Breeder regulations may indirectly reduce cat overpopulation and predation on wildlife and promote responsible pet ownership when regulations are effectively enforced and include breeder traceability and requirements for microchipping and prepubertal desexing of kittens.

Keeping cats at home

No legislation in New Zealand requires owners to keep their cats at home (Gepp, 2019; Somerfield, 2019; Sumner et al., 2021). In at least one case, a local bylaw compelled a cat owner to keep her cat at home due to the cat causing a nuisance in the neighbourhood (Hart, 2023).

Some areas in New Zealand have created restrictions on allowing people to keep companion cats (Gepp, 2019). Bengal cats are prohibited from being kept on Stewart Island as companion animals (Southland Regional Council, 2019). It is prohibited to keep

companion cats in a newly developed residential area of Hamilton that is also home to short-tailed bats (Environment Court, 2021).

Containing cats indoors is considered the most impactful for New Zealand biodiversity value, with containing cats in an enclosure, on the property via a fence and inside at night providing decreasing conservation value (Linklater et al., 2019). A requirement to contain cats on an owner's property may not prevent cats from killing wildlife on the property and presents a limitation to the effectiveness of cat containment. Containment within a New Zealand context needs to consider that cats hunt mostly during the day (Metsers et al., 2010), and prey hunted at night is likely introduced animals such as rodents (van Heezik et al., 2010).

There are a few areas in Australia where full or partial containment of cats is required. In these areas, cats are often required to be on a leash or within an enclosure. For example, in the Australian Capital Territory (ACT) a 24-hour containment regulation is in place across seventeen suburbs for cats born before 1 July 2022 and across all suburbs for cats born on or after 1 July 2022 (ACT Government, n.d.). Anecdotally, no cat attacks on wildlife have been reported to the RSPCA ACT since the enactment of this regulation (RSPCA, 2018). Compliance with regulations relating to the confinement of cats at night is largely unknown but at least some reports indicate it varies between 32–80% in Australia (Toukhsati et al., 2012b) making assessment of its effectiveness difficult.

7. Improving the Educative and Public Engagement Approach

A strategic outcome of the NCMG is for humane cat management to be supported through a comprehensive public engagement framework.

An educative framework will include different approaches to cat management based on the cat category and community support. Common methods used by Government to motivate community behaviours include legislation, regulation, penalties, taxes, and subsidies. Other methods that improve cooperative community behaviour change (Head, 2008), such as education and community awareness programmes (Toukhsati et al., 2012a) can also be successful. A more collaborative and encouraging approach to engage stakeholders would be a shift from more punitive and negative measures such as penalties and taxes.

7.1. Encouraging Responsible Cat Ownership

Responsible cat ownership comprises two different elements: firstly, and preferably, owners voluntarily doing the right thing; and, secondly, enforcement of responsible cat ownership requirements through legislation.

It is important to increase awareness of the benefits of responsible ownership behaviours with positive impacts on cat welfare such as providing appropriate environments for cats that allow them to express their natural behaviour for cats (Toukhsati et al., 2012b; Ellis et al., 2013a, b). Presenting information in a logical, myth-debunking approach is typically the most common way to share information (McLeod et al., 2017b). More effective strategies to motivate behaviour change are underused including choosing a trusted messenger to deliver the information, framing messaging with an emphasis on gains rather than loss and local significance, and a focus on values, goals, social norms, and compelling stories can improve uptake of information for behaviour change (McLeod et al., 2017b).

Successfully changing human behaviour related to managing companion cats will also require an understanding of the behaviour, the audience, which type of action will best suit the behaviour targeted, and the need for evaluation to determine if and why success is achieved (McLeod et al., 2019). Increasing public understanding of the importance and benefits of responsible cat ownership will involve consistent public messages, including messages about the legal requirements for cat owners; these messages need to come from government and animal welfare organisations, education programmes in schools and social marketing campaigns.

7.1.1. Identification

Microchipping

Microchipping is a well-supported management tool for cats in New Zealand, with almost 66% of the public in favour of a national requirement for mandatory microchipping (Walker et al., 2017). The number of owners reporting their cats are microchipped has increased to 72% (CANZ, 2025), however, this still leaves over a quarter of all companion cats and nearly all stray cats without a reliable means of identification.

The main barriers to microchipping include not feeling it is necessary and the cost of the procedure (CANZ, 2025). Additionally, cat owners did not microchip their cats because they had not prioritised it, they were unaware cats could be microchipped, it is not legally required, they have indoor-only cats, or it was not recommended by a veterinarian (CANZ, 2025).

The primary issue with microchip reliability is that owners must keep their cat's information updated if contact details change (Lancaster et al., 2015). The microchip failure rate is extremely low (0.1%) and often due to implant error (New Zealand Companion Animal Register [NZCAR], 2019). NZCAR does not allow the registration of microchips from implanters without some form of implant qualification (NZCAR, 2019). A microchip may appear to fail due to migration of the chip within the animal, low battery level in scanners, low-quality scanners, scanning too quickly, and metal near the scanner (Lord et al., 2008). Migration occurs in less than 0.6% of cases (Lord et al., 2010). Migration should not affect the scanner's ability to read the microchip if a robust scanning technique is used.

The risk of tumour growth associated with the presence of the microchip is extremely low (Daly et al., 2008; Carminato et al., 2011) and may be associated with concurrent vaccination, long-acting injectable medications, or any cause of chronic inflammation (Day et al., 2016; Kass et al., 2003; Srivastav et al., 2012; Vaccine-Associated Feline Sarcoma Task Force, 2005; Woodward, 2011). The WSAVA Microchip Committee has concluded that the benefits of microchip implantation far outweigh the potential health risks, as the development of tumours at microchip implantation sites appears to be a rare event (WSAVA, n.d.). Other complications associated with microchipping are extremely rare and include the inappropriate placement of a microchip into the spinal canal (Platt et al., 2007).

Collars

Collar use does not appear to be a popular management technique with studies reporting collars to be worn by only approximately 1/3 of all owned cats in New Zealand (27.1%, Gates et al., 2019; 35.9%, Harrod et al., 2016). Owners' reasons for not using collars include cat

intolerance of collars, repeated collar loss, and concern over collar safety (Harrod et al., 2016).

Cats that wear collars should be observed to determine if there are negative impacts on the cat (Arhant et al., 2022; Lord et al., 2010). Collar injuries and deaths are rare, and the benefits of identification and reduction in predation outweigh the risks to the cat (Arhant et al., 2022; Calver et al., 2013). Cats can become injured if their collar is not designed to break away when it is entangled in an object or a body part (Calver et al., 2013). A collar should be sufficiently snug around the cat's neck to reduce the possibility of it catching on objects such as vegetation. Collars that are too loose around the neck can be a hazard, as the cat may get a front leg or lower jaw caught through the collar, with potentially severe consequences (Calver et al., 2013). Two fingers should fit snugly between the collar and the cat's neck (Arhant et al., 2022; Lord et al., 2010).

7.1.2. Desexing and Prepubertal Desexing

New Zealand has consistently had a high rate of owners desexing their cats. Recent survey work indicates 96% of owners desex their cats, which is an increase from 88% reported previously (CANZ, 2025) but more consistent with earlier reports (93.2%; Gates et al., 2019 and 93%; New Zealand Companion Animal Council, 2016). Despite the high rate of desexed companion cats in New Zealand, the age at which cats are commonly desexed and if they had a litter of kittens before desexing is unknown. A proportion of New Zealand cat owners think it is important for their cats to have a litter of kittens before being desexed (CANZ, 2020; Gates et al., 2019). In Australia, between 12-20% of cats have a litter before they undergo the desexing procedure (Jupe et al., 2017). Less than 50% of cats under two years of age are desexed compared to more than 93% aged over two years desexed (Johnson & Calver, 2014).

Pre-pubertal desexing of cats is supported by numerous veterinary associations including the New Zealand Veterinary Association (NZVA), the American Veterinary Medical Association (AVMA), the Australian Veterinary Association (AVA), and the British Veterinary Association (BVA). Four to five months is considered the optimal age in Australia and New Zealand for desexing owned companion cats (Jupe et al., 2017). The AVMA endorses the recommendation of the Veterinary Task Force on Feline Sterilization Recommendations for Age of Spay and Neuter Surgery (2016) that companion cats not intended for breeding are desexed by 5 months of age.

Pre-pubertal desexing is not a universally accepted practice among New Zealand veterinarians (Farnworth et al., 2013a; Yates et al., 2013) with concerns related to the risks and long-term health complications (Jupe et al., 2017). Additionally, veterinary students in Australia and New Zealand do not commonly graduate with the knowledge and skills to perform pre-pubertal desexing (Jupe et al., 2017). The scientific literature shows pre-

pubertal desexing can be safely performed from 6 weeks of age (Howe, 2015), with no difference in health and behaviour outcomes for cats desexed before and after 12 weeks (Howe et al., 2000; Spain et al., 2004).

Veterinarians are an important link in communicating with cat owners and ensuring that owned kittens are desexed before reproductive maturity (Fournier & Gellar, 2004; New et al., 2000; Stavisky, 2014; Welsh et al., 2014). Encouragement of veterinarians to accept prepubertal desexing and training to ensure that they are comfortable delivering this service is important (Farnworth et al., 2013a; Yates et al., 2013). International reports suggest that pre-pubertal desexing is increasing, for example, 70% of veterinarians in British Columbia are reported to perform the procedure (Sherwood et al., 2019).

7.1.3. Accessible Desexing Schemes

The high intake of cats into animal shelters and welfare organisations is impacted by the failure to increase the desexing rate of cats living in low-income households and stray cats with a human care provider (Marsh, 2010; Toukhsati et al., 2007; Zito, 2015). In New Zealand, 93.2% of cats are reported by their owners to be desexed, with the most common reason for not desexing being cost (Gates et al., 2019). In the US and Australia, 90% of desexed cats live in higher-income households (Marsh, 2010; Toukhsati et al., 2007). Cat surrender has been associated with lower socio-economic status (Zito et al., 2016a) and several studies have identified lower desexing rates among owner-surrendered cats (Alberthsen, 2014; Alberthsen et al., 2013; Marston & Bennett, 2009). These findings suggest a need to provide access to affordable desexing (Gates et al., 2019).

Anecdotally reported success stories for free or low-cost subsidised desexing programmes include:

- Snip ‘n’ Chip, subsidised desexing and microchipping scheme, New Zealand (Royal New Zealand Society for the Prevention of Cruelty to Animals, 2024)
- National Desexing Network, Australia (National Desexing Network, 2024)
- Operation Wanted, RSPCA QLD, Australia (RSPCA QLD, 2017)
- Getting to Zero (G2Z), Gold Coast City Council, Australia (Getting to Zero, 2024)

Historically, veterinarians have provided a desexing service at a substantially reduced rate to encourage people to desex their pets.

Characteristics common to successful desexing initiatives include:

- Caretakers with genuine needs receive help. Several criteria are used to decide who can access these desexing programmes including income targeting, geographic targeting, and programmes for senior citizens.

- Programmes are accessible to caretakers, including consideration of transportation of cats to the surgery location. Options include providing services through a network of private veterinary clinics, a mobile surgical unit, or transport of cats to a fixed-site clinic. Ancillary services such as transportation for cats to and from surgery appointments are crucial in assisting low-income cat owners.
- There is enough funding to desex large numbers of animals from lower socio-economic households every year for several years. It has been reported that desexing five pets from lower socio-economic households every year for every 1,000 residents will significantly reduce local animal shelter intake and euthanasia rates. However, this progress can quickly be reversed if the programme cannot sustain that volume over the long term (Marsh, 2012).
- Programmes are time limited. Desexing programmes that are available to all cat owners, and broadscale high-profile promotions and incentives are likely to increase uptake (Robbins et al., 2018).

7.1.4. Keeping Cats at Home

Community acceptance for cat containment varies; some studies show broad support (Elliot et al., 2019; Loyd & Hernandez, 2012; Sherwood et al., 2019; Toukhsati et al., 2012b) and others a lack of support, or even opposition (Sharp & Saunders, 2012; Travaglia & Miller, 2018). New Zealand studies report 41% - 48% of interviewees support confinement to the owner's property at certain times; night-time confinement being the most supported, and non-cat owners show higher support than owners (Gates et al., 2019; Linklater et al., 2019; Woolley and Hartley, 2019; Walker et al., 2017).

Containment techniques likely to result in higher effectiveness for conservation (e.g., 24-hour cat confinement) are less likely to be adopted by cat owners and often not supported by veterinarians (Linklater et al., 2019).

Success in increasing the number of New Zealand owners who keep their cats at home will require a better understanding of how containment, when viewed as a restriction on providing their cat with choices, impacts their relationship with their cat and their cat's welfare (Ovenden et al., 2024). Owners perceive barriers to containment including confidence that they can effectively contain their cat; relevant knowledge and skills to keep their cat contained; belief that containment will diminish their cat's quality of life; belief the cats' physical and psychological needs cannot be met in a contained space; belief that it is unethical to keep a cat contained; and financial capacity to implement containment, (i.e. for outdoor containment strategies) (Crowley et al., 2019; Woolley and Hartley 2019; et al., 2015; Mcleod et al., 2020).

Cat owners likely underestimate how far from home their cat travels. GPS tracking of cats reveals they often travel much greater distances than owners are aware, and owners place

increased importance on day-time confinement after learning the extent of travel (Roetman et al., 2018).

To overcome these barriers and ensure well-being in areas where cat containment regulations are proposed, cat owners should be aware of how to provide a suitable environment that meets their cat's needs and promotes positive cat welfare (Loyd & Hernandez, 2012; Toukhsati et al., 2012b).

Messaging framed through a 'cat benefit' lens elicited changes in Australian cat owners' containment intentions and adoption of behaviour (McLeod et al., 2017b). Targeted information that can increase the understanding of the risk associated with cats being outside, may prove more useful in the adoption of cat containment to mitigate risk (Gramza et al., 2016; McLeod et al., 2017a). Campaigns should use veterinarians to advocate messages to emphasise the benefits to companion cats of being inside and the positive impact on the owner (MacDonald et al., 2015).

7.1.5. Enriched Environments and Exercise

Surveys have found that owners provide environmentally appropriate homes for their cats to some extent (Alho et al., 2016; Lawson et al., 2020; Strickler & Shull, 2013). However, at least one study has found that owners are not meeting their cat's needs in confined home environments (Lawson et al., 2020).

Attitudes towards the importance of exercise and enrichment have shifted for New Zealand cat owners. In 2020, only just over half of cat owners in New Zealand thought exercise and enrichment are important (CANZ, 2020). However, recent survey work has indicated that 85% of owners that keep their cats indoors with controlled access outdoors and 71% that allow their cats to have uncontrolled access outdoors felt exercise is very or quite important (CANZ, 2025). Similarly, cat owners felt the same about providing enrichment (85% for owners providing controlled access outdoors, 69% for owners providing uncontrolled access outdoors. That fewer owners who allow their cats uncontrolled access outdoors think exercise and enrichment are important may reflect that owners think their cat gets enough exercise and enrichment whilst outdoors (Ovenden et al., 2024). Even if a cat has access to the outdoors, exercise and enrichment are essential for cat welfare.

Cats are at welfare risk if they cannot engage in behaviours that are important to them such as foraging, hunting, climbing, perching, hiding, socialising, scent-marking, and scratching, and also help prevent boredom, reduce the risk of developing unwanted behaviours, and facilitate weight management (Boissy et al., 2007; Cisneros et al., 2022; Ellis et al., 2013; Lawson et al., 2020; Rochlitz, 2005; Herron & Buffington, 2010; Rochlitz, 2005; Stella & Croney, 2019; van Der Leij et al., 2019; Wagner et al., 2018a, 2018b). Cats

confined in an unsuitable environment with minimal provision for adequate exercise are at risk of suffering from poor health, depression, and behaviour problems (Amat et al., 2009, 2016; Ellis et al., 2013; Herron & Buffington, 2010; Zoran & Buffington, 2011).

All cats should be given regular opportunities to forage, explore, and play (Ellis, 2009; Ellis et al., 2017; Ellis & Wells, 2010; Herron & Buffington, 2010). This can be facilitated in numerous ways, such as:

- by providing hideouts, tunnels (Ellis, 2009; Herron & Buffington, 2010);
- using treat balls, placing food around the home or enclosure, and having toys that simulate chasing and stalking will encourage natural hunting behaviours (Ellis, 2009);
- through human interaction, for example through training or playing with toys, can also be enriching for cats. Interactions between cats and humans should be on the cat's terms, and they should be able to end them at any point (Ellis et al., 2013; Rehnberg et al., 2015); and
- training cats to facilitate normal behaviours such as exploration (Bollen, 2015) which may be a feasible option for supervised access outdoors where no other options exist.

Toys and furniture should be switched around to provide cats with novelty and variety (Rochlitz, 2005). However, care should be taken to not entirely remove items or clean areas so that their scent markings are removed (Ellis et al., 2013).

Promoting play behaviour can promote positive interactions between cats and people (Henning et al., 2023; Kogan & Grigg, 2021). Play periods do not need to be long (15 minutes daily), and the quality or variety of play (not simply quantity) may be associated with positive welfare outcomes for cats (Henning et al., 2022).

7.2. Public Engagement on the Negative Impacts of Cats on Biodiversity

The impact of feral cats on wildlife is well documented (Clancy et al., 2003; Clarke & Pacin, 2002; Jöchle & Jöchle, 1993; Patronek, 1998; Woods et al., 2003) and generally accepted by the public, however, the impact of companion cats on wildlife is less well recognised and accepted (Loss et al., 2018). A New Zealand study found members of the public were mostly concerned about the impacts of feral cats, unmanaged strays, and colony cats on native and non-native wildlife (Walker et al., 2017). While the prey intake of feral cats is approximately four times that of a companion cat, cats that receive food (directly or indirectly) from humans in the urban environment still hunt (Farnworth et al., 2013b). Although companion cats vary in their hunting activity levels and patterns, unrestricted, outdoor access facilitates predation of wildlife (Farnworth et al., 2013b; Loyd et al., 2013a).

In addition to the negative impact of predation on wildlife, all cats can transmit the *T. gondii* to wildlife causing mortality and morbidity in native species (Howe et al., 2014).

A survey of New Zealanders' (N=1011) attitudes towards cat predation and management found the majority (82-86%) of respondents expressed concern regarding the predation of native wildlife by feral and stray cats and a high number (69%) of respondents also expressed concern regarding predation by owned cats (Walker et al., 2017). Fewer participants (38-60%) were concerned about the cat predation on non-native wildlife, suggesting a higher value placed on native species (Walker et al., 2017).

Restricting cats from roaming through containment can protect wildlife, however, campaigns designed to encourage containment will be more successful if they concentrate on the welfare benefits to cats, or a combination of welfare benefits for cats and wildlife, rather than focusing solely on the benefits in terms of wildlife protection (Woolley and Hartley, 2019; Hall et al., 2016b; Toukhsati et al., 2012b; McLeod et al., 2015; McLeod et al., 2017b). Cat containment (indoors or on the owner's property), when proposed as a solution to the issue of cat predation on wildlife, received low support (25%) from New Zealand cat owners (Woolley and Hartley, 2019) reinforcing the need to concentrate on how containment benefits individual cat welfare.

In a 2018 study, 512 Australian cat owners, who did not contain their cats, were randomly assigned to view one of three short video messages: one framed to highlight the negative impact of cats on wildlife and biodiversity ('wildlife protection' frame), one framed to highlight the health and safety benefits of keeping cats contained ('cat benefit' frame), and a control message focused on general information about cats ('neutral' frame). The results revealed that both the 'wildlife protection' and 'cat benefit' messages increased owners' motivation to contain their cats and their beliefs that they could effectively contain their cats to achieve the desired outcomes (McLeod et al., 2017b). Studies (McLeod et al., 2017b; Toukhsati et al., 2012b) demonstrate the relationship between beliefs and related behaviour; people who believed that cat containment was important (to protect their cats and wildlife) were most likely to contain their cats or report intentions to implement a cat containment solution and adopt containment behaviour.

7.3. Public Engagement in Stray and Feral Cat Management

Managing stray and feral cats will require a better understanding of the values, attitudes, and beliefs that people have about cats (Deak et al., 2019; McLeod et al., 2019). Recent reviews of this topic emphasise the key challenge to implementing and maintaining successful cat management is having the social license to do so (Deak et al., 2019; McLeod et al., 2019). New Zealanders show rather high support for feral cat management (Palmer & Thomas, 2023). Non-lethal control methods for feral cats are preferred over lethal control

methods by the public; however, inadequate justification and use of lethal control may be poorly supported by the public (Farnworth et al., 2014).

Public support of feral cat management can be impacted by confusion in determining if a cat is truly feral or stray (Deak et al., 2019). This is highlighted throughout this report as an important aspect of determining the most humane and effective programme for managing free-roaming cats and increasing public support of such activities. People have different connections to types of cats, which underscores the need to identify the values they attach to cats (Deak et al., 2019).

7.3.1. Public Engagement for Stray Cat Management

The New Zealand public supports stray cat management (Walker et al., 2017). A recent survey in Wellington City indicated that 99% of respondents supported the city's efforts to reduce stray cats and 97% supported the bylaw amendment requiring companion cats to be desexed (Wellington City Council, 2024a). However, as noted earlier in this report, support for stray cat management is contingent on the methods used. Using a range of management approaches to address the impacts of stray cats will likely be necessary to build and maintain public support.

7.3.2. Education Programmes and Support for Semi-Owners/Stray Cat Care Providers

Feeding stray cats is a significant factor influencing the number of stray cats entering animal shelters and living in communities (Zito, 2015). Therefore, engagement with people who provide care to stray cats is important for the successful management of cat populations. Education campaigns that acknowledge and connect with the perceptions and emotions of cat semi-owners/stray cat care providers are likely more effective at redirecting this behaviour than eliminating it (Zito, 2015a). Cat semi-owners/stray cat care providers are likely more amenable to non-lethal than lethal cat management strategies, since they are attached to the cats they care for and feel protective of them (Centonze & Levy, 2002; Zasloff et al., 1998; Zito et al., 2015b). Consequently, efforts to curtail the contribution of semi-ownership to unwanted cat numbers should concentrate on encouraging and facilitating more responsible caretaking, such as desexing, regardless of whether the semi-owner/stray cat care provider accepts ownership of the cat (Finkler et al., 2011a, b; Toukhsati et al., 2007; 2012a). Acceptance of ownership is not necessary to achieve the goal of reducing the contribution of semi-owned cats to unwanted cat numbers and improving cat welfare. The goal is not to encourage cat semi-ownership but rather, where people are already feeding stray cats, provide support (particularly to desex their cats) in improving cat welfare, preventing the birth of unwanted cats, and reducing cat numbers over time.

Desexing initiatives for stray cats should be affordable to encourage semi-owners/stray cat care providers to desex the cats in their care. The success of such programmes is likely increased by implementing education campaigns targeted at stray cat care providers community engagement campaigns and helping transfer cats to the veterinary surgery (e.g., volunteer support to pick up and drop off cats).

7.3.3. TNR as a Strategy

Different factors influence people's support for TNR including demographics, residential location (particularly rural vs urban), attitudes, ethics, values, and cat ownership (Ash & Adams, 2003; Lauber 2007; Lord 2008; Loyd & Hernandez, 2012; Loyd & Miller, 2010). Some studies have found broad public support for TNR (Lord, 2008), including New Zealand (Walker et al., 2017) and a preference for non-lethal animal management in general (Farnworth et al., 2014). Others have found mixed results and less support (Lohr & Lepczyk, 2014; Loyd & Hernandez, 2012; Loyd & Miller, 2010).

The diversity of views about TNR indicates the need to thoroughly consult different stakeholder groups when determining the best course of action for managing stray cats (Deak et al., 2019). At least one study with Australian members of the public found most respondents supported TNR, despite this not being the current government approach to cat management (Rand et al., 2019). The study also found that negative beliefs towards cats are a barrier to supporting TNR (Rand et al., 2019).

There may be differences between the New Zealand public opinion and the operating policy of local governments, animal control, and welfare organisations, therefore, more research on public attitudes about stray cat management would provide a better understanding of the social context.

The definition of 'success' of a cat management programme is likely to differ for welfare organisations, conservation biologists, local government and policymakers (Longcore et al., 2009), which creates controversy (Dauphine & Cooper 2009; Kilgour et al., 2017). For welfare organisations and cat advocates, success is likely measured through improved cat health and welfare; a stable or reducing population; and reduced admissions and euthanasia of unowned cats in animal shelters (Neville, 1989; Longcore et al., 2009; Zaunbrecher & Smith, 1993). For conservation biologists, the complete and rapid extinction of a cat colony and the reduction or elimination of cat predation on wildlife is likely the measure of success (Jessup, 2004; Longcore et al., 2009; Nogales et al., 2004). For local government and policymakers, success will most likely be measured by the reduction of nuisance complaints and conflicts involving cats, improved public opinion, and reduced cat management costs. It is important to note that no assessments of the success of TNR programmes based on the impact of cats on wildlife have been reported. Conservation scientists and advocates should identify the environmental implications of using TNR and

contribute this evidence to the assessment of this cat management tool (Longcore et al., 2009).

7.3.4. Lethal Control as a Strategy

The socio-political and practical implications of a trap-and-kill programme for urban and peri-urban cat management should be considered (Hatley, 2003). Ensuring unconfined, owned cats and semi-owned cats would be unaffected by such a programme is difficult (Robertson, 2007). Furthermore, many community members may be opposed to lethal cat control programmes, particularly in urban areas (Deak et al., 2019; Hurley, 2013a, b; Paterson, 2014; Robertson, 2007; Wald et al., 2013; Walker et al., 2017; Wilken, 2012) and non-lethal cat control measures, or even inaction, are more often accepted (Liordosa et al., 2017; Loyd & DeVore, 2010; Medina et al., 2016; Walker et al., 2017). It is unlikely that implementing intensive, high-level and large-scale culling will be accepted in most urban areas. Indeed, such programmes can meet fierce opposition, protests, and sabotage attempts (Hatley, 2003; Nogales et al., 2013; Parkes et al., 2014; Sterba, 2002).

Non-lethal control methods for feral cats are preferred over lethal control methods by the public (Farnworth et al., 2014). Importantly, inadequate justification and use of lethal control may be poorly supported by the public (Farnworth et al., 2014). If an intensive and large-scale culling programme is considered, a pervasive, intense, and continuing campaign to educate the public about the impacts of cats on wildlife and human health and the resulting need for culling would be necessary (Medina et al., 2016; Proulx, 1988). A public education campaign should be planned and implemented well before a culling operation commenced and would likely need to include public service announcements on television, radio, social media and in newspapers, and education in schools. It can be difficult to develop effective communication programmes; it is necessary to begin the development process with a clear understanding of target audiences, including their attitudes and beliefs (Fishbein & Ajzen, 2010; Jacobson, 2009). In addition, local government programmes aimed at reducing the immigration of cats into the unowned population would need to be strictly enforced (Hatley, 2003).

8. Ensuring Cat Management Strategies are Humane and Effective

A strategic goal of the National Cat Management Group is cat management strategies are evaluated to ensure they are humane and effective.

8.1. Using Ethical Principles of Animal Management to Guide Action

A strategic outcome of the National Cat Management Group is that an ethics framework is used to develop and implement cat management activities.

Minimising tensions between concerns for protecting the welfare of cats and the concerns for communities and the environment will require an approach that ensures transparency in decision-making and balances concerns for all stakeholders involved in managing cats. Using both an ethical and evidence-based approach, Dubois et al. (2017) have created a framework for making decisions about animal population control that can be applied to cat management based on the following questions:

- Can the problem be mitigated by changing human behaviour?
- Are the harms serious enough to warrant wildlife control?
- Is the desired outcome clear and achievable, and will it be monitored?
- Does the proposed method carry the least animal welfare cost and to the fewest animals?
- Have community values been considered alongside scientific, technical, and practical information?
- Is the control action part of a systematic, long-term management programme?
- Are the decisions warranted by the specifics of the situation rather than negative labels applied to the animals?

The Dubois et al. (2017) framework explicitly includes questions about humans first altering their actions, and questions how attitudes about the perceived value of an animal, or lack thereof, can influence decisions.

8.2. Monitoring and Evaluation of Cat Management

A strategic outcome of the National Cat Management Group is that adaptive management frameworks are used to monitor and evaluate cat management activities.

Improving cat management through a legislative and regulatory framework should be evaluated to assess effectiveness for cat management, humaneness, cost-effectiveness, and potential for implementation and enforcement. Determination of which cat management strategies are the most effective whilst ensuring high welfare standards can minimise the need for lethal control of cats.

There are currently few formal assessments of the impact of specific cat management strategies on wildlife predation by cats, unwanted cat numbers, animal shelter intakes, shelter euthanasia numbers, and nuisance complaints. Reported data are either compilations of or extrapolations from (sometimes diverse and inaccurate) data from different animal welfare organisations and animal control agencies. The few existing assessments relate to the impact of desexing initiatives and TNR programmes on animal shelter cat intake and euthanasia numbers and the increase in reclaim rates associated with the identification of cats. Clear and measurable objectives are needed for initiatives and formal assessments based on the objectives.

8.2.1. Using Adaptive Frameworks to Manage Cats

Adaptive frameworks can help ensure transparency and empiricism in the decision-making process (Warburton & Norton, 2009). Adaptive frameworks are useful for cat management activities such as TNR where monitoring and evaluation of the population of cats and the impacts of management activities are necessary to engage all stakeholders and improve effectiveness (Boone, 2015; Flockhart et al., 2022; Perry & Perry, 2008).

For companion cats, Table 5 sets out a series of measures that can be used to evaluate the overall success of cat management strategies and measures specific to individual strategies. Evaluation of the success of cat management programmes should include pre- and post-implementation monitoring using specific measures included below.

Table 5: Evaluation of strategies to manage owned cats

Strategy	Measurable indicators
Reducing cat surrender and abandonment	• Number of companion cats surrendered to animal shelters • Number of cat abandonment complaints received by the SPCA inspectorate
Keeping cats at home	• Number of cats kept inside • Number of outdoor cat enclosures or cat-proof fences • Use of environmental enrichment for contained cats • Number of nuisance complaints • Number of cats reported lost • Number of trauma-related injuries in cats

Mandatory identification	• Number of cats reported as microchipped • Reclaim rates recorded by shelters, pounds and veterinarians • Number of microchips registered on the NZCAR
Mandatory desexing	• Number of companion cats reported as desexed before sexual maturity • Shelter admissions of kittens • Shelter euthanasia of kittens • Number of kittens/cats being sold/given away on trading platforms (e.g. Trade Me ™ or other media)
Targeted and affordable desexing	• Number of desexed cats from low-income areas • Number of kittens/cats being sold/given away on trading platforms (e.g. Trade Me ™ or other media) • Shelter admissions of kittens and cats • Shelter euthanasia of kittens and cats
Pre-pubertal desexing	• Number of cats desexed before sexual maturity • Retention of adult cats desexed before sexual maturity • Age of mother cat when kittens are surrendered to animal shelters and pounds • Number of kittens/cats being sold/given away on trading platforms (e.g. Trade Me ™ or other media) • Number of veterinarians performing pre-pubertal desexing • Average age at which veterinarians desex kittens
Mandatory Registration	• Number of registered cats • Council income from cat registration (and application towards cat management initiatives) • Expenditure of cat registration income on supporting cat management initiatives (where councils allocate funds from registration to cat management initiatives) • Reclaim rates at appropriate animal management facility
Limiting cat ownership	• Number of hoarding complaints dealt with by the SPCA inspectorate • Number of nuisance complaints to local councils or SPCA
Breeding regulation	• Number of breeding complaints dealt with by the SPCA inspectorate • Number of kittens/cats being sold/given away on trading platforms (e.g. Trade Me ™ or other media) • Number of registered breeders
Educational strategies/ Facilitation of behaviour change	• Support for cat management strategies • New Zealander's preferences for and opinions about cat management

Additional measures for evaluating domestic and feral cat management programmes include (adapted from Identifying Best Practice Cat Management in Australia; RSPCA Australia 2018):

- overall number of stray cats
- feral cat densities in targeted areas
- proportion of companion and stray cats desexed
- size of individual stray cat colonies
- shelter/pound admissions of stray cats
- shelter/pound euthanasia of stray cats
- shelter/pound disease surveillance of stray cats (e.g., FIV, FeLV)
- nuisance complaints about cats
- wildlife injuries and deaths documented by veterinarians, wildlife groups, and shelters
- community satisfaction and support for cat management
- wildlife prey abundance

Indicators for TNR are discussed in section 4.2.2 of this report. In addition, monitoring the number of stray cats desexed and adopted can provide a useful evaluation of educational strategies targeted towards stray cat care providers. It is important to include an assessment of the barriers that care providers experience in desexing stray cats.

8.3. Collecting and Managing Data on Cat Management Activities

A strategic outcome of the National Cat Management Group is that robust data collection and management inform cat management activities.

Successful long-term cat management will be assisted by the collection, analysis, and reporting of accurate data about different facets of cat management.

8.3.1. Creation of a National Database for Shelters and Rescues

The current lack of statistical information on animals entering and exiting shelters on a national scale means evaluation of progress is not known. The collection of transparent information on the number of animals requiring and receiving support from shelters annually is critical in understanding the number of at-risk animals in New Zealand's community.

The establishment of a national database is required to facilitate standardised data collection amongst shelter and rescue organisations in New Zealand. This database would

capture the minimal data required to compile a picture of the animals entering and leaving shelters/rescues.

The development of a national database would help address the gaps in understanding the impact of cat management activities such as desexing, microchipping, and TNR.

8.3.2. Addressing Research Gaps in Cat Management

Several research gaps have been identified for the management of companion, stray and feral cats that span ecological, biological, social, and legal topics. Glen et al. (2023), Kikillus et al. (2017); and Sumner et al. (2022) provide further recommendations for research priorities for cat management. Below is a list of some suggested research priorities:

- New Zealanders' attitudes towards, and interactions with, stray cats including the intentions of stray cat care providers (Ma et al., 2023);
- typical cat abandonment rates under different conditions and the socio-economic and attitudinal factors that contribute to higher abandonment rates and prevention of abandonment (Miller et al., 2014);
- how restricting companion cat roaming impacts cat owners' relationships with their cats and cat welfare (Ovenden et al., 2024);
- impact of regulations and legislation for cat management activities such as mandatory desexing and microchipping (Sumner et al., 2022);
- effects of desexing on cat behaviour and how this might influence cat population dynamics (it is commonly theorised that desexed cats occupy space within a cat population and prevent other entire cats from entering that area but there is no data available to substantiate this theory (Gunther et al., 2011; Miller et al., 2014; Natoli et al., 2006));
- typical cat dispersal rates, dispersal rates under different conditions, and the survival rates of dispersing cats (Miller et al., 2014);
- whether intensely managing cats within a small part of the meta-population or managing a larger part of the meta-population at lower intensity is more effective at controlling the cat population (Miller et al., 2014);
- shelter statistics that correspond to cat management activities including intake, euthanasia, and adoption; and health information and infectious disease prevalence in stray cat populations;
- the relationship between feral cat abundances (or densities) and their impacts on populations of vulnerable native species to determine management targets (Glen et al., 2023);
- behavioural differences in cats that impact the methods used for cat management (Glen et al., 2023);
- a full ecosystem impact of managing feral cats, including impacts on other predators and prey species (Glen et al., 2023; Kemp et al., 2023);

- background reference values for toxoplasmosis and impacts of managing cats on reducing transmission to pastoral animals and native wildlife (Niebuhr & Norbury, 2020); and
- development of more humane lethal control methods for feral cats.

8.3.3. Improving Data Collection Methods

Cat management should be informed by the context in which cats need to be managed. Efforts should be made to measure cat populations to better understand the problem, design a cat management programme, and determine if cat management is effective (Flockhart et al., 2022).

Recently geographic information systems (GIS) have been used to identify specific areas that disproportionately contribute kittens to shelter intakes (Reading et al., 2014), areas with high concentrations of stray cats (Aguilar et al., 2012), and unmanaged cat colonies (Aguilar et al., 2013). The use of GIS can help focus targeted desexing and education campaigns (Aguilar et al., 2012; Reading et al., 2014) and assess the efficacy of implemented programmes (Reading et al., 2014). Recent work in Washington DC, USA has led to the development of methodologies for estimating cat populations using ecological tools paired with community-led data collection (Flockhart et al., 2022). See Appendix C for a list of resources for estimating and monitoring community cat populations.

Data on cat management should be accessible to stakeholders interested in supporting, monitoring, and evaluating activities to ensure they are effective and humane.

9. Collaboration Between Government, NGOs, and the Community

A strategic goal of the National Cat Management is humane and effective cat management is achieved through multi-stakeholder collaboration.

This will require identifying and understanding the different stakeholders and their relationships with and concerns regarding cats including cat owners, cat care providers, breeders, pet retailers and manufacturers, veterinarians, local and central government, animal welfare, and rescue organisations, animal control organisations, the farming community, conservation groups, and the wider community.

9.1. New Zealand Government

A strategic outcome of the NCMG is for the New Zealand Government to actively support multi-stakeholder oversight of cat management strategies for all types of cats.

Opportunities should be created for national consultative groups on feral cat control and domestic cat management to discuss common issues to encourage greater stakeholder collaboration, and integration of initiatives. This will help focus attention and resources to achieve greater success. Core areas of focus should be applied to cat management including science, action, and partnership.

9.1.1. Governmental Agencies Involved in Cat Management

The agencies who should currently share responsibility for cat management in New Zealand include:

- Department of Conservation
- Regional Councils
- Local Councils
- Ministry for Primary Industries
- Department of Internal Affairs
- Ministry for the Environment
- Approved Organisations
- Police

9.1.2. Legal Reform

Legislation is key to providing a legal framework for resolving cat management issues but mandating specific aspects of cat management can only provide part of the solution. The challenge is to identify which aspects will be most cost-effective and provide an ethical, humane, and sustainable approach to cat management.

Current legislation relating to cat (domestic and feral) management is complex. Government plays an important role in reviewing and rationalising legislation to reflect best practices and community expectations to achieve consistent and effective change. This involves undertaking meaningful evaluation and public consultation.

9.1.3. Developing and Sharing Resources

Awareness and education are important for effective cat management and having one agency coordinate the development of materials will help ensure consistency and cost-effectiveness. For example, the Dog and Cat Management Board in South Australia develops guidelines to assist councils in establishing cat bylaws and producing resource materials promoting responsible cat ownership. These resources can be used by all councils and other groups including veterinarians and animal welfare organisations. This could be a role fulfilled by a cat management task force or management board in New Zealand.

9.2. Local Government

A strategic outcome for the NCMG is for local New Zealand governments to coordinate community cat management activities with national cat management activities.

Local government generally enforces domestic cat legislation and acts at the community level. Therefore, local government has a pivotal role in working with key community stakeholders including cat owners, cat care providers, breeders, sellers, animal welfare organisations, veterinarians, and conservation groups. Councils can facilitate and coordinate community-based activities including accessible desexing schemes, promotion of responsible cat ownership, encouraging cat-friendly rental accommodation, discouraging no-pet clauses in tenancy agreements, and supporting cat adoption drives. Enforcement of regulations is also important but is considered secondary to the other educative and support roles the council can pursue. Another critical role for Council is to liaise and collaborate with grassroots community conservation groups to support and coordinate cat management activities.

Council cat management plans

In the absence of national law, local councils have been introducing bylaws related to cat management. If councils develop and submit a cat management plan, these plans can incorporate priority areas, education and support programmes (e.g. accessible desexing and microchipping schemes), and research and evaluation activities. Councils in New Zealand undertaking this focus public attention on cats would complement a national cat management plan.

9.3. Organisations and Professionals with an Interest in Cat Management

A strategic outcome of the NCMG is for organisations representing conservation groups, animal welfare, veterinary science, and industry to take an active role in cat management.

Communication with the local community and other stakeholders, involvement of stakeholders in decision-making and solutions, and education have all been identified as key components of effective management of issues similar to cat management (Lohr, 2012). It is important that all stakeholders involved with cat management work collaboratively towards the goal of effectively and humanely reducing and controlling cat numbers. Cooperation between the stakeholders with opposing viewpoints, such as wildlife conservationists and cat caretakers, will be crucial to effective community management of cat populations (Crowley et al., 2020a, b, 2022; Leong et al., 2020; Peterson et al., 2012; Palmer, 2014). Collaboration between social scientists and ecologists

to manage wildlife-related conflict issues is also needed, as knowledge and application of concepts from social science are important in understanding and addressing problems with human dimensions like the cat overpopulation problem (Dayer et al., 2004; Mascia et al., 2003; Wallace & Levy., 2006).

9.3.1. Conservation Groups

Conservation groups in New Zealand ranging in size from government agencies to small grassroots groups are involved in managing feral and domestic cats either directly (on privately owned land), or indirectly (through information given to supporters and the public). Conservation groups also have an important role in community engagement and in promoting and implementing practices that minimise welfare harms related to cat management.

9.3.2. Animal Welfare Organisations and Rescues

Animal welfare organisations and rescues that manage unwanted companion cats and stray cats implement initiatives to address cat overpopulation problems in communities. Welfare organisations and rescues play an important role in community support, including facilitating adoption drives, desexing programmes, and promoting microchipping. Animal advocacy groups may also assist conservation groups and Government with advice on addressing animal welfare risks associated with cat management programmes, engage in research to address knowledge gaps and advocate for legislative change related to cat management.

9.3.3. Veterinarians

Veterinarians have a role to play in the management of cats including:

- educating clients and the public about responsible cat ownership, cat impacts on wildlife, cat welfare, and the need for cat management;
- educating owners on the appropriate environmental needs of cats to ensure positive welfare outcomes;
- encouraging the adoption of cats from welfare organisations and rescues;
- supporting and implementing pre-pubertal desexing;
- supporting community initiatives such as accessible desexing programmes for cats; and
- advocating for national cat management legislation.

In addition, the New Zealand Veterinary Association have a role in providing advice and assisting with cat management initiatives.

9.3.4. Cat Breeders

Cat breeders play a role in educating buyers about responsible cat ownership and ensuring that all legal and health requirements are met for the cats and kittens they sell. Responsible cat breeders should:

- register as a breeder; and
- desex kittens before sexual maturity, unless sold to another registered breeder.

All cat breeders must comply with:

- the Code of Welfare: Companion Cats (2018)
- relevant regulations and legislation

9.3.5. Pet Retailers and Manufacturers

The Pet Industry Association of New Zealand provides advice and assists with initiatives contributing to cat management. The roles of individual businesses that sell cats, cat accessories, food, and equipment include:

- educating clients and the public about responsible cat ownership, cat impacts on wildlife, cat welfare and the need for cat management;
- supporting pre-pubertal desexing;
- supporting community initiatives such as accessible desexing programmes and low-cost microchipping for cats;
- selling only desexed, vaccinated, and microchipped kittens and cats from responsible breeders; and
- supporting initiatives to rehome cats from animal shelters and pounds through their retail outlets.

9.4. Individuals with an Interest in Cat Management

A strategic outcome of the NCMG is that individuals including people who do and do not provide care to cats take an active role in cat management.

9.4.1. Cat Owners

Responsible owners ensure:

- Cats are microchipped and the microchip is registered with current owner information on the New Zealand Companion Animal Register. Where practical cats, are equipped with a collar and tag for identification purposes (AVMA, 2016; CANZ, 2018; NZVA, 2018).

- Cats are desexed before puberty to prevent unplanned litters of kittens (NZVA, 2018).
- Cats are adequately socialised, trained, exercised, and have mental stimulation appropriate to their age, breed, and health status (AVMA, 2016; CANZ, 2020).
- Cats are provided with appropriate health care for their cat in accordance with veterinary advice. Cats require both preventive and therapeutic care (e.g., diet, vaccinations, parasite control, and treatment and monitoring of health problems) (NZVA, 2018).

Cat ownership is a commitment for a cat's lifetime, with the average lifespan of a desexed companion cat being 14-16 years (NZVA, 2018). Cat ownership requires time and money for food, containment, and care. Cats owners should be able to:

- provide care when the owner is away (AVMA, 2016; NZVA, 2018; Rodan & Sparkes, 2012) or alternative arrangements if they can no longer look after their cat (NZVA, 2018);
- ensure their cat's well-being in the case of an emergency or disaster, including assembling an animal-specific evacuation kit (AVMA, 2016, CANZ, 2018; NZVA, 2018); and
- recognise a decline in a cat's quality of life, and decisions should be made in consultation with a veterinarian regarding appropriate end-of-life care (e.g., palliative care, euthanasia) (AVMA, 2016; Littlewood, 2021).

Cat owners also have an important role in cat management including:

- adopting cats from welfare organisations and rescues;
- preventing or mitigating predation on wildlife through effective containment and/or anti-predation collars;
- complying with the Code of Welfare: Companion Cats (2018); and
- compliance with other relevant regulations and legislation.

9.4.2. Semi-Owners/Stray Cat Care Providers

Stray cat care providers have a role in cat management including:

- taking responsibility for the cats in their care, including providing appropriate health care and euthanasia when required; and recognising the cats' potential to contribute to cat overpopulation and impact on wildlife.
- mitigating the negative impact of the cats they care for on wildlife with effective anti-predation collars;
- desexing the cats they care for before the cats reach sexual maturity to avoid breeding;

- supporting community initiatives to reduce the number of unwanted cats, such as accessible desexing programmes and mtTNR programmes;
- helping to educate other cat care providers about the impact of cats on wildlife and what can be done to mitigate these impacts; and
- identifying cats in their care with a microchip and external identification.

9.4.3. People who neither own nor provide care for cats

People who neither own nor provide care for cats have a role to play in cat management including:

- supporting community initiatives to reduce the number of unwanted cats, such as accessible desexing programmes and mtTNR programmes;
- treating cats with kindness, care, and respect; and
- helping to educate cat owners and cat care providers about the impact of cats on communities and wildlife, and what can be done to mitigate these impacts.

10. Conclusion

This report has presented a comprehensive multi-stakeholder approach to cat management in New Zealand that requires investment from all levels of government, use of effective and humane management strategies to reduce the number of cats and incorporates monitoring and evaluation of management activities to determine decision-making.

Currently, there is no national strategy for cat management in New Zealand, despite the need to address the negative impacts that cats have on urban, rural, and wild environments, and the poor welfare outcomes for cats that are poorly or not at all managed. Protecting cat welfare and New Zealand's unique ecosystems is not a binary choice. Effective and humane cat management will be successful in protecting cats, people, and ecosystems when strategies are grounded in an understanding of cat populations and correspond to the multiplicity of values that cats hold in New Zealand.

11. References

Adamelli, S., Marinelli, L., Normando, S., & Bono, G. (2005). Owner and cat features influence the quality of life of the cat. *Applied Animal Behaviour Science, 94*(1-2), 89-98. https://doi.org/10.1016/j.applanim.2005.02.003

Aebischer, N. J., Wheatley, C. J., & Rose, H. R. (2014). Factors associated with shooting accuracy and wounding rate of four managed wild deer species in the UK, based on anonymous field records from deer stalkers. *PLoS ONE, 9*(10), Article e109698. https://doi.org/10.1371/journal.pone.0109698

Aguilar, G. D., & Farnworth, M. J. (2012). Stray cats in Auckland, New Zealand: Discovering geographic information for exploratory spatial analysis. *Applied Geography, 34*, 230-238. https://doi.org/10.1016/j.apgeog.2011.11.011

Aguilar, G. D., & Farnworth, M. J. (2013). Distribution characteristics of unmanaged cat colonies over a 20-year period in Auckland, New Zealand. *Applied Geography, 37*, 160-167. https://doi.org/10.1016/j.apgeog.2012.11.009

Aguilar, G. D., Farnworth, M. J., & Winder, L. (2015). Mapping the stray domestic cat (*Felis catus*) population in New Zealand: Species distribution modelling with a climate change scenario and implications for protected areas. *Applied Geography, 63*, 146-154. https://doi.org/10.1016/j.apgeog.2015.06.019

Akucewich, L. H., Philman, K., Clark, A., Gillespie, J., Kunkle, G., Nicklin, C. F., & Greiner, E. C. (2002). Prevalence of ectoparasites in a population of feral cats from north central Florida during the summer. *Veterinary Parasitology, 109*(1-2), 129-139. https://doi.org/10.1016/S0304-4017(02)00205-4

Alberthsen, C. (2014). *The Australian excess cat population: An exploration of cat admissions and outcomes to RSPCA shelters*. [Doctoral thesis, University of Queensland]. https://espace.library.uq.edu.au/view/UQ:344278

Alberthsen, C., Rand, J. S., Bennett, P. C., Paterson, M., Lawrie, M., & Morton, J. M. (2013). Cat admissions to RSPCA shelters in Queensland, Australia: Description of cats and risk factors for euthanasia after entry. *Australian Veterinary Journal, 91*(1-2), 35-42. https://doi.org/10.1111/avj.12013

Alho, A. M., Pontes, J., & Pomba, C. (2016). Guardians' knowledge and husbandry practices of feline environmental enrichment. *Journal of Applied Animal Welfare Science*, *19*(2), 115-125. https://doi.org/10.1080/10888705.2015.1117976

Allen, K., Shykoff, B. E., & Izzo Jr., J. L. (2001). Pet ownership, but not ace inhibitor therapy, blunts home blood pressure responses to mental stress. *Hypertension, 38*(4), 815-820. https://doi.org/10.1161/hyp.38.4.815

Amat, M., Camps, T., & Manteca, X. (2016). Stress in owned cats: Behavioural changes and welfare implications. *Journal of Feline Medicine and Surgery*, *18*(8), 577-586. https://doi.org/10.1177/1098612X15590867

Amat, M., de la Torre, J. L. R., Fatjó, J., Mariotti, V. M., Van Wijk, S., & Manteca, X. (2009). Potential risk factors associated with feline behaviour problems. *Applied Animal Behaviour Science, 121*(2), 134-139. https://doi.org/10.1016/j.applanim.2009.09.012

American Veterinary Medical Association. (2013). *Microchipping of animals*. www.avma.org/KB/Resources/Reference/Pages/Microchipping-of-Animals-Backgrounder.aspx

American Veterinary Medical Association. (2016). *Guidelines for Responsible Pet Ownership*. www.avma.org/KB/Policies/Pages/Guidelines-for-Responsible-PetOwnership.aspx

American Veterinary Medical Association. (2019). *AVMA guidelines for the depopulation of animals: 2019 edition*. https://www.avma.org/KB/Policies/Pages/depopulation-guidelines.aspx

American Veterinary Medical Association. (2020). *AVMA Guidelines for the euthanasia of animals: 2020 edition*. https://www.avma.org/sites/default/files/2020-02/Guidelines-on-Euthanasia-2020.pdf

Andersen, M. C., Martin, B. J., & Roemer, G. W. (2004). Use of matrix population models to estimate the efficacy of euthanasia versus trap-neuter-return for management of free-roaming cats. *Journal of American Veterinary Medical Association, 225*(12), 1871-1876. https://doi.org/10.2460/javma.2004.225.1871

Anderson, D. C. (2004). The human-companion animal bond. *The Reference Librarian, 41*(86), 7-23. https://doi.org/10.1300/J120v41n86_02

Anderson, T. C., Foster, G. W., & Forrester, D. J. (2003). Hookworms of feral cats in Florida. *Veterinary Parasitology, 115*(1), 19-24. https://doi.org/10.1016/S0304-4017(03)00162-6

Angold, P. G., Sadler, J. P., Hill, M. O., Pullin, A., Rushton, S., Austin, K., Small, E., Wood, B., Wadsworth, R., Sanderson, R., & Thompson, K. (2006). Biodiversity in urban habitat patches. *Science of the Total Environment, 360*(1-3), 196-204. https://doi.org/10.1016/j.scitotenv.2005.08.035

Animal Welfare Act. (1999). https://www.legislation.govt.nz/act/public/1999/0142/latest/dlm49664.html

Animal Welfare Royal of Queensland. (2010). *AWLQ Statistics 2009/10*. www.awlqld.com.au/wp-content/uploads/2011/07/Statistics200910.pdf.

Arhant, C., Heizmann, V., Schauberger, G., & Windschnurer, I. (2022). Risks and benefits of collar use in cats (*Felis catus*): A literature review. *Journal of Veterinary Behavior, 55-56*, 35-47. https://doi.org/10.1016/j.jveb.2022.07.012

Aronsohn, M. G., & Faggella, A. M. (1993). Surgical techniques for neutering 6- to 14-week-old kittens. *Journal of American Veterinary Medical Association, 202*(1), 53-55. https://doi.org/10.2460/javma.1993.202.01.53

Ash, S. J., & Adams, C. E. (2003). Public preferences for free-ranging domestic cat management options. *Wildlife Society Bulletin, 31*(2), 334-339. http://www.jstor.org/stable/3784311

Association of Shelter Veterinarians' Veterinary Task Force to Advance Spay-Neuter. (2016). The Association of Shelter Veterinarians' 2016 Veterinary medical care guidelines for spay-neuter programs. *Journal of the American Veterinary Medical Association, 249*(2), 165-188. https://doi.org/10.2460/javma.249.2.165

Australian Capital Territory Government. (n.d). *City Services*. https://www.cityservices.act.gov.au/pets-and-wildlife/cats#Containment

Baker, P. J., Bentley, A. J., Ansell, R. J., & Harris, S. (2005). Impact of predation by feral cats *Felis catus* in an urban area. *Mammal Review, 35*, 302-312. https://doi.org/10.1111/j.1365-2907.2005.00071.x

Baker, P. J., Molony, S. E., Stone, E., Cuthill, I. C., & Harris, S. (2008). Cats about town: Is predation by free-ranging pet cats *Felis catus* likely to affect urban bird populations? *Ibis, 150*(s1), 86-99. https://doi.org/10.1111/j.1474-919X.2008.00836.x

Baquero, O. S., Chiozzotto, E. N., Garcia, R. de C. M., Amaku, M., & Ferreira, F. (2017). Abandonment of dogs and cats: Public opinions as population management indicators. *Journal of Applied Animal Welfare Science*, *20*(3), 289-295. https://doi.org/10.1080/10888705.2017.1317251

Barratt, D. G. (1997). Predation by house cats *Felis catus* (L.), in Canberra. I. Prey composition and preference. *Wildlife Research, 24*(3), 263-277. https://doi.org/10.1071/WR96020

Bassett, I., McNaughton, E. J., Plank, G. D., & Stanley, M. (2020). Cat ownership and proximity to significant ecological areas influence attitudes towards cat impacts and management practices. *Environmental Management, 66*(30), 30–41. https://doi.org/10.1007/s00267-020-01289-2

Basso, W., Hartnack, S., Pardini, L., Maksimov, P., Koudela, B., Venturini, M. C., Schares, G., Sidler, X., Lewis, F. I., & Deplazes, P. (2013). Assessment of diagnostic accuracy of a commercial ELISA for the detection of *Toxoplasma gondii* infection in pigs compared with IFAT, TgSAG1-ELISA and Western blot, using a Bayesian latent class approach. *International Journal of Parasitology, 43*(7), 565–570. https://doi.org/10.1016/j.ijpara.2013.02.003

Beausoleil, N. J., & Mellor, D. J. (2015). Introducing breathlessness as a significant animal welfare issue. *New Zealand Veterinary Journal, 63*(1), 44–51. https://doi.org/10.1080/00480169.2014.940410

Beaver, B. V. (2003). *Feline behaviour. A guide for veterinarians (*2nd ed.). Saunders. https://vetbooks.ir/feline-behavior-a-guide-for-veterinarians-2nd-edition/

Beckerman, A., Boots, M., & Gaston, K. (2007). Urban bird declines and the fear of cats. *Animal Conservation, 10*(3), 320–325. https://doi.org/10.1111/j.1469-1795.2007.00115.x

Beef and Lamb New Zealand. (2016). *Abortion in ewes*. www.beeflambnz.com

Bell, M., & Bell, D. (2003). The recolonisation of Mangere Island by New Zealand white-faced storm petrels (*Pelagodroma marina maoriana*). *Notornis, 50*(1), 57–58. https://www.birdsnz.org.nz/publications/the-recolonisation-of-mangere-island-by-new-zealand-white-faced-storm-petrels-pelagodroma-marina-maoriana/

Bellingham, P. J., Towns, D. R., Cameron, E. K., Davis, J. J., Wardle, D. A., Wilmshurst, J. M., & Mulder, C. P. H. (2010). New Zealand island restoration: Seabirds, predators, and the importance of history. *New Zealand Journal of Ecology, 34*(1), 115–136. https://newzealandecology.org/nzje/2905

Bergstrom, D. M., Lucieer, A., Kiefer, K., Wasley, J., Belbin, L., Pedersen, T. K., & Chown, S. L. (2009). Indirect effects of invasive species removal devastate World Heritage Island. *Journal of Applied Ecology, 46*, 73–81. https://doi.org/10.1111/j.1365-2664.2008.01601.x

Bi-state Pet Food Pantry. (2014). *Bi-state Pet Food Pantry*. www.bistatepetfoodpantry.org.

Bionet. (n.d.). *Welfare performance of animal traps*. https://www.bionet.nz/rules/performance-traps/

Biosecurity Tasmania, Department of Primary Industries, Water and Environment. (2016). *Draft Tasmanian Cat Management Plan*. www.dpipwe.tas.gov.au/invasive-species/cat-management-in-tasmania/draft-tasmanian-cat-management-plan.

Bissonette, V., Lussier, B., Doizé, B., & Arsenault, J. (2018). Impact of a trap-neuter-return event on the size of free-roaming cat colonies around barns and stables in Quebec. *The Canadian Journal of Veterinary Research, 82*(3), 192-197. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6040017/

Boissy, A., Manteuffel, G., Jensen, M. B., Moe, R. O., Spruijt, B., Keeling, L. J., Winckler, C., Forkman, B., Dimitrov, I., Langbein, J., Bakken, M., Veissier, I., & Aubert, A. (2007). Assessment of positive emotions in animals to improve their welfare. *Physiology and Behavior*, *92*(3), 375-397. https://doi.org/10.1016/j.physbeh.2007.02.003

Bollen, K. (2015). Training and behavior modification for shelter cats. In E. Weiss, H. Mohan-Gibbons, & S. Zawistowski (Eds.), *Animal behavior for shelter veterinarians and staff* (pp. 250-266). John Wiley & Sons. https://www.wiley.com/en-ie/Animal+Behavior+for+Shelter+Veterinarians+and+Staff-p-9781118922835

Bonnington, C., Gaston, K. J., & Evans, K. L. (2013). Fearing the feline: Domestic cats reduce avian fecundity through trait-mediated indirect effects that increase nest predation by other species. *Journal of Applied Ecology, 50*, Article 15e24. https://doi.org/10.1111/1365-2664.12025.

Boone, J. D. (2015). Better trap–neuter–return for free-roaming cats: Using models and monitoring to improve population management. *Journal of Feline Medicine and Surgery, 17*(9), 800-807. https://doi.org/10.1177/1098612X15594995

Borkin, K. M., Easton, L., & Bridgman, L. (2022). Bats attacked by companion and feral cats: evidence from indigenous forest and rural landscapes in New Zealand. *New Zealand Journal of Zoology, 50*(3), 425-432. https://doi.org/10.1080/03014223.2022.2098782

Bowman, D. D., Montgomery, S. P., Zajac, A. M., Eberhard, M. L., & Kazacos, K. R. (2010). Hookworms of dogs and cats as agents of cutaneous larva migrans. *Trends in Parasitology, 26*(4), 162-167. https://doi.org/10.1016/j.pt.2010.01.005

Breitschwerdt, E. B., Maggi, R. G., Chomel, B. B., & Lappin, M. R. (2010). Bartonellosis: An emerging infectious disease of zoonotic importance to animals and human beings. *Journal of Veterinary Emergency and Critical Care, 20*(1), 8-30. https://doi.org/10.1111/j.1476-4431.2009.00496.x

British Columbia Society for the Prevention of Cruelty to Animals. (2017). *Position statement: Cat welfare*. https://spca.bc.ca/programs-services/leaders-in-our-field/position-statements/position-statement-on-cat-welfare/

Bruce, S. J., Zito, S., Gates, M. C., Aguilar, G., Walker, J. K., Goldwater, N., & Dale, A. (2019). Predation and risk behaviors of free-roaming owned cats in Auckland, New Zealand via the use of animal-borne cameras. *Frontiers in Veterinary Science*, *6*, Article 205. https://doi.org/10.3389/fvets.2019.00205

Budke, C. M., & Slater, M. R. (2009). Utilization of matrix population models to assess a 3-year single treatment nonsurgical contraception program versus surgical sterilization in feral cat populations. *Journal of Applied Animal Welfare Science, 12*(4), 277-292. https://doi.org/10.1080/10888700903163419

Burns, B., Innes, J., & Day, T. (2012). The use and potential of pest-proof fencing for ecosystem restoration and fauna conservation in New Zealand. In M. J. Somers, & M. W. Hayward (Eds.), *Fencing for conservation: Restriction of evolutionary potential or a riposte to threatening processes?* (pp. 65-90). Springer Science+Business Media. https://doi.org/10.1007/978-1-4614-0902-1_5

Burrells, A., Taroda, A., Opsteegh, M., Schares, G., Benavides, J., Dam-Deisz, C., Bartley, P. M., Chianini, F., Villena, I., van der Giessen, J., Innes, E. A., & Katzer, F. (2018). Detection and dissemination of *Toxoplasma gondii* in experimentally infected calves, a single test does not tell the whole story. *Parasitology Vectors, 11*, Article 45. https://doi.org/10.1186/s13071-018-2632-z

Bushby, P. A, & Griffin, B. (2011). *An overview of pediatric spay and neuter benefits and techniques*. https://www.dvm360.com/view/overview-pediatric-spay-and-neuter-benefits-and-techniques

Buxton, D., Blewett, D. A., Trees, A. J., McColgan, C., & Finlayson, J. (1988). Further studies in the use of monensin in the control of experimental ovine toxoplasmosis. *Journal of Comparative. Pathology, 98*(2), 225-236. https://doi.org/10.1016/0021-9975(88)90021-7

Buxton, D., Gilmour, J. S., Angus, K. W., Blewett, D. A., & Miller, J. K. (1982). Perinatal changes in lambs infected with *Toxoplasma gondii*. *Research in Veterinary Science, 32*(2), 170-176. https://doi.org/10.1016/S0034-5288(18)32408-1

Buxton, D., & Losson, B. (2007). Toxoplasmosis: general considerations. In L. M. Ortega-Mora, B. Gottstein, F. J. Conraths, & D. Buxton (Eds.), *Protozoal abortifacients in farm ruminants: Guidelines for diagnosis and control* (pp.122-131). CABI. https://doi.org/10.1016/j.fawpar.2019.e00037

Cafarchia, C., Romito, D., Capelli, G., Guillot, J., & Otranto, D. (2006). Isolation of Microsporum canis from the hair coat of pet dogs and cats belonging to owners diagnosed with *M. canis tinea corporis*. *European Society of Veterinary Dermatology, 17*(5), 327-331. https://doi.org/10.1111/j.1365-3164.2006.00533.x

Cafazzo, S., Bonanni, R., & Natoli, E. (2019). Neutering effects on social behaviour of urban unowned free-roaming domestic cats. *Animals, 9*(12), Article 1105. https://doi.org/10.3390/ani9121105

Calero-Bernal, R., & Gennari, S. M. (2019). Clinical toxoplasmosis in dogs and cats: An Update. *Frontiers in Veterinary Science, 6,* Article 54. https://doi.org/10.3389/fvets.2019.00054

Calver, M. C., Adams, G., Clark, W., & Pollock, K. H. (2013). Assessing the safety of collars used to attach predation deterrent devices and ID tags to pet cats. *Animal Welfare, 22*(1), 95-105. https://doi.org/10.7120/09627286.22.1.095

Calver, M., C., Crawford, H. M., Scarff, F. R., Bradley, J. S., Dormon, P., Boston, S., & Fleming, P.A. (2022). Intensive adoption as a management strategy for unowned, urban cats: A case study of 25 years of Trap-Assess-Resolve (TAR) in Auckland, New Zealand. *Animals, 12*, Article 2301. https://doi.org/10.3390/ani12172301

Calver, M. C., & Thomas, S. R. (2011). Effectiveness of the Liberator™ in reducing predation on wildlife by domestic cats. *Pacific Conservation Biology, 16*(4), 244-250. https://doi.org/10.1071/PC110244

Calver, M., Thomas, S., Bradley, S., & McCutcheon, H. (2007). Reducing the rate of predation on wildlife by pet cats: The efficacy and practicability of collar-mounted pounce protectors. *Biological Conservation, 137*(3), 341-348. https://doi.org/10.1016/j.biocon.2007.02.015

Campbell, K. J., Harper, G., Algar, D., Hanson, C. C., Keitt, B. S., & Robinson, S. (2011). Review of feral cat cat eradications on islands. In C. R. Veitch, M. N. Clout, & D. R. Towns (Eds.), *Island invasives: Eradication and management* (pp. 37-46). Proceedings of the International Conference on Island Invasives. https://www.islandconservation.org/publications/

Caprilli, S., & Messeri, A. (2006). Animal-assisted activity at A. Meyer Children's Hospital: A pilot study. *Evidence-based Complementary and Alternative Medicine, 3*(3), 379-383. https://doi.org/10.1093/ecam/nel029

Carminato, A., Vascellari, M., Marchioro, W., Melchiotti, E., & Mutinelli, F. (2011). Microchip-associated fibrosarcoma in a cat. *Veterinary Dermatology, 22*(6), 565-569. https://doi.org/10.1111/j.1365-3164.2011.00975.x

Casey, R. A., Bradshaw, J. W. S., Roberts, M. A., & Vandenbussche, S. (2009). Reasons for relinquishment and return of domestic cats (*Felis Silvestris Catus*) to rescue shelters in the UK. *Anthrozoös, 22*(4), 347-347. https://doi.org/10.2752/089279309X12538695316185

Castaño, P., Fuertes, M., Regidor-Cerrillo, J., Ferre, I., Fernandez, M., Ferreras, M. C., Moreno-Gonzalo, J., González-Lanza, C., Pereira-Bueno, J., Katzer, F., Ortega-Mora, L. M., Pérez, V, & Benavides, J. (2016). Experimental ovine toxoplasmosis: Influence of the gestational stage on the clinical course, lesion development and parasite distribution. *Veterinary Research, 47*, Article 43. https://doi.org/10.1186/s13567-016-0327-z

Castelli, P., Hart, L. A., & Zasloff, R. L. (2001). Companion cats and the social support systems of men with AIDS. *Psychological Report, 89*(1), 177-187. https://doi.org/10.2466/pr0.2001.89.1.17

Castillo, D., & Clarke, A. (2003). Trap/neuter/release methods ineffective in controlling domestic cat "colonies" on public lands. *Natural Areas Journal, 23*(3), 247-253. https://www.jstor.org/stable/43912243

Cecchetti, M., Crowley, S. L., Goodwin, C. E. D., & McDonald, R. A. (2021a). Provision of high meat content food and object play reduce predation of wild animals by domestic cats *Felis catus*. *Current Biology, 31*(5), 1-5. https://doi.org/10.1016/j.cub.2020.12.044

Cecchetti, M., Crowley, S. L., Goodwin, C. E. D., Cole, H., McDonald, J., Bearhop, S., & McDonald, R. A. (2021b). Contributions of wild and provisioned foods to the diets of domestic cats that depredate wild animals. *Ecosphere 12*(9), Article 03737. https://doi.org/10.1002/ecs2.3737

Centonze, L. A., & Levy, J. K. (2002). Characteristics of free-roaming cats and their caretakers. *Journal of the American Veterinary Medical Association, 220*(11), 1627-1633. https://doi.org/10.2460/javma.2002.220.1627

Centre for Invasive Species Solutions. (2016). *PestSmart*. www.pestsmart.org.au

Chermette, R., Ferreiro, L., & Guillot, J. (2008). Dermatophytoses in animals. *Mycophathologia, 166* (5-6), 385-405. https://doi.org/10.1007/s11046-008-9102-7

Chomel, B. B., Boulouis, H., Maruyama, S., & Breitschwerdt, E. B. (2006). *Bartonella* Spp. In pets and effect on human health. *Emerging Infectious Disease, 12*(3), 389-394. https://doi.org/10.3201/eid1203.050931

Chomel, B. B., Kasten, R. W., Floyd-Hawkins, K., Chi, B., Yamamoto, K., Roberts-Wilson, J., Gurfield, A. N., Abbott, R. C., Pedersen, N.C., & Koehler, J. E. (1996). Experimental transmission of *Bartonella henselae* by the cat flea. *Journal of Clinical Microbiology, 34*(8), 1952-1956. https://doi.org/10.1128/jcm.34.8.1952-1956.1996

Cisneros, A., Litwin, D., Niel, L., & Stellato, A. C. (2022). Unwanted scratching behavior in cats: Influence of management strategies and cat and owner characteristics. *Animals, 12*(19), Article 2551. https://doi.org/10.3390/ani12192551

Clancy, E. A., Moore, A. S., & Bertone, E. R. (2003). Evaluation of cat and owner characteristics and their relationships to outdoor access of owned cats. *Journal of the American Veterinary Medical Association, 222*(11), 1541-1545. https://doi.org/10.2460/javma.2003.222.1541

Clark, C. C., Gruffydd-Jones, T., & Murray, J. K. (2012). Number of cats and dogs in UK welfare organisations. *Veterinary Record, 170*(19), 493-499. https://doi.org/10.1136/vr.100524

Clarke A. L., & Pacin, T. (2002). Domestic cat "colonies" in natural areas: A growing exotic species threat. *Natural Areas Journal, 22*(2), 154-159. https://www.jstor.org/stable/43912043Code of Welfare: Companion Cats. (2018). https://www.mpi.govt.nz/animals/animal-welfare/codes/all-animal-welfare-codes/code-of-welfare-companion-cats/

Coe, J. B., Elmore, J. A., Elizondo, E. C., & Loss, S. R. (2021). Free-ranging domestic cat abundance and sterilization percentage following five years of a trap-neuter-return program. *Wildlife Biology*, *1*. https://doi.org/10.2981/wlb.00799

Commonwealth of Australia, Department of the Environment. (2015a). *Background document for the Threat abatement plan for predation by feral cats*. www.environment.gov.au/system/files/resources/78f3dea5-c278-4273-8923-fa0de27aacfb/files/tap-predation-feral-cats-2015-background.pdf

Commonwealth of Australia, Department of the Environment. (2015b). *Threat abatement plan for predation by feral cats*. www.environment.gov.au/system/files/resources/78f3dea5-c278-4273-8923-fa0de27aacfb/files/tap-predation-feral-cats-2015.pdf.

Companion Animal Parasite Council. (2017). *Fleas*. https://capcvet.org/guidelines/fleas/

Companion Animals New Zealand. (2018). *Animal microchip implantation best practice guide*. https://static1.squarespace.com/static/5d1bf13a3f8e880001289eeb/t/5fbb1cd4158b

28734be7d8bc/1606098220556/Microchip+Implantation+Best+Practice+Guide+2020.pdf

Companion Animals New Zealand. (2020). *Companion animals in New Zealand*. https://static1.squarespace.com/static/5d1bf13a3f8e880001289eeb/t/5f768e8a17377653bd1eebef/1601605338749/Companion+Animals+in+NZ+2020+%281%29.pdf

Companion Animals New Zealand. (2025). *Companion animals in New Zealand*. *New Zealand Pet Data Report*. https://www.companionanimals.nz/2024-nz-pet-data-report .

Connell, C. M., Janevic, M. R., Solway, E., & McLaughlin, S. J. (2007). Are pets a source of support or added burden for married couples facing dementia? *Journal of Applied Gerontology, 26*(5), 472-485. https://doi.org/10.1177/0733464807305180

Conroy, M., O'Neill, D., Boag, A., Church, D., & Brodbelt, D. (2019). Epidemiology of road traffic accidents in cats attending emergency-care practices in the UK. *Journal of Small Animal Practice, 60*(3), 146-152. https://doi.org/10.1111/jsap.12941

Cook, A. J., Gilbert, R. E., Buffolano, W., Zufferey, J., Petersen, E., Jenum, P. A., Foulon, W., Semprini, A. E., & Dunn, D. T. (2000). Sources of toxoplasma infection in pregnant women: European multicentre case-control study. *British Medical Journal, 321*(7254), 142-147. https://doi.org/10.1136/bmj.321.7254.142

Costa, A. J., Araujo, F. G., Costa, J. O., Lima, J. D., & Nascimento, E. (1977). Experimental infection of bovines with oocysts of *Toxoplasma gondii*. *Journal of Parasitology, 63*(2), 212-218. https://doi.org/10.2307/3280042

Craig, L. E., (2001). Physeal dysplasia with slipped capital femoral epiphysis in 13 cats. *Veterinary Pathology, 38*(1), 92-97. https://doi.org/10.1354/vp.38-1-92

Crawford, H. M., Calver, M. C., & Fleming, P. A. (2019). 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, 9*, Article 171. https://doi.org/10.3390/ani9040171

Crawford, H. M., Fontaine, J. B., & Calver, M. C. (2018). Ultrasonic deterrents reduce nuisance cat (*Felis catus*) activity on suburban properties. *Global Ecology and Conservation*, *15*, Article e00444. https://doi.org/10.1016/j.gecco.2018.e00444

Cressy, P., & Lake, R. (2015). Risk profile update: *Toxoplasma gondii* in red meat and meat products. https://www.mpi.govt.nz/dmsdocument/10091-risk-profile-update-toxoplasma-gondii-in-red-meat-and-meat-products

Crowley, S. L., Cecchetti, M., & McDonald, R. A. (2019). Hunting behaviour in domestic cats: An exploratory study of risk and responsibility among cat owners. *People and Nature, 1*(1), 18-30. https://doi.org/10.1002/pan3.6

Crowley, S. L., Cecchetti, M., & McDonald, R. A. (2020a). Our wild companions in the Anthropocene. *Trends in Ecology & Evolution, 35*(6), 477-483. https://doi.org/10.1016/j.tree.2020.01.008

Crowley, S. L., Cecchetti, M., & McDonald, R. A. (2020b). Diverse perspectives of cat owners indicate barriers to and opportunities for managing cat predation on wildlife. *Frontiers in Ecology and the Environment, 18*(10), 544-549. https://doi.org/10.1002/fee.2254

Crowley, S. L., DeGrange, L., Matheson, D., & McDonald, R. A. (2022). Comparing conservation and animal welfare professional's perspectives on domestic cat management. *Biological Conservation, 272*, Article 109659. https://doi.org/10.1016/j.biocon.2022.109659

Daly, M. K., Saba, C. F., Crochik, S. S., Howerth, E. W., Kosarek, C. E., Cornell, K. K., Roberts, R. E., & Northrup, N. C. (2008). Fibrosarcoma adjacent to the site of microchip implantation in a cat. *Journal of Feline Medicine and Surgery, 10*, 202-205. https://doi.org/10.1016/j.jfms.2007.10.011

D'Arcy, Y. (2011). 'Paws' to provide comfort, relieve pain. *Nursing, 41*(4), 67-69. https://doi.org/10.1097/01.NURSE.0000395305.83786.93

Dauphine, N., & Cooper, R. J. (2009). Impacts of free-ranging domestic cats (*Felis catus*) on birds in the United States: A review of recent research with conservation and management recommendations. *Proceedings of the Fourth International Partners Flight Conference Tundra to Tropics,* 205-219. https://abcbirds.org/wp-content/uploads/2015/07/Dauphine-and-Cooper-2009-Impacts-of-free-ranging-cats-on-birds-in-US.pdf

Day, M. J., Horzinek, M. C., Schultz, R. D., & Squires, R. A. (2016). WSAVA Guidelines for the vaccination of dogs and cats. *Journal of Small Animal Practice, 57*(1), E1-E45. https://doi.org/10.1111/jsap.2_12431

Dayer, A., & Manfredo, M. (2004). Concepts for exploring the social aspects of human-wildlife conflict in a global context. *Human Dimensions of Wildlife*, *9*(4), 1-20. https://doi.org/10.1080/10871200490505765

de Assis, L. S., & Mills, D. S. (2021). Introducing a controlled outdoor environment impacts positively in cat welfare and owner concerns: The use of a new feline welfare

assessment tool. *Frontiers in Veterinary Science, 7*, Article 599284. https://doi.org/10.3389/fvets.2020.599284

Deak, B. P., Ostendorf, B., Taggart, D., A., Peacock, D., E., & Bardsley, D. K. (2019). The significance of social perceptions in implementing successful feral cat management strategies: A global review. *Animals, 9*(9), Article 617. https://doi.org/10.3390/ani9090617

Dempster, R. P.,Wilkins, M., Green, R. S., & de Lisle, G. W. (2011). Serological survey of *Toxoplasma gondii* and *Campylobacter fetus fetus* in sheep from New Zealand. *New Zealand Veterinary Journal, 59*(4), 155-159. https://doi.org/10.1080/00480169.2011.579240

Denny, E., & Dickman, C. (2010). *Review of cat ecology and management strategies in Australia*. University of Sydney. https://pestsmart.org.au/wp-content/uploads/sites/3/2020/06/CatReport_web.pdf

Department of Conservation. (2001). *Forbes' parakeet and Chatham Island red-crowned parakeet recovery plan 2001-2011*. Threatened Species Recovery Plan 45. https://www.doc.govt.nz/documents/science-and-technical/TSRP45.pdf

Department of Conservation. (2011). *Tuhua welcomes first baby orange-fronted parakeet*. www.doc.govt.nz/orange-fronted-parakeet

Department of Conservation. (2016). *Nature and conservation of Motuihe Island/Te Motu-a-Ihenga*. www.doc.govt.nz/parks-and-recreation/places-to-go/auckland/places/motuihe-island-recreation-reserve/nature-and-conservation

Department of Conservation. (2024). *Predator Free 2050. A Practical Guide to Trapping. Mustelids Rats Possums. 3rd ed*. https://dcon01mstr0c21wprod.azurewebsites.net/globalassets/documents/conservation/threats-and-impacts/pf2050/trapping-guide-pf2050.pdf

Dias, R. A., Abrahão, C. R., Micheletti, T., Mangini, P. R., de Oliveira Gasparotto, V. P., de Jesus Pena, H. F., Ferreira, F., Russell, J. C., & Silva, J. C. R. (2017). Prospects for domestic and feral cat management on an inhabited tropical island. *Biological Invasions, 19*, 2339-2353, https://doi.org/10.1007/s10530-017-1446-9

Dorn, C. R., Taylor, D. O. N., Schneider, R., Hibbard, H. H., & Klauber, M. R. (1968). Survey of animal neoplasms in Alameda and Contra Costa Counties, California. II. Cancer morbidity in dogs and cats from Alameda County. *Journal of the National Cancer Institute, 40*(2), 307-318. https://academic.oup.com/jnci/article/40/2/307/929183

Dowding, J. E., & Murphy, E. C. (2001). The impact of predation by introduced mammals on endemic shorebirds in New Zealand: A conservation perspective. *Biological Conservation, 99*(1), 47-64. https://doi.org/10.1016/S0006-3207(00)00187-7

Driscoll, C. A., Macdonald, D. W., & O'Brien, S. J. (2009). From wild animals to domestic pets, an evolutionary view of domestication. *Proceedings of the National Academy of Sciences of the United States of America, 106*(Suppl 1), 9971-9978. https://doi.org/10.1073/pnas.0901586106

Driscoll, C. A., Menotti-Raymond, M., Roca, A. L., Hupe, K., Johnson, W. E., Geffen, E., Harley, E. H., Delibes, M., Pontier, D., Kitchener, A. C., Yamaguchi, N., O'brien, S. J., & Macdonald, D. W. (2007). The Near Eastern origin of cat domestication. *Science, 317*(5837), 519-523. https://doi.org/10.1126/science.1139518

Dubey, J. P. (1973). Feline toxoplasmosis and coccidiosis: A survey of domiciled and stray cats. *Journal of the American Veterinary Medical Association, 162*(10), 873-877. https://pubmed.ncbi.nlm.nih.gov/4633752/

Dubey, J. P. (1981). Protective immunity against clinical toxoplasmosis in dairy goats vaccinated with Hammondia hammondi and Hammondia heydorni. *American Journal of Veterinary Research, 42*(12), 2068-2070. https://pubmed.ncbi.nlm.nih.gov/7340577/

Dubey, J. P. (1985). Persistence of encysted *Toxoplasma gondii* in tissues of equids fed oocysts. *American Journal of Veterinary Research, 46*(8), 1753-1754. https://pubmed.ncbi.nlm.nih.gov/4037503/

Dubey, J. P. (2009). Toxoplasmosis in sheep- The last 20 years. *Veterinary Parasitology, 163(1-2)*, 1-14. https://doi.org/10.1016/j.vetpar.2009.02.026

Dubey, J. P. (2021). *Toxoplasmosis of animals and humans* (2nd ed.). CRC Press. https://doi.org/10.1201/9781003199373

Dubey, J. P., Cerqueira-Cézar, C. K., Murata, F. H. A., Kwok, O. C. H., Yang, Y. R., & Su, C. (2020). All about toxoplasmosis in cats: The last decade. *Veterinary Parasitology, 283*, Article 109145. https://doi.org/10.1016/j.vetpar.2020.109145

Dubey, J. P., & Desmonts, G. (1987). Serological responses of equids fed *Toxoplasma gondii* oocysts. *Equine Veterinary Journal,19*(4), 337-339. https://doi.org/10.1111/j.2042-3306.1987.tb01426.x

Dubey, J. P., Lindsay, D. S., & Lappin, M. R. (2009). Toxoplasmosis and other intestinal coccidial infections in cats and dogs. *Veterinary Clinics of North America - Small Animal Practice*, *39*(6), 1009-1034. https://doi.org/10.1016/j.cvsm.2009.08.001

Dubná, S., Langrová, I., Jankovská, I., Vadlejch, J., Pekár, S., Nápravník, J., & Fechtner, J. (2007). Contamination of soil with Toxocara eggs in urban (Prague) and rural areas in the Czech Republic. *Veterinary Parasitology, 144*(1-2), 81-86. https://doi.org/10.1016/j.vetpar.2006.09.023

Dubois, S., Fenwick, N., Ryan, E. A., Baker, L., Baker, S. E., Beausoleil, N. J., Carter, S., Cartwright, B., Costa, F., Draper, C., Griffin, J., Grogan, A., Howald, G., Jones, B., Littin, K. E., Lombard, A. T., Mellor, D. J., Ramp, D., Schuppli, C. A., & Fraser, D. (2017). International consensus principles for ethical wildlife control. *Conservation Biology, 31*(4), 753-760. https://dx.doi.org/10.1111/cobi.12896

Elliott, A., Howell, T. J., McLeod, E. M., & Bennett, P. C. (2019). Perceptions of responsible cat ownership behaviors among aconvenience sample of Australians. *Animals, 9,* Article 703. https://doi.org/10.3390/ani9090703

Ellis, S. L. H. (2009). Environmental enrichment. Practical strategies for improving feline welfare. *Journal of Feline Medicine and Surgery, 11*(11), 901-912. https://doi.org/10.1016/j.jfms.2009.09.011

Ellis, S. L. H., Rodan, I., Carney, H. C., Heath, S., Rochlitz, I., Shearburn, L. D., Sundahl, E., & Westropp, J. L. (2013). AAFP and ISFM feline environmental needs guidelines. *Journal of Feline Medicine and Surgery, 15*(3), 219-230. https://doi.org/10.1177/1098612X13477537

Ellis, J. J., Stryhn, H., Spears, J., & Cockram, M. S. (2017b). Environmental enrichment choices of shelter cats. *Behavioural Processes, 141*, 291-296. https://doi.org/10.1016/j.beproc.2017.03.023

Ellis, S. L. H., & Wells, D. L. (2010). The influence of olfactory stimulation on the behaviour of cats housed in a rescue shelter. *Applied Animal Behaviour Science, 123*(1-2), 56-62. https://doi.org/10.1016/j.applanim.2009.12.011

Environment Court of New Zealand. (2021). *Weston Lea Ltd. & Director-General of Conservation v Hamilton City Council 27/09/2021.* https://hamilton.govt.nz/property-rates-and-building/resource-consent/publicly-notified-resource-consents/detail/weston-lea-limited

Environment Southland. (2019). *Southland Regional Pest Management Plan 2019-29*. https://www.es.govt.nz/about-us/plans-and-strategies/regional-plans/southland-regional-pest-management-plan

Esteban-Redondo, I., Maley, S. W., Thomson, K., Nicoll, S.,Wright, S., Buxton, D., & Innes, E. A. (1999). Detection of *T. gondii* in tissues of sheep and cattle following oral infection.

Veterinary Parasitology, 86(3), 155-171. https://doi.org/10.1016/S0304-4017(99)00138-7

European Food Safety Authority (EFSA), Candiani, D., Drewe, J., Forkman, B., Herskin, M. S., Van Soom, A., Aboagye, G., Ashe, S., Mountricha, M., Van der Stede Y., & Fabris, C. (2023). Scientific and technical assistance on welfare aspects related to housing and health of cats and dogs in commercial breeding establishments. *EFSA Journal, 21*(9), 1-105. https://doi.org/10.2903/j.efsa.2023.8213

European Platform on Animal Welfare: Welfare in Pet Trade. (2020). *Responsible cat breeding guidelines*. https://food.ec.europa.eu/animals/animal-welfare/eu-platform-animal-welfare/platform-conclusions_en#pets

Fakhri, Y., Gasser, R. B., Rostami, A., Fan, C. K., Ghasemi, S. M., Javanian, M., Bayani, M., Armoon, B., & Moradi, B. (2018). Toxocara eggs in public places worldwide - A systematic review and meta-analysis. *Environmental Pollution, 242*(Part B), 1467-1475. https://doi.org/10.1016/j.envpol.2018.07.087

Farnworth, M. J., Adams, N. J., Seksel, K., Waran, N. K., Beausoleil, N. J., & Stafford, K. J. (2013a). Veterinary attitudes towards pre-pubertal gonadectomy of cats: A comparison of samples from New Zealand, Australia and the United Kingdom. *New Zealand Veterinary Journal*, *61*(4), 226-233. https://doi.org/10.1080/00480169.2012.738591

Farnworth, M. J., Campbell, J., & Adams, N. J. (2011). What's in a name? Perceptions of stray and feral cat welfare and control in Aotearoa, New Zealand. *Journal of Applied Animal Welfare Science, 14*(1), 59-74. https://doi.org/10.1080/10888705.2011.527604

Farnworth, M., Dye, N., & Keown, N. (2010). The legal status of cats in New Zealand: A perspective on the welfare of companion, stray, and feral domestic cats (*Felis catus*). *Journal of Applied Animal Welfare Science*, *13*(2), 180-188. https://doi.org/10.1080/10888700903584846

Farnworth, M. J., Muellner, P., & Benschop, J. (2013b). A systematic review of the impacts of feral, stray and companion domestic cats (Felis catus) on wildlife in New Zealand and options for their management. New Zealand Veterinary Association, Wellington, New Zealand.

Farnworth, M. J., Watson, H., & Adams, N. J. (2014). Understanding control of non-native wild and feral mammals: Similarities and differences in the opinions of the general public, animal protectionists and conservationists in New Zealand (Aotearoa). *Journal of Applied Animal Welfare Science, 17*(1), 1-17. https://doi.org/10.1080/10888705.2013.799414

Ferré Dolcet, L., Ventura, L., & Marchiori, A. (2023). Long-term effect of neutering on cancer development in cats: Can we compare it to dogs? *Reproduction in Domestic Animals, 58*, 286. https://doi.org/10.1111/rda.14442

Finka, L. R., Ellis, S. L. H., & Stavisky, J. (2014). A critically appraised topic (CAT) to compare the effects of single and multi-cat housing on physiological and behavioural measures of stress in domestic cats in confined environments. *BMC Veterinary Research, 10*, Article 73. https://doi.org/10.1186/1746-6148-10-73

Finkler, H. A. C., Hatna, E. B., & Terkel, J. A. (2011a). The influence of neighbourhood socio-demographic factors on densities of free-roaming cat populations in an urban ecosystem in Israel. *Wildlife Research, 38*(3), 235-243. https://doi.org/10.1071/WR10215

Finkler, H., Hatna, E., & Terkel, J. (2011b). The impact of anthropogenic factors on the behavior, reproduction, management and welfare of urban, free-roaming cat populations. *Anthrozoös, 24*(1), 31-49. https://doi.org/10.2752/175303711X12923300467320

Finkler, H., & Terkel, J. (2011). Dichotomy in the emotional approaches of caretakers of free-roaming cats in urban feeding groups: Findings from in-depth interviews. *Anthrozoös, 24*(2), 203-218. https://doi.org/10.2752/175303711X12998632257413

Finkler, H., & Terkel, J. (2012). The contribution of cat owners' attitudes and behaviours to the free-roaming cat overpopulation in Tel Aviv, Israel. *Preventive Veterinary Medicine, 104*(1-2), 125-135. https://doi.org/10.1016/j.prevetmed.2011.11.006

Fischer, H. R., Norton, J., Kobluk, C. N., Reed, A. L., Rooks, R. L., & Borostyankoi, F. (2004). Surgical reduction and stabilization for repair of femoral capital physeal fractures in cats: 13 cases (1998-2002). *Journal of the American Veterinary Medical Association, 224*(9), 1478-1482. https://doi.org/10.2460/javma.2004.224.1478

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach*. Taylor and Francis. https://doi.org/10.4324/9780203838020

Fisher, P., Algar, D., Murphy, E., Johnston, M., & Eason, C. (2015). How does cat behaviour influence the development and implementation of monitoring techniques and lethal control methods for feral cats? *Applied Animal Behaviour Science, 173*, 88-96. https://doi.org/10.1016/j.applanim.2014.09.01

Fitzgerald, B. M., & Veitch, C. R. (1985). The cats of Herekopareisland, New Zealand; Their history, ecology and effects on birdlife. *New Zealand Journal of Zoology, 12*(3), 319-330. https://doi.org/10.1080/03014223.1985.10428285

Flockhart, D. T. T, Lipsey, L., Herrera, D. J., Belsley, J., Decker, S. T., Moore, S. M., Robinson, E., Kilgour, R. J., Gramza, A., McShea, W., Cove, M. V., Haston, R., Slater, M. R., Bays, D. J., & Boone, J. D. (2022). Estimates of domestic cats in urban areas using interdisciplinary science: The Washington D.C. Cat Count. *Society & Animals*, 1-18. https://doi.org/10.1163/15685306-bja10097

Florin, T. A., Zaoutis, T. E., & Zaoutis, L. B. (2008). Beyond cat scratch disease: Widening the spectrum of *Bartonella henselae* infection. *Pediatrics, 121*(5), e1413-1425. https://doi.org/10.1542/peds.2007-1897

Foley, P., Foley, J. E., Levy, J. K., & Paik, T. (2005). Analysis of the impact of trap-neuter-return programs on populations of feral cats. *Journal of the American Veterinary Medical Association, 227*(11), 1775-1781. https://doi.org/10.2460/javma.2005.227.1775

Foreman-Worsley, R., & Farnworth, M. J. (2019). A systematic review of social and environmental factors and their implications for indoor cat welfare. *Applied Animal Behaviour Science*, *220*, Article 104841. https://doi.org/10.1016/j.applanim.2019.104841

Foreman-Worsley, R., Finka, L., R., Ward, S. J., & Farnworth, M J. (2021). Indoors or outdoors? An international exploration of owner demographics and decision making associated with lifestyle of pet cats. *Animals, 11*, Article 253. https://doi.org/10.3390/ani11020253

Fossati, P. (2022). Sapy/neuter laws as debated approach to stabilizing the populations of dogs and cats: An overview of the European legal framework and remarks. *Journal of Applied Animal Welfare Science, 27*(2), 281-293. https://doi.org/10.1080/10888705.2022.2081807

Fossati, P., & Ruffo, G. (2021). Purebred dogs and cats: A proposal for a better protection. *Journal of Veterinary Behavior, 45*, 44-50. https://doi.org/10.1016/j.jveb.2021.05.009

Fournier, A. K., & Gellar, E. S. (2004). Behaviour analysis of companion-animal overpopulation: A conceptualization of the problem and suggestions for intervention. *Behavior and Social Issues, 13*, 51-69. https://doi.org/10.5210/bsi.v13i1.35

Friedmann, E., & Thomas, S. A. (1995). Pet ownership, social support, and one-year survival after acute myocardial infarction in the Cardiac Arrhythmia Suppression Trial (CAST). *The American Journal of Cardiology, 76*(17), 1213-1217. https://doi.org/10.1016/S0002-9149(99)80343-9

Gagnon, J., Bouchard, F., Landry, M., Belles-Isles, M., Fortier, M., & Fillion, L. (2004). Implementing a hospital-based animal therapy program for children with cancer: A descriptive study. *Canadian Oncology Nursing Journal, 14*(4), 217-222. https://doi.org/10.5737/1181912x144217222

Gao, X., Yin, M., Yang, P., Li, X., Di, L., Wang, W., Cui, H., Yan, X., & Liu, J. (2020). Effect of exposure to cats and dogs on the risk of asthma and alleric rhinitis: A systematic review and meta-analysis. *Americal Journal of Rhinology & Allergy, 34*(5), 703-714. https://doi.org/10.1177/1945892420932487

Gartrell, B. D., Jolly, M., Yissink, K., Argilla, L. S., & Esam, F. (2023). A retrospective study of native wild birds and retiles admitted to three New Zealand wildlife hospitals due to predation by cats. *New Zealand Veterinary journal, 71*(2), 86-91. https://doi.org/10.1080/00480169.2022.2152889

Gates, M. C., Vigeant, S., & Dale, A. (2017). Prevalence and risk factors for cats testing positive for feline immunodeficiency virus and feline leukaemia virus infection in cats entering an animal shelter in New Zealand. *New Zealand Veterinary Journal, 65*(6), 1-7. https://doi.org/10.1080/00480169.2017.1348266

Gates, M., Walker, J., Zito, S., & Dale, A. (2019). A survey of opinions towards dog and cat management policy issues in New Zealand. *New Zealand Veterinary Journal, 67*(6), 1-8. https://doi.org/10.1080/00480169.2019.1645627

Gepp, S. (2019). Cats and wildlife: Is New Zealand's existing regulatory framework too fragmented to enable effective management of cats' impacts on native species? LLM Research Paper Law 582: Masters Legal Writing. Victoria University of Wellington.

Getting to Zero. (2024). *Information for developing cooperative desexing programs*. https://www.g2z.org.au/co-operative-desexing-programs.html

Giles-Corti, B., Bulsara, M., & Wood, L. (2005). The pet connection: Pets as a conduit for social capital? *Social Science and Medicine, 61*(6), 1159-1173. https://doi.org/10.1016/j.socscimed.2005.01.017

Gilhofer, E. M., Windschnurer, I., Troxler, J., & Heizmann, V. (2019). Welfare of feral cats and potential influencing factors. *Journal of Veterinary Behavior, 30*, 114-123. https://doi.org/10.1016/j.jveb.2018.12.012

Gillies, C., & Clout, M. (2003). The prey of domestic cats (*Felis catus*) in two suburbs of Auckland City, New Zealand. *Journal of Zoology, 259*(3), 309-315. https://doi.org/10.1017/S095283690200328X

Gillies, C. A., & van Heezik, Y. M. (2021). Family felidae. In C. M. King, & D. M. Forsyth (Eds.), *The handbook of New Zealand mammals* (3rd ed., pp. 343-370). CSIRO. https://www.publish.csiro.au/book/7576/#details

Glen, A. S., Edwards, S., Finlay-Smits, S., Jones, C., Niebuhr, C., Norbury, G. L., & Samaniego, A. (2023). Management of cats in Aotearoa New Zealand: A review of current

knowledge and research needs. *New Zealand Journal of Ecology, 47*(1), Article 3550. https://doi.org/10.20417/nzjecol.47.3550

Goodwin, K., Rand, J., Morton, J., Uthappa, V., & Walduck, R. (2018). Email reminders increase the frequency that pet owners update their microchip information. *Animals, 8*(2), Article 20. https://doi.org/10.3390/ani8020020

Gordon, J. K., Matthaei, C., & Van Heezik, Y. (2010). Belled collars reduce catch of domestic cats in New Zealand by half. *Wildlife Research, 37*(5), 372-378. https://doi.org/10.1071/WR09127

Gotteland, C., Gilot-fromont, E., Aubert, D., Poulle, M., Dupuis, E., Dardé, M., Forin-Wiart, M-A., Rabilloud, M., Riche, B., & Villena, I. (2014). Spatial distribution of *Toxoplasma gondii* oocysts in soil in a rural area: Influence of cats and land use. *Veterinary Parasitology, 205*(3-4), 629-637. https://doi.org/10.1016/j.vetpar.2014.08.003

Gourkow, N., & Fraser, D. (2006). The effect of housing and handling practices on the welfare, behaviour and selection of domestic cats (*Felis sylvestris catus*) by adopters in an animal shelter. *Animal Welfare, 15*(4), 371-377. https://doi.org/10.1017/s0962728600030700

Grabka, M. M., & Headey, B. (2007). Pets and human health in Germany and Australia: National longitudinal results. *Social Indicators Research, 80*, 297-311. https://doi.org/10.1007/s11205-005-5072-z

Graf, R., Grüntzig, K., Boo, G., Hässig, M., Axhausen, K. W., Fabrikant, S., Welle, M., Meier, D., Guscetti, F., Folkers, G., Otto, V., & Pospischil, A. (2016). Swiss Feline Cancer Registry 1965-2008: The influence of sex, breed and age on tumour types and tumour locations. *Journal of Comparative Pathology, 154*(2-3), 195-210. https://doi.org/10.1016/j.jcpa.2016.01.008

Gramza, A., Teel, T., Vandewoude, S., & Crooks, K. (2016). Understanding public perceptions of risk regarding outdoor pet cats to inform conservation action. *Conservation Biology, 30*(2), 276-286. https://www.jstor.org/stable/24760926

Gräser, Y., Monod, M., Bouchara, J. P., Dukik, K., Nenoff, P., Kargl, A., Kupsch, C., Zhan, P., Packeu, A., Chaturvedi, V., & de Hoog, S. (2018). New insights in dermatophyte research. *Medical Mycology, 56*(1), S2-S9. https://doi.org/10.1093/mmy/myx141

Grayson, J., Calver, M., & Styles, I. (2002). Attitudes or suburban Western Australians to proposed cat control legislation. *Australian Veterinary Journal, 80*(9), 536-543. https://doi-org.ezproxy.auckland.ac.nz/10.1111/j.1751-0813.2002.tb11030.x

Greenwell, C. N., Calver, M. C., & Loneragan, N. R. (2019). Cat gets its Tern: A case study of predation on a Threatened Coastal Seabird. *Animals, 9*(7), Article 445. https://doi.org/10.3390/ani9070445

Gunther, I., Finkler, H., & Terkel, J. (2011). Demographic differences between urban feeding groups of neutered and sexually intact free-roaming cats following trap-neuter-return procedure. *Journal of the American Veterinary Medical Association, 238*(9), 1134-1140. https://doi.org/10.2460/javma.238.9.1134

Gunther, I., Hawlena, H., Azriel, L., Gibor, D., Berke, O., & Klement, E. (2022). Reduction of free-roaming cat population requires high-intensity neutering in spatial contiguity to mitigate compensatory effects. *PNAS, 119*(15), Article e2119000119. https://doi.org/10.1073/pnas.2119000119

Gunther, I., Raz, T., Berke, O., & Klement, E. (2015). Nuisances and welfare of free-roaming cats in urban settings and their association with cat reproduction. *Preventive Veterinary Medicine, 119*(3-4), 203-210. https://doi.org/10.1016/j.prevetmed.2015.02.012

Gunther, I., Raz, T., & Klement, E. (2018). Association of neutering with health and welfare of urban free-roaming cat population in Israel, during 2012-2014. *Preventive Veterinary Medicine, 157*, 26-33. https://doi.org/10.1016/j.prevetmed.2018.05.018

Gunther, I., Raz, T., Zor, Y. E., Bachowski, Y., & Klement, E. (2016). Feeders of free-roaming cats: Personal characteristics, feeding practices, and data on cat health and welfare in an urban setting of Israel. *Frontiers in Veterinary Science, 3,* Article 21. www.doi.org/10.3389/fvets.2016.00021

Gunther, I., & Terkel, J. (2002). Regulation of free-roaming cat (*Felis silvestris catus*) populations: A survey of the literature and its application to Israel. *Animal Welfare, 11*(2), 171-188. https://doi.org/10.1017/S096272860002813X

Guttilla, D. A., & Stapp, P. (2010). Effects of sterilization on movements of feral cats at a wildland-urban interface. *Journal of Mammalogy, 91*(2), 482-489. https://doi.org/10.1644/09-MAMM-A-111.1

Hagman, R., Holst, B. S., Möller, & egenvall, A. (2014). Incidence of pyometra in Swedish insured cats. *Therionology, 82*(1), 114-120. https://doi.org/10.1016/j.theriogenology.2014.03.007

Hall, C. M., Bryant, K. A., Fontaine, J. B., & Calver, M. C. (2016a). Do collar-mounted predation deterrents restrict wandering in pet domestic cats? *Applied Animal Behaviour Science, 176*, 96-104. https://doi.org/10.1016/j.applanim.2015.12.006

Hall, C. M., Adams, N. A., Bradley, J. S., Bryant, K. A., Davis, A. A., Dickman, C. R., Fujita, T., Kobayashi, S., Lepczyk, C. A., McBride, E. A., Pollock, K. H., Styles, I. M., van Heezik, Y., Wang, F., & Calver, M. C. (2016b). Community attitudes and practices of urban residents regarding predation by pet cats on wildlife: An international comparison. *PLoS ONE, 11*(4), Article e0151962. https://doi.org/10.1371/journal.pone.0151962

Hall, C. M., Fontaine, J. B., Bryant, K. A., & Calver, M. C. (2015). Assessing the effectiveness of the Birdsbesafe® anti-predation collar cover in reducing predation on wildlife by pet cats in Western Australia. *Applied Animal Behaviour Science, 173*, 40–51. https://doi.org/10.1016/j.applanim.2015.01.004

Halls, V. (2013). Management of behavioural disorders. In A. Harvey, & S. Tasker (Eds.), *BSAVA Manual of Feline Practice* (pp. 433–438). BSAVA. https://doi.org/10.22233/9781910443149.18

Hamilton, J. B., Hamilton, R. S., & Mestler, G. E. (1969). Duration of life and causes of death in domestic catsavior. *Journal of Gerontology, 24*(4), 427–437. https://doi.org/10.1093/geronj/24.4.427

Hampe, J. F., & Misdorp, W. (1974). Tumours and dysplasias of the mammary gland. *Bulletin World Health Organisation, 50*(1–2), 111–133. https://pmc.ncbi.nlm.nih.gov/articles/PMC2481221/

Hampton, J. O., Forsyth, D. M., Mackenzie, D. I., & Stuart, I. G. (2015). A simple quantitative method for assessing animal welfare outcomes in terrestrial wildlife shooting: The European rabbit as a case study. *Animal Welfare, 24*(3), 307–317. https://doi.org/10.7120/09627286.24.3.307

Harper, G. A. (2010). Diet of feral cats on subantarctic Auckland Island. *New Zealand Journal of Ecology, 34*(2), 258–261. https://newzealandecology.org/nzje/2928.

Harrod, M., Keown, A. J., & Farnworth, M. J. (2016). Use and perception of collars for companion cats in New Zealand. *New Zealand Veterinary Journal, 64*(2), 121–124. https://doi.org/10.1080/00480169.2015.1110064

Hart, M. (2023, January 26). Could keeping cats at home become New Zealand's norm? *RNZ*. https://www.rnz.co.nz/news/national/483169/could-keeping-cats-at-home-become-new-zealand-s-norm#:~:text=The%20Marlborough%20District%20Council%20recently,to%20roam%20off%20the%20property.

Hart, B. L., & Cooper, L. C. (1984). Factors relating to urine spraying and fighting in prepubertally gonadectomized cats. *Journal of the American Veterinary Medical Association*, *184*(10), 1255-8. https://pubmed.ncbi.nlm.nih.gov/6539762/

Haspel, C., & Calhoon, R. E. (1990). The interdependence of humans and free-ranging cats in Brooklyn, New York. *Anthrozoös, 3*(3), 155-155. https://doi.org/10.2752/089279390787057630

Hatley, P. J. (2003). Feral cat colonies in Florida: The fur and feathers are flying. *Journal of Land Use and Environmental Law*, *18*(2), 441-465. https://www.jstor.org/stable/42842825

Havlickova, B., Czaika, V. A., & Friedrich, M. (2008). Epidemiological trends in skin mycoses worldwide. *Mycoses, 51*(Suppl. 4), 2-15. https://doi.org/10.1111/j.1439-0507.2008.01606.x.

Haye, L., Gérard, P., Debue, K., & Guilaine, J. (2004). Early taming of the cat in Cyprus. *Science, 304*, 259-259. https://doi.org/10.1126/science.1095335

Hayes, H. M., Milne, K. L., & Mandel, C. P. (1981). Epidemiological features of feline mammary carcinoma. *Veterinary Record, 108*(22), 476-479. https://doi.org/10.1136/vr.108.22.476

Hayward, M. (2007). *Mandatory desexing in the ACT: Has it worked*? Australian Institute of Animal Management Annual Conference. https://aiam.org.au/resources/Documents/2007%20Workshop%20presentations/Mandatory%20Desexing%20in%20the%20ACT%20-%20Has%20it%20worked,%20Dr%20Michael%20Hayward.pdf

Head, B. W. (2008). Wicked problems in public policy. *Public Policy, 3*(2), 101-118. https://espace.library.uq.edu.au/view/UQ:167582

Headey, B. (1999). Health benefits and health cost savings due to pets: Preliminary estimates from an Australian National Survey. *Social Indicators Research, 47*, 233-243. https://doi.org/10.1023/A:1006892908532

Henning, J. S., L., Nielsen, T., Fernandez, E., & Hazel, S. (2022). Factors associted with play behavior in human-cat dyads. *Journal of Veterinary Behavior*, *52-53*, 21-30. https://doi.org/10.1016/j.jveb.2022.05.007

Henning, J., Nielsen, T., Fernandez, E., & Hazel, S. (2023). Cats just want to have fun: Associations between play and welfare in domestic cats. *Animal Welfare, 32*, Article e9. https://doi.org/10.1017/awf.2023.2

Herron, M. E., & Buffington, C. A. T. (2010). Environmental enrichment for indoor cats. *Compendium: Continuing Education for Veterinarians, 32*(12), Article E4. http://www.vetlearn.com/InPractice/ClientHandouts.aspx

Hodges, C. F. (2010). *Detailed discussion of state spay and neuter laws*. https://www.animallaw.info/article/detailed-discussion-state-spay-and-neuter-laws#fn17

Hou, Z. F., Su, S. J., Liu, D. D., Wang, L. L., Jia, C. L., Zhao, Z. X., Ma, Y. F., Li, Q. Q., Xu, J. J., Tao, J. P. (2018). Prevalence, risk factors and genetic characterization of *Toxoplasma gondii* in sick pigs and stray cats in Jiangsu Province, eastern China. *Infection, Genetics, and Evolution, 60*, 17-25. https://doi.org/10.1016/j.meegid.2018.02.007

Howe, L. M. (1997). Short-term results and complications of prepubertal gonadectomy in cats and dogs. *Journal of American Veterinary Medical Association, 211*(1), 57-62. https://doi.org/10.2460/javma.1997.211.01.57

Howe, L. M. (2000). Long-term outcome of gonadectomy performed at an early age or traditional age in cats. *Journal of the American Veterinary Medical Association, 217*(11), 1661-1665. https://doi.org/10.2460/javma.2000.217.1661

Howe, L. M. (2015). Current perspectives on the optimal age to spay/castrate dogs and cats. *Veterinary Medicine: Research and Reports, 6*, 171-180. https://doi.org/10.2147/vmrr.s53264

Howe, L., Hunter, S., Burrows, E., & Roe, W. (2014). Four cases of fatal toxoplasmosis in three species of endemic New Zealand birds. *Avian Diseases, 58*, 171-5. https://doi.org/10.1637/10625-080413-Case.1

Huang, L., Coradini, M., Rand, J., Morton, J., Albrecht, K., Wasson, B., & Robertson, D. (2018). Search methods used to locate missing cats and locations where missing cats are found. *Animals, 8*(1), Article 5. https://doi.org/10.3390/ani8010005

Hughes, K. L., & Slater, M. R. (2002). Implementation of a feral cat management program on a university campus. *Journal of Applied Animal Welfare Science, 5*(1), 15-28. https://doi.org/10.1207/S15327604JAWS0501_2

Hughes, K. L., Slater, M. R., & Haller, L. (2002). The Effects of implementing a feral cat spay/neuter program in a Florida County Animal Control Service. *Journal of Applied Animal Welfare Science, 5*(4), 285-298. https://doi.org/10.1207/S15327604JAWS0504_03

Humane Society of the United States. (2014). *Are you having trouble affording your pet?* https://www.humanesociety.org/resources/are-you-having-trouble-affording-your-pet

Hunter, S. A., & Alley, M. R. (2014). Toxoplasmosis in wild birds in New Zealand. *Kokako, 21*(2), 58-59. https://www.sciquest.org.nz/browse/publications/article/112757

Hurley, K. (2013a). *Making the case for a paradigm shift in community cat management, part one*. www.maddiesfund.org/making-the-case-for-community-cats-part-two.htm?p=topic35

Hurley, K. (2013b). *Making the case for a paradigm shift in community cat management, part two*. www.maddiesfund.org/making-the-case-for-community-cats-part-two.htm?p=topic35

Ihan, Z., Karaca, M., Ekin, I. H., Solmaz, H., Akkan, H. A., & Tutuncu, M. (2016). Detection of seasonal asymptomatic dermatophytes in Van cats. *Brazilian Journal of Microbiology, 47*(1), 225-230. https://doi.org/10.1016/j.bjm.2015.11.027

Imber, M. J., West, J. A., & Cooper, W. J. (2003). Cook's petrel (*Pterodroma cookii*): Historic distribution, breeding ecology and effects of predators. *Notornis, 50*(4), 221-230. https://www.birdsnz.org.nz/publications/cooks-petrel-pterodroma-cookii-historic-distribution-breeding-biology-and-effects-of-predators/

Ines, M., Ricci-Bonot, C., & Mills, D. S. (2021). My Cat and me- A study of cat owner perceptions of their bond and relationship. *Animals, 11*(6), Article 1601. https://doi.org/10.3390/ani11061601

Innes, E. A., Hamilton, C., Garcia, J. L., & Chryssafidis, A. (2019). A One Health approach to vaccines against *Toxoplasma gondii*. *Food and Waterborne Parasitology, 15*, Article e00053. https://doi.org/10.1016/j.fawpar.2019.e00053

Izawa, M., & Ono, Y. (1986). Mother-offspring relationship in the feral cat population. *The Mammal Society of Japan, 11*(1-2), 27-34. https://www.jstage.jst.go.jp/article/jmammsocjapan1952/11/1-2/11_1-2_27/_pdf/-char/ja

Jacobson, S. K. (2009). *Communication skills for conservation professionals*. 2nd edition. Island Press. https://islandpress.org/books/communication-skills-conservation-professionals-0#desc

James, K. E., Smith, W. A., Packham, A. E., Conrad, P. A., & Pusterla, N. (2017). *Toxoplasma gondii* seroprevalence and association with equine protozoal myeloencephalitis: A

case-control study of Californian horses. *The Veterinary Journal, 224*, 38-43. https://doi.org/10.1016/j.tvjl.2017.05.008

Jennings, L. B. (1997). Potential benefits of pet ownership in health promotion. *Journal of Holistic Nursing, 15*(4), 358-372. https://doi.org/10.1177/089801019701500404

Jessup, D. A. (2004). The welfare of feral cats and wildlife. *Journal of the American Veterinary Medical Association, 1225*(9), 1377-1383. https://doi.org/10.2460/javma.2004.225.1377

Jiang, H. H., Huang, S. Y., Zhou, D. H., Zhang, X. X., Su, C., Deng, S. Z., & Zhu, X. Q. (2013). Genetic characterization of *Toxoplasma gondii* from pigs from different localities in China by PCR-RFLP. *Parasites & Vectors, 6*, Article 227. https://doi.org/10.1186/1756-3305-6-227

Jöchle, W., & Jöchle, M. (1993). Reproduction in a feral cat population and its control with a prolactin inhibitor, cabergoline. *Journal of Reproductive Fertility Supplement, 47,* 419-424. https://pubmed.ncbi.nlm.nih.gov/8229957/

Johnson, J., & Calver, M. C. (2014). Prevalence of desexed cats in relation to age in a convenience sample of Western Australian cats. *Australian Veterinary Journal, 92*(6), 226-227. https://doi.org/10.1111/avj.12182

Johnson, K. L., & Cicirelli, J. (2014), Study of the effect on shelter cat intakes and euthanasia from a shelter neuter return project of 10,080 cats from March 2010 to June 2014. *PeerJ, 2*, Article e646. https://doi.org/10.7717/peerj.646

Johnston, S. D., & Rhodes, L. (2015). No surgery required: The future of feline sterilization. An overview of the Michelson Prize and Grants in Reproductive Biology. *Journal of Feline Medicine and Surgery, 17*(9), 777-782. https://doi.org/10.1177/1098612X15594992

Jones, A. L., & Downs, C. T. (2011). Managing feral cats on a university's campuses: How many are there and is sterilization having an effect? *Journal of Applied Animal Welfare Science, 14*(4), 304–320. https://doi.org/10.1080/10888705.2011.600186

Joyce, A., & Yates, D. (2011). Help stop teenage pregnancy! *Journal of Feline Medicine and Surgery, 13*(1), 3-10. https://doi.org/10.1016/j.jfms.2010.11.005

Jupe, A., Rand, J., Morton, J., & Fleming, S. (2017). Attitudes of veterinary teaching staff and exposure of veterinary students to early-age desexing, with review of current early-age desexing literature. *Animals, 8*(1), Article 3. https://doi.org/10.3390/ani8010003

Kays, R. W., & DeWan, A. A. (2004). Ecological impact of inside/outside house cats around a suburban nature preserve. *Animal Conservation, 7*, 273-283. https://doi.org/10.1017/S1367943004001489

Kays, R., Dunn, R. R., Parsons, A. W., Mcdonald, B., Perkins, T., Powers, A., Shell, L., McDonald, J. L., Cole, H., Kikillus, H., Woods, L., Tindle, H., & Roetman, P. (2020). The small home ranges and large local ecological impacts of pet cats. *Animal Conservation, 23*, 516-523. https://doi.org/10.1111/acv.12563

Kass, P. H. (2005). Cat overpopulation in the United States. In I. Rochlitz (Ed.), *The welfare of cats* (pp. 119-140). Springer. https://doi.org/10.1007/978-1-4020-3227-1_5

Kemp, J. R., Young, L., Mosen, C., Bolitho, L., Orr-Walker, T., Yockney, I., & Elliott, G. (2023). Irruptive dynamics of invasive carnivores and prey populations, and predator control, affect kea survivorship across the Southern Alps. *New Zealand Journal of Zoology, 50*(2), 279-304. https://doi.org/10.1080/03014223.2021.2021249

Kent, M. S., Karchemskiy, S., Culp, W. T. N., Lejeune, A. T., Pesavento, P. A., Toedebusch, C., Brady, R., & Rebhun, R. (2022). Longevity and mortality in cats: A single institution necropsy study of 3108 cases (1989–2019). *PLoS ONE 17*(12), Article e0278199. https://doi.org/10.1371/journal.pone.0278199

Kijlstra, A., Meerburg, B. G., & Mul, M. F. (2004). Animal-friendly production systems may cause re-emergence of *Toxoplasma gondii*. *NJAS-Wageningen Journal of Life Sciences, 52*(2), 119-132. https://doi.org/10.1016/S1573-5214(04)80008-3

Kikillus, K. H., Champers, G. K., Farnworth, M. J., & Hare, K. M. (2017). Research challenges and conservation implications for urban cat management in New Zealand. *Pacific Conservation Biology, 23*(1), 15-24. https://doi.org/10.1071/PC16022

Kilgour, R. J., Magle, S. B., Slater, M., Christian, A., Weiss, E., & DiTullio, M. (2017). Estimating free-roaming cat populations and the effects of one year Trap-Neuter-Return management effort in a highly urban area. *Urban Ecosystems, 20*(1), 207-216. https://doi.org/10.1007/s11252-016-0583-8

Kim, J. H., Kang, K. I., Kang, W. C., Sohn, H. J., Jean, Y. H., Park, B. K., Kim, Y., 7 Kim, D. Y. (2009). Porcine abortion outbreak associated with *Toxoplasma gondii* in Jeju Island. *Korean Journal of Veterinary Science, 10*(2), 147-151. https://doi.org/10.4142/jvs.2009.10.2.147

Klein, S., Wendt, M., Baumgärtner, W., & Wohlsein, P. (2010). Systemic toxoplasmosis and concurrent porcine circovirus-2 infection in a pig. *Journal of Comparative Pathology, 142*(2-3), 228-234. https://doi.org/10.1016/j.jcpa.2009.08.155

Kogan, L. R., & Grigg, E. K. (2021). Laser light pointers for use in companion cat play: Association with guardian-reported abnormal repetitive behaviors. *Animals, 11*(8), Article 2178. https://doi.org/10.3390/ani11082178

Kreisler, R. E., Cornell, H. N., & Levy, J. K. (2019). Decrease in population and increase in welfare of community cats in a twenty-three-year trap-neuter-return program in Key Largo, FL: The ORCAT program. *Frontiers in Veterinary Science, 6*, Article 7. https://doi.org/10.3389/fvets.2019.00007

Lancaster, E., Rand, J., Collecott, S., & Paterson, M. (2015). Problems associated with the microchip data of stray dogs and cats entering RSPCA Queensland shelters. *Animals, 5*(2), 332-348. https://doi.org/10.3390/ani5020332

Landcare Research. (2015). *Garden Bird Survey*. https://www.landcareresearch.co.nz/science/plants-animals-fungi/animals/birds/garden-bird-surveys/discover-and-learn/results/2015-results

Lappin, M. R., Elston, T., Evans, L., Glaser, C., Jarboe, L., Karczmar, P., Lund, C., & Ray, M. (2019). 2019 AAFP Feline Zoonoses Guidelines. *Journal of Feline Medicine and Surgery, 21*(11), 1008-1021. https://doi.org/10.1177/1098612X19880436

Lascelles, B. D., X., Henry, J. B., Brown, J., Robertson, I., Sumrell, A. T., Simpson, W., Wheeler, S., Hansen, B. D., Zamprogno, H., Freire, M., & Pease, A. (2010). Cross-sectional study of the prevalence of radiographic degenerative joint disease in domesticated cats. *Veterinary Surgery, 39(5)*, 535-544. https://doi.org/10.1111/j.1532-950X.2010.00708.x

Lauber, T. B., Knuth, B. A., Tantillo, J. A., & Curtis, P. D. (2007). The role of ethical judgments related to wildlife fertility control. *Society & Natural Resources, 20*(2), 119-133. https://doi.org/10.1080/08941920601052362

Lawson, G. T., Langford, F. M., & Harvey, A. M. (2020). The environmental needs of many Australian pet cats are not being met. *Journal of Feline Medicine and Surgery, 22*(10), 898-906. https://doi.org/10.1177/1098612X19890189

Lazenby, B. T., Mooney, N. J., & Dickman, C. R. (2015). Effects of low-level culling of feral cats in open populations: A case study from the forests of southern Tasmania. *Wildlife Research, 41*(5), 407-420. https://doi.org/10.1071/WR14030

Leong, K. M., Gramza, A. R., & Lepczyk, C. A. (2020). Understanding conflicting cultural models of outdoor cats to overcome conservation impasse. *Conservation Biology, 34*(5), 1190-1199. https://doi.org/10.1111/cobi.13530

Leung, O. Y. V., Kelman, M., Hayward, M., & Ward, M. P. (2016). Survey of recommendations given by Australian veterinarians on the age of desexing of dogs and cats. *Australian*

Veterinary Practice, 46(3), 72–82. https://www.cabidigitallibrary.org/doi/full/10.5555/20163361465

Levy, J. (2012). *Shelter crowd control: Keeping community cats out of shelters*. https://www.maddiesfund.org/shelter-crowd-control-keeping-community-cats-out-of-shelters-presentation.htm

Levy, J. K., & Crawford, P. C. (2004). Humane strategies for controlling feral cat populations. *Journal of the American Veterinary Medical Association, 225*(9), 1354–1360. https://doi.org/10.2460/javma.2004.225.1354

Levy, J. K., Gale, D. W., & Gale, L. A. (2003a). Evaluation of the effect of a long-term trap-neuter-return and adoption program on a free-roaming cat population. *Journal of the American Veterinary Medical Association, 222*(1), 42–46. https://doi.org/10.2460/javma.2003.222.42

Levy, J. K., Isaza, N. M., & Scott, K. C. (2014). Effect of high-impact targeted trap-neuter-return and adoption of community cats on cat intake to a shelter. *Veterinary Journal, 201*(3), 269–274. https://doi.org/10.1016/j.tvjl.2014.05.001

Levy, J. K., Scott, H. M., Lachtara, J. L., & Crawford, C. (2006). Seroprevalence of feline leukemia virus and feline immunodeficiency virus infection among cats in North America and risk factors for seropositivity. *Journal of the American Medical Veterinary Association, 228*(3), 371–376. https://doi.org/10.2460/javma.2003.223.202

Levy, J. K., Woods, J. E., Turick, S. L., & Etheridge, D. L. (2003b). Number of unowned free-roaming cats in a college community in the southern United States and characteristics of community residents who feed them. *Journal of the American Veterinary Medical Association, 223*(2), 202–205. https://doi.org/10.2460/javma.2003.223.202

Li, X., Wang, Y., Yu, F., Li, T., & Zhang, D. (2010). An outbreak of lethal toxoplasmosis in pigs in the Gansu province of China. *Journal of Veterinary Diagnostic Investigation, 22*(3), 442–444. https://doi.org/10.1177/104063871002200318

Lilith, M., Calver, M., Styles, I., & Garkaklis, M. (2006). Protecting wildlife from predation by owned domestic cats: Application of a precautionary approach to the acceptability of proposed cat regulations. *Australian Ecology, 31*(2), 176–189. https://doi.org/10.1111/j.1442-9993.2006.01582.x

Linklater, W. L., Farnworth, M. J., van Heezik, Y., Stafford, K. J., & MacDonald, E. A. (2019). Prioritizing cat-owner behaviors for a campaign to reduce wildlife depredation. *Conservation Science and Practice, 1*(5), Article e29. https://doi.org/10.1111/csp2.29

Liordos, V., Kontsiotis, V. J., Georgari, M., Baltzi, K., & Baltzi, I. (2017). Public acceptance of management methods under different human-wildlife conflict scenarios. *Science of the Total Environment, 579*, 685-693. https://doi.org/10.1016/j.scitotenv.2016.11.040

Lipinski, M. J., Froenicke, L., Baysac, K. C., Billings, N. C., Leutenegger, C. M., Levy, A. M., Longeri, M., Niini, T., Ozpinar, H., Slater, M. R., Pedersen, N. C., Lyons, L.A. (2008). The ascent of cat breeds: Genetic evaluations of breeds and worldwide random-bred populations. *Genomics, 91*(1), 12-21. https://doi.org/10.1016/j.ygeno.2007.10.009

Littin, K., Fisher, P., Beausoleil, N. J., & Sharp, T. (2014). Welfare aspects of vertebrate pest control and culling: Ranking control techniques for humaneness. *Rev. sci. tech. Off. int. Epiz. 33*(1), 281-289. http://dx.doi.org/10.20506/rst.33.1.2281

Little, S. E. (2011a). Female reproduction. In S. E. Little (Ed.), *The cat: Clinical medicine and management* (1st ed., pp. 1195-1227). Elsevier Saunders. https://doi.org/10.1016/C2009-0-40456-2

Little, S. E. (2011b). Male reproduction. In S. E. Little (Ed.), *The cat: Clinical medicine and management* (1st ed., pp. 1185-94). Elsevier Saunders. https://doi.org/10.1016/C2009-0-40456-2

Littlewood, K., Beausoleil, N., Stafford, K., & Stephens, C. (2021). "What would you do? How cat owners make end-of-life decisions and implications for veterinary-client interactions. *Animals, 11*(4), Article 1114. https://doi.org/10.3390/ani11041114

Littlewood, K. E., Heslop, M. V., & Cobb, M. L. (2023). The agency domain and behavioural interactions: Assessing positive animal welfare using the Five Domains Model. *Frontiers in Veterinary Science, 10*, Article 1284869. https://doi.org/10.3389/fvets.2023.1284869

Lohr, C. A. (2012). *Human dimensions of introduced terrestrial vertebrates in the Hawaiian Islands*. [Doctoral thesis, University of Hawaii at Manoa]. http://hdl.handle.net/10125/100860

Lohr, C. A., Cox, L. J., Lepczyk, C. A. (2012). Costs and benefits of Trap-neuter-Release and euthanasia for removal of urban cats in Oahu, Hawaii. *Conservation Biology, 27*(1), 64-73. https://doi.org/10.1111/j.1523-1739.2012.01935.x

Lohr, C. A., & Lepczyk, C. A. (2014). Desires and management preferences of stakeholders regarding feral cats in the Hawaiian Islands. *Conservation Biology, 28*(2), 392-403. https://doi.org/10.1111/cobi.12201

Longcore, T., Rich, C., & Sullivan, L. M. (2009). Critical assessment of claims regarding management of feral cats by Trap-Neuter-Return. *Conservation Biology, 239*(4), 887-894. https://doi.org/10.1111/j.1523-1739.2009.01174.x

Looney, A. L., Bohling, M. W., Bushby, P. A., Howe, L. M., Griffin, B., Levy, J. K., Eddlestone, S. M., Weedon, J. R., Appel, L. D., Rigdon-Brestle, Y. K., Ferguson, N. J., Sweeney, D. J., Tyson, K. A., Voors, A. H., White, S. C., Wilford, C. L., Farrell, K. A., Jefferson, E. P., Moyer, M. R., … Scarlett, J. M. (2008). The Association of Shelter Veterinarians veterinary medical care guidelines for spay-neuter programmes. *Journal of the American Veterinary Medical Association, 233*(1), 74-86. https://doi.org/10.2460/javma.233.1.74

Lord, L. K. (2008). Attitudes toward and perceptions of free-roaming cats among individuals living in Ohio. *Journal of the American Veterinary Medical Association, 232*(8), 1159-1167. https://doi.org/10.2460/javma.232.8.1159

Lord, L. K., Griffin, B., Slater, M. R., & Levy, J. K. (2010). Evaluation of collars and microchips for visual and permanent identification of pet cats. *Journal of the American Veterinary Medical Association, 237*(4), 3870-394. https://doi.org/10.2460/javma.237.4.387

Lord, L. K., Ingwersen, W., Gray, J. L., & Wintz, D. J. (2009). Characterization of animals with microchips entering animal shelters. *Journal of American Veterinary Medical Association, 235*(5), 160-167. https://doi.org/10.2460/javma.235.2.160

Lord, L. K., Pennell, M. L., Ingwersen, W., & Fisher, R. A. (2008). Sensitivity of commercial scanners to microchips of various frequencies implanted in dogs and cats. *Journal of the American Veterinary Medical Association, 233*, 1729-1735. https://doi.org/10.2460/javma.233.11.1729.

Lord, E., Widmar, N. O., & Lister,, A. (2014). Economic impacts of adoption and fundraising strategies in animal shelters. *Preventive Veterinary Medicine, 113*, 423-429. https://doi.org/10.1016/j.prevetmed.2013.12.002

Lord, L. K., Wittum, T. E., Ferketich, A. K., Funk, J. A., & Rajala-Schultz, P. J. (2007). Search and identification methods that owners use to find a lost cat. *Journal of the American Veterinary Medical Association, 230*(2), 217-220. https://doi.org/10.2460/javma.230.2.217

Lort Smith. (2014). *About Lort Smith*. https://lortsmith.com/about-us/

Loss, S. R., Will, T., Longcore, T., & Marra, P. P. (2018). Responding to misinformation and criticisms regarding United States cat predation estimates. *Biological Invasions, 20*, 3385-3396. https://doi.org/10.1007/s10530-018-1796-y

Loss, S. R., Will, T., & Marra, P. P. (2013). The impact of free-ranging domestic cats on wildlife of the United States. *Nature Communications, 4*, Article 1396. https://doi.org/10.1038/ncomms3961

Loyd, K. A. T., & Devore, J. L. (2010). An evaluation of feral cat management options using a deciaion analysis network. *Ecology and Society, 15*(4), Article 10. https://www.jstor.org/stable/26268204

Loyd, K. A. T., & Hernandez, S. M. (2012). Public perceptions of domestic cats and preferences for feral cat management in the southeastern United States. *Anthrozoös, 25*(3), 337-351. https://doi.org/10.2752/175303712X13403555186299

Loyd, K. A. T., Hernandez, S. M., Carroll, J. P., Abernathy, K. J., & Marshall, G. J. (2013a). Quantifying free-roaming domestic cat predation using animal-borne video cameras. *Biological Conservation, 160*, 183-9. https://doi.org/10.1016/j.biocon.2013.01.008

Loyd, K. A. T., Hernandez, S. M., Abernathy, K. J., Shock, B. C., & Marshall, G. J. (2013b). Risk behaviours exhibited by free-roaming cats in a suburban US town. *Veterinary Record, 173*(12), 295. https://doi.org/10.1136/vr.101222

Loyd, K. A. T., & Miller, C. A. (2010). Factors related to preferences for trap–neuter–release management of feral cats among Illinois homeowners. *Journal of Wildlife Management, 74*(1), 160-165. https://doi.org/10.2193/2008-488

Luria, B. J., Levy, J. K., Lappin, M. R., Breitschwerdt, E. B., Legendre, A. M., Hernandez, J. A., Gorman, S. P., & Lee, I. T. (2004). Prevalence of infectious diseases in feral cats in Northern Florida. *Journal of Feline Medicine and Surgery, 6*(5), 287-296. https://doi.org/10.1016/j.jfms.2003.11.005

Ly, L. H., Gordon, E., & Protopopova, A. (2021). Exploring the relationship between human social deprivation and animal surrender to shelters in British Columbia, Canada. *Frontiers in Veterinary Science, 8*, Article 656597. https://doi.org/10.3389/fvets.2021.656597

Ma, G. C., McLeod, L. J., & Zito, S. J. (2023). Characteristics of cat semi-owners. *Journal of Feline Medicine and Surgery, 25*(9). https://doi.org/10.1177/1098612X231194225

MacDonald, E., Milfont, T., & Gavin, M. (2015). What drives cat-owner behaviour? First steps towards limiting domestic-cat impacts on native wildlife. *Wildlife Research, 42*(3), 257-265. https://doi.org/10.1071/WR14164

Machado, D. S., Bragança, A. F. F., Travnik, I. C., Rossi, A. P., & Sant'Anna, A. C. (2021). Should cats be allowed outdoors? A research survey on animal welfare risks for free-roaming cats in Brazil. *Animal Welfare, 30*, 331-339. https://doi.org/10.7120/09627286.30.3.011

Manning, L., Chambers, S., Paltridge, G., & Maurice, P. (2006). Cutaneous larva migrans (hookworm) acquired in Christchurch, New Zealand. *New Zealand Medical Journal, 119* (1231), Article U1910. http://www.nzma.org.nz/journal/119-1231/1910/

Manning, A., & Rowan, A. (1992). Companion animal demographics and sterilization status: Results from a survey in four Massachusetts towns. *Anthrozoös, 5*(3), 192-201. https://doi.org/10.2752/089279392787011368

Marsh, P. (2010). *Replacing myth with math: Using evidence-based programs to eradicate shelter overpopulation*. http://www.shelteroverpopulation.org/Books/Replacing_Myth_with_Math.pdf

Marsh, P. (2012). *Getting to zero: A roadmap to ending animal shelter overpopulation in the United States*. www.shelteroverpopulation.org/Books/Getting_to_Zero.pdf.

Marston, L. C., & Bennett, P. C. (2009). Admissions of cats to animal welfare shelters in Melbourne, Australia. *Journal of Applied Animal Welfare Science, 12*(3), 189-213. https://doi.org/10.1080/10888700902955948

Mascia, M. B., Brosius, J. P., Dobson, T. A., Forbes, B. C., Horowitz, L., McKean, M. A., & Turner, N. J. (2003). Conservation and the social sciences. *Conservation Biology*, *17*(3), 649-650. https://doi.org/10.1046/j.1523-1739.2003.01738.x

Massaro, M., & Blair, D. (2003). Comparison of population numbers of yellow-eyed penguins, *Megadyptes antipodes*, on Stewart Island and on adjacent cat-free islands. *New Zealand Journal of Ecology, 27*(2), 107-113. https://newzealandecology.org/nzje/2190

McCarthy, R. J., Levine, S. H., & Reed, J. M. (2013). Estimation of effectiveness of three methods of feral cat population control by use of a simulation model. *Journal of the American Veterinary Medical Association, 243*(4), 502-511. https://doi.org/10.2460/javma.243.4.502

McColgan, C., Buxton, D., & Blewett, D. A. (1988). Titration of *Toxoplasma gondii* oocysts in non-pregnant sheep and the effects of subsequent challenge during pregnancy. *Veterinary Record, 123*, 467-470. https://doi.org/10.1136/vr.123.18.467

McDonald, J., Finka, L., Foreman-Worsley, R., Skillings, E., & Hodgson, D. (2023). Cat: Empirial modelling of *Felis catus* population dynamics in the UK. *PloS ONE, 18*(7), Article e0287841. https://doi.org/10.1371/journal.pone.0287841

McDonald, J. L., & Hodgson, D. (2021). Counting cats: The integration of expert and citizen science data for unbiased inference of population abundance. *Ecology and Evolution, 11*(9), 3657-4992. https://doi.org/10.1002/ece3.7330

McLeod, L. J., Driver, A. B., Bengsen, A. J., & Hine, D. W. (2017a). Refining online communication strategies for domestic cat management. *Anthrozoös, 30*(4), 635-649. https://doi.org/10.1080/08927936.2017.1370237

McLeod, L. J., Evans, D., Jones, B., Paterson, M., & Zito, S. (2020). Understanding the relationship between intention and cat containment behaviour: A case study of kitten and cat adopters from RSPCA Queensland. *Animals (10),* Article 1214. https://doi.org/10.3390/ani10071214

McLeod, L. J., Hine, D. W., & Bengsen, A. J. (2015). Born to roam? Surveying cat owners in Tasmania, Australia, to identify the drivers and barriers to cat containment. *Preventive Veterinary Medicine, 122*(3), 339-344. https://doi.org/10.1016/j.prevetmed.2015.11.007

McLeod, L. J., Hine, D. W., Bengsen, A. J., & Driver, A. B. (2017b). Assessing the impact of different persuasive messages on the intentions and behaviour of cat owners: A randomised control trial. *Preventive Veterinary Medicine, 146*, 136-142. https://doi.org/10.1016/j.prevetmed.2017.08.005

McLeod, L. J., Hine, D. W., & Driver, A. B. (2019). Change the humans first: Principles for improving the management of free-roaming cats. *Animals(9),* Article 555. https://doi.org/10.3390/ani9080555

McManus, C. M., Levy, J. K., Andersen, L. A., McGorray, S. P., Leutenegger, C. M., Gray, L. K., Hilligas, J., & Tucker, S. J. (2014). Prevalence of upper respiratory pathogens in four management models for unowned cats in the Southeast United States. *Veterinary Journal, 201*(2), 196-201. https://doi.org/10.1016/j.tvjl.2014.05.015

McNicholas, W. T., Wilkens, B. E., Blevins, W. E., Snyder, P. W., McCabe, G. P., Applewhite, A. A., Laverty, P. H., Breur, G. J. (2002). Spontaneous femoral capital physeal fractures in adult cats? 26 cases (1996-2001). *Journal of the American Veterinary Medical Association, 221*(12), 1731-1736. https://doi.org/10.2460/javma.2002.221.1731

Medina, F. M., Nogales, M., Farnworth, M. J., & Bonnaud, E. (2016). Human-cat relationship in an oceanic Biosphere Reserve: The case of La Palma Island, Canary Archipelago. *Journal for Nature Conservation, 34*, 8-14. http://dx.doi.org/10.1016/j.jnc.2016.04.006

Mellor, D. J. (2015). Enhancing animal welfare by creating opportunities for positive affective engagement. *New Zealand Veterinary Journal, 63*(1), 3-8. https://doi.org/10.1080/00480169.2014.926799

Mellor, D. J., & Beausoleil, N. J. (2015). Extending the 'Five Domains' model for animal welfare assessment to incorporate positive welfare states. *Animal Welfare, 24*, 241-253. https://doi.org/10.7120/09627286.24.3.241

Mellor, D. J., Beausoleil, N. J., Littlewood, K. E., McLean, A. N., McGreevy, P. D., Jones, B., & Wilkins, C. (2020). The 2020 Five Domains Model: Including human–animal interactions

in assessments of animal welfare. *Animals, 10*(10), 1-24. https://doi.org/10.3390/ani10101870

Melson, G. F. (2003). Child Development and the Human-Companion Animal Bond. *American Behavioral Scientist, 47*(1), 31-39. https://doi.org/10.1177/0002764203255210

Mendes-de-Almeida, F., Faria, M. C. F., Branco, A. S., Serrão, M. L., Souza, A. M., Almosny, N., Charme, M., & Labarthe, N. (2004). Sanitary conditions of a colony of urban feral cats (*Felis catus Linnaeus*, 1758) in a zoological garden of Rio De Janeiro, Brazil. *Revista do Instituto de Medicina Tropical de São Paulo, 46*(5), 269-74. https://doi.org/10.1590/s0036-46652004000500007

Mendes-de-Almeida, F., Faria, M. C. F., Landau-Remy, G., Branco, A. S., Barata, P., Chame, M., Pereira, M. J., S., & Labarthe, N. (2006). The impact of hysterectomy in an urban colony of domestic cats (*Felis catus* Linneaus 1758). *International Journal of Applied Research in Veterinary Medicine, 4*(2), 134-141. http://www.jarvm.com/articles/Vol4Iss2/index.htm

Mendes-de-Almeida, F., Remy, G. L., Gershony, L C., Rodrigues, D. P., Chame, M., & Labarthe, N. V. (2011). Reduction of feral cat (*Felis catus* Linnaeus 1758) colony size folowing hysterectomy of adult female cats. *Journal of Feline Medicine and Surgery, 13*(6), 436-440. https://doi.org/10.1016/j.jfms.2011.02.001

Metsers, E. M., Seddon, P. J., & van Heezik, Y. M. (2010). Cat-exclusion zones in rural and urban-fringe landscapes: How large would they have to be? *Wildlife Research, 37*(1), 47-56. https://doi.org/10.1071/WR09070

Michael, S. A., Howe, L. M., Chilvers, B. L., Morel, P. C. H., & Roe, W. D. (2016). Seroprevalence of *Toxoplasma gondii* in mainland and sub-Antarctic New Zealand sea lion (*Phocarctos hookeri*) populations. *New Zealand Veterinary Journal, 64*(5), 293-297. https://doi.org/10.1080/00480169.2016.1191974

Mignon, B. R., & Losson, B. J. (1997). Prevalence and characterization of *Microsporum canis* carriage in cats. *Medical Mycology, 35*(4), 249-256. https://doi.org/10.1080/02681219780001231

Miller, P. S., Boone, J. D., Briggs, J. R., Lawler, D. F., Levy, J. K., Nutter, F. B., Slater, M., & Zawistowski, S. (2014). Simulating free-roaming cat population management options in open demographic environments. *PLoS ONE, 9*(11), Article e0150040. https://doi.org/10.1371/journal.pone.0113553

Miller, D. D., Staats, S. R., Partlo, C., & Rada, K. (1996). Factors associated with the decision to surrender a pet to an animal shelter. *Journal of the American Veterinary Medical Association, 209*(4), 738-742. https://doi.org/10.2460/javma.1996.209.04.738

Mills, D. S., Bailey, S. L., & Thurstans, R. E. (2000). Evaluation of the welfare implications and efficacy of an ultrasonic "deterrent" for cats. *Veterinary Record, 147*(24), 678-680. https://doi.org/10.1136/vr.147.24.678

Mills, J. A., Yarral, J. W., Bradford-Grieve, J. M., Morrissey, M., & Mills, D. A. (2018). Major changes in the red-billed gull (*Larus novaehollandiae scopulinus*) population at Kaikoura Peninsula, New Zealand; Causes and consequences: A review. *Notornis, 65*, 14-26. https://www.birdsnz.org.nz/wp-content/uploads/2021/12/Mills_etal_2018.pdf

Ministry of Agriculture and Forestry Biosecurity New Zealand. (2010). *How humane are our pest control tools?* MAF Biosecurity New Zealand Technical Paper No: 2011/01. https://www.mpi.govt.nz/dmsdocument/4009-How-humane-are-our-pest-control-tools

Mirmovitch, V. (1995). Spatial organisation of urban feral cats (*Felis catus*) in Jerusalem. *Wildlife Research, 22*(3), 299-310. https://doi.org/10.1071/WR9950299

Møller, A. P., & Erritzøe, J. (2000). Predation against birds with low immunocompetence. *Oecologia, 122*(4), 500-504. https://doi.org/10.1007/s004420050972

Monks, J. M., Besson, A. A., & O'Donnell, C. F. J. (2023). Landscape scale control of selected mammalian predators fails to protect lizards. *Biological Invasions, 26*, 107-118. https://doi.org/10.1007/s10530-023-03160-x

Morgan, S., Hansen, C. M., Ross, J. G., Hickling, G. J., Ogilvie, S. C., & Paterson, A. M. (2009). Urban cat (*Felis catus*) movement and predation activity associated with a wetland reserve in New Zealand. *Wildlife Research, 36*, 574-580. https://doi.org/10.1071/WR09023

Moriello, K. A., Coyner, K., Paterson, S., & Mignon, B. (2017). Diagnosis and treatment of dermatophytosis in dogs and cats. *Veterinary Dermatology, 28*, 266-e68. https://doi.org/10.1111/vde.12440

Moseby, K. E., & Read, J. L. (2006). The efficacy of feral cat, fox and rabbit exclusion fence designs for threatened species protection. *Biological Conservation, 127*(4), 429-437. https://doi.org/10.1016/j.biocon.2005.09.002

Munday, B. L. (1978). Bovine toxoplasmosis: Experimental infections. *Internatnional Journal of Parasitology, 8*(4), 285-288. https://doi.org/10.1016/0020-7519(78)90092-9

Murray, J. K., Skillings, E., & Gruffydd-Jones, T. J. (2008). A study of risk factors for cat mortality in adoption centres of a UK cat charity. *Journal of Feline Medicine and Surgery, 10*(4), 338-345. https://doi.org/10.1016/j.jfms.2008.01.0

Nagengast, S. L., Baun, M. M., Megel, M., & Leibowitz, J. M. (1997). The effects of the presence of a companion animal on physiological arousal and behavioral distress in children during a physical examination. *Journal of Pediatric Nursing, 12*, 323-330. https://doi.org/10.1016/S0882-5963(97)80058-9

National Animal Welfare Advisory Committee. (6 June 2019). *Assessing the welfare performance of restraining and kill traps*. https://www.nawac.org.nz/guidelines/

National Animal Welfare Advisory Committee. (24 November 2021). *Animal sentience*. https://www.nawac.org.nz/animal-sentience/

National Desexing Network. (2024). *Low cost desexing*. https://ndn.org.au/

National Pest Control Agencies (NPCA). (2015a). *Kill traps: A guideline to trap possums, ferrets, stoats and feral cats using kill traps*. https://www.bionet.nz/assets/Uploads/Publications/A4.2-Kill-Traps-2015-Nov-HR.pdf

National Pest Control Agencies (NPCA). (2015b). *Leghold traps - A guideline for capturing possums, ferrets and feral cats using leghold traps*. https://www.bionet.nz/assets/Uploads/Publications/A4.1-Leghold-Traps-2015-Nov-HR.pdf

National Pest Control Agencies (NPCA). (2015c). *Feral and stray cats: Monitoring and control, a preliminary guideline towards good practice*. https://www.bionet.nz/assets/Uploads/A11-Feral-and-Stray-Cats-2018-04-LR.pdf

National Pest Control Agencies. (2015d). *Legislation guide: User guide to legislation relating to terrestrial pest control*. https://www.bionet.nz/assets/Uploads/B1-Legislation-Guide-2018-04-LR.pdf

Natoli, E., Maragliano, L., Cariola, G., Faini, A., Bonanni, R., Cafazzo, S., & Fantini, C. (2006). Management of feral domestic cats in the urban environment of Rome (Italy). *Preventive Veterinary Medicine, 77*(3-4), 180-185. https://doi.org/10.1016/j.prevetmed.2006.06.005

Neal, S. M., & Wolf, P. J. (2023). A cat is a cat: Attachment to community cats transcends ownership status. *Journal of Shelter Medicine & Community Animal Health, 2,* Article 62. http://dx.doi.org/10.56771/jsmcah.v2.62

Nelson, S. H., Evans, A. D., & Bradbury, R. B. (2006). The efficacy of an ultrasonic cat deterrent. *Applied Animal Behaviour Science, 96*(1-2), 83-91. https://doi.org/10.1016/j.applanim.2005.05.005

Neville, P. N. (1989). Feral cats: Management of urban populations and pest problems by neutering. In R. J. Putnam (Ed.), *Mammals as pests* (pp. 261-268). Kluwer.

New, J. C., Salman, M. D., King, M., Scarlett, J. M., Kass, P. H., & Hutchison, J. M. (2000). Characteristics of shelter-relinquished animals and their owners compared with animals and their owners in U.S. pet-owning households. *Journal of Applied Animal Welfare Science, 3*(3), 179-201. https://doi.org/10.1207/s15327604jaws0303_1

New Zealand Companion Animal Council. (2016). *Companion Animals in New Zealand 2016*. https://static1.squarespace.com/static/5d1bf13a3f8e880001289eeb/t/5f556c917d0bb54905a22858/1599433901911/Companion+Animals+in+New+Zealand+2016+Report_web.pdf

New Zealand Companion Animal Register. (2019). *Benefits of the NZCAR*. https://www.animalregister.co.nz/owner-information/benefits-of-the-nzcar.html.

New Zealand Veterinary Association. (2018). *Responsible companion cat ownership*. https://nzva.org.nz/resource/companion-animal/cat-ownership/

Nguyen, T., Balanovic, J., Aley, J., & Neff, M. B. (2022). *Human dimensions of Predator Free 2050: A literature overview of social and behavioural research*. Department of Conservation. https://doi.org/10.31235/osf.io/f98m3

Niebuhr, C. N., & Norbury, G. (2020). Impact of feral cat control on toxopasmosis levels in sheep as part of the Cape to City Programme. Contract Report: LC3836. Maanaki Whenua Landcare Research. https://www.pfhb.nz/assets/Document-Library/LC3836-Niebuhr-and-Norbury-2020-Impact-of-feral-cat-control-on-toxoplasmosis-in-sheep-MWLR-report-2020.pdf

Nogales, M., Martìn, A., Tershy, B. R., Donlan, C. J., Veitch, D., Nestor, D., Wood, B., & Alonso, J. (2004). A review of feral cat eradication on islands. *Conservation Biology, 18*(2), 310-319. https://doi.org/10.1111/j.1523-1739.2004.00442.x

Nogales, M., Vidal, E., Medina, F. M., Bonnaud, E., Tershy, B. R., Campbell, K. J., & Zavaleta, E. S. (2013). Feral cats and biodiversity conservation: The urgent prioritization of Island management. *BioScience, 63*(10), 804-810. https://doi.org/10.1525/bio.2013.63.10.7

Norbury, G., & Heyward, R. (2008). Predictors of clutch predation of a globally significant avifauna in New Zealand's braided river ecosystems. *Animal Conservation, 11*(1), 17-26. https://doi.org/10.1111/j.1469-1795.2007.00142.x

Norkus, C. L. (2018). Toxicological emergencies. In C. L. Norkus (Ed.), *Veterinary technician's manual for small animal emergency and critical care* (pp. 295-314). Wiley Blackwell. https://www.wiley.com/en-us/Veterinary+Technician's+Manual+for+Small+Animal+Emergency+and+Critical+Care%2C+2nd+Edition-p-9781119179092

Norris, J. M., Bell, E. T., Hales, L., Toribio, J. L. M. L., White, J. D., Wigney, D. I., Baral, R. M, & Malik. R. (2007). Prevalence of feline immunodeficiency virus infection in domesticated and feral cats in eastern Australia. *Journal of Feline Medicine and Surgery, 9*(4), 300-308. https://doi.org/10.1016/j.jfms.2007.01.007

Nottingham, C. M., Buckley, H. L., Case, B. S., Glen, A. S., & Stanley, M. C. (2022). Factors affection home range size of feral cats: A meta-analysis. *New Zealand Journal of Ecology, 64*(2), 3476. https://dx.doi.org/10.20417/nzjecol.46.26

Nottingham, C. M., Buckley, H. L., Case, B. S., Glen, A. S., & Stanley, M. C. (2024). Does landscape composition influence the diets of feral cats in agroecosystems. *Biological Invasions, 26*, 1787-1799. https://doi.org/10.1007/s10530-024-03277-7

Nutter, F. B. (2006). Evaluation of a Trap-neuter-return Management Program for Feral Cat Colonies: Population Dynamics, Home Ranges, and Potentially Zoonotic Diseases. [Doctoral thesis, North Carolina State University]. https://repository.lib.ncsu.edu/items/75ca1973-dc7f-4c6b-bf06-89186c004d5a

Nutter, F. B., Levine, J. F., & Stoskopf, M. K. (2004a). Reproductive capacity of free-roaming domestic cats and kitten survival rate. *Journal of the American Veterinary Medical Association, 225*(9), 1399-1402. https://doi.org/10.2460/javma.2004.225.1399

Nutter, F. B., Stoskopf, M. K., & Levine, J. F. (2004b). Time and financial costs of programs for live trapping feral cats. *Journal of the American Veterinary Medical Association, 225*(9), 1403-1405. https://doi.org/10.2460/javma.2004.225.1403

Olinda, R. G., Pena, H. F., Frade, M. T. S., Ferreira, J. S., Maia, L. Â., Gennari, S. M., Oliveira, S., Dantas, A. F. M., & Riet-Correa, F. (2016). Acute toxoplasmosis in pigs in Brazil caused by *Toxoplasma gondii* genotype Chinese 1. *Parasitology Research, 115*, 2561-2566. https://doi.org/10.1007/s00436-016-4999-0

Oliveira, I. de A., Viana-Junior, A. B., & de Azevedo, C. S. (2023). Indoor and outdoor management for cats: inferences about the welfare and cat-caretaker relationship. *Journal of Veterinary Behavior, 60*, 70-78. https://doi.org/10.1016/j.jveb.2022.12.010

O'Neill, D. G., Church, D. B., McGreevy, P. D., Thomson, P. C., & Brodbelt, D. C. (2015). Longevity and mortality of cats attending primary care veterinary practices in England. *Journal of Feline Medicine and Surgery, 17*(2), 125-133. https://doi.org/10.1177/1098612X14536176

Orr, B., & Jones, B. (2019). A survey of veterinarian attitudes toward prepubertal desexing of dogs and cats in the Australian Capital Territory. *Frontiers in Veterinary Science*, *6*, Article 272. https://doi.org/10.3389/fvets.2019.00272

Ovenden, K., Bassett, I., & Sumner, C. L. (2024). 'I want you to want me': How owners value cats' choices has implications for cat containment. *People and Nature, 6*(2), 548-561. https://doi.org/10.1002/pan3.10580

Overley, B., Shofer, F. S., Goldschmidt, M. H., Sherer, D., & Sorenmo, K. U. (2005). Association between ovarihysterectomy and feline mammary carcinoma. *Journal of Veterinary Internal Medicine, 19*(4), 560-563. https://doi.org/10.1892/0891-6640(2005)19[560:aboafm]2.0.co;2

Ownby, D. R., Johnson, C. C., & Peterson, E. L. (2003). Exposure to dogs and cats in the first year of life and risk of allergic sensitization at 6 to 7 years of age. *Pediatrics, 288*(8), 963-972. https://doi.org/0.1001/jama.288.8.963

Palmas, P., Gouyet, R., Oedin, M., Millon, A., Cassan, J., Kowi, J., Bonnaud, E., & Vidal, E. (2020). Rapid recolonisation of feral cats following intensive culling in a semi-isolated context. *NeoBiota, 63*, 177-200. https://doi.org/10.3897/neobiota.63.58005

Palmer, C. (2014). Value conflicts in feral cat management: Trap-neuter-return or trap-euthanize? In M. C. Appleby, Weary, D. M., & P. Sandøe (Eds.), *Dilemmas in Animal Welfare* (pp.148-168). CABI. https://philpapers.org/rec/PALVCI

Palmer, A., & Thomas, V. (2023). Categorisation of cats: Managing boundary felids in Aotearoa New Zealand and Britain. *People and Nature, 5*(5), 1539-1551. https://doi.org/10.1002/pan3.10519

Palmerston North City Council. (2024). *Animals and Bees Bylaw 2024*. https://www.pncc.govt.nz/files/assets/public/v/2/documents/council/bylaws/palmerston-north-animals-and-bees-bylaw-2024.pdf

New Zealand Parliament. (2024, Sept 27). J.1 Government response to the report of the Environment Committee on Petition of Erica Rowlands: Mandate the registration and desexing of pet cats and kittens. https://bills.parliament.nz/v/4/11084e68-225c-482c-9f1d-08dcde8830f7

Parkes, J., Fisher, P., Robinson, S., & Aguirre-Muñoz, A. (2014). Eradication of feral cats from large islands: An assessment of the effort required for success. *New Zealand Journal of Ecology, 38*(2), 307-314. https://newzealandecology.org/nzje/3129

Patel, K. K., Burrows, E., Heuer, C., Asher, G. W., Wilson, P. R., & Howe, L. (2019). Investigation of *Toxoplasma gondii* and association with early pregnancy and abortion rates in New Zealand farmed red deer (*Cervus elaphus*). *Parasitology Research, 118*, 2065-2077. https://doi.org/10.1007/s00436-019-06355-1

Paterson, M. (2014). TNR (Trap-Neuter-Return): Is it a solution for the management of feral cats in Australia? In G. L. Burns, & M. Paterson (Eds.), *Engaging with animals: Interpretations of a shared existence* (pp. 169-183). University Press.

Patronek, G. (1998). Free-roaming and feral cats—their impact on wildlife and human beings. *Journal of the American Veterinary Medical Association, 212*(2), 218-226. https://doi.org/10.2460/javma.1998.212.02.218

Pennington, D. N., Hansel, J., & Blair, R. B. (2008). The conservation value of urban riparian areas for landbirds during spring migration: Land cover, scale, and vegetation effects. *Biological Conservation, 141*, 1235-1248. https://doi.org/10.1016/j.biocon.2008.02.021

Perry, D., & Perry, G. (2008). Improving interactions between animal rights groups and conservation biologists. *Conservation Biology, 22*(1), 27-35. https://doi.org/10.1111/j.1523-1739.2007.00845.x

Peterson, M. N., Hartis, B., Rodriguez, S., Green, M., & Lepczyk, C. A. (2012). Opinions from the front lines of cat colony management conflict. *PLoS ONE, 7*(9), Article e44616. https://doi.org/10.1371/journal.pone.0044616

Platt, S., Wieczorek, L., Dennis, R., & De Stefani, A. (2007). Spinal cord injury resulting from incorrect microchip placement in a cat. *Journal of Feline Medicine and Surgery, 9*(2), 157-160. https://doi.org/10.1016/j.jfms.2006.07.00

Platts-Mills, T. A. E. (2002). Paradoxical effect of domestic animals on asthma and allergic sensitization. *Journal of the American Medical Association, 288*(8), 1012-1014. https://doi.org/10.1001/jama.288.8.1012

Plumlee, K. H. (2012). Citrus Oils. In P.A. Talcott, & M. E. Peterson (Eds.), *Small Animal Toxicology* (3rd ed., pp. 512-515). Elsevier. https://doi.org/10.1016/B978-1-4557-0717-1.00040-5

Porters, N., de Rooster, H., & Moons, C. P. (2015). Prepubertal gonadectomy in cats: Different injectable anaesthetic combinations and comparison with gonadectomy at traditional

age. *Journal of Feline Medicine and Surgery, 17*(6), 458-467. https://doi.org/10.1177/1098612X14546919

Potter, K., Hancock, D.H., & Gallina, A.M. (1991). Clinical and pathologic features of endometrial hyperplasia, pyometra, and endometritis in cats: 79 cases (1980-1985). *Journal of the American Veterinary Medical Association, 198(8)*, 1427-1431. https://doi.org/10.2460/javma.1991.198.08.1427

Predator Free New Zealand. (2016). *Predator Free New Zealand*. www.predatorfreenz.org

Project Maddie. (2014). *Project Maddie: a pet food bank*. www.projectmaddie.com

Proulx, G. (1988). Control of urban wildlife predation by cats through public education. *Environmental Conservation, 15*(4), 358-359. https://doi.org/10.1017/S0376892900029878

Putignani, L., Mancinelli, L., Del Chierico, F., Menichella, D., Adlerstein, D., Angelici, M. C., Marangi, M., Berrilli, F., Caffara, M., Frangipane di Regalbono, D. A., & Giangaspero, A. (2011). Investigation of *Toxoplasma gondii* presence in farmed shellfish by nested-PCR and real-time PCR fluorescent amplicon generation assay (FLAG). *Experimental Parasitology, 127*(2), 409-417. https://doi.org/10.1016/j.exppara.2010.09.007

Qureshi, A. I., Memon, M. Z., Vazquez, G., & Suri, M. F. K. (2009). Cat ownership and the risk of fatal cardiovascular disease. Results from the second National Health and Nutrition Examination Study Mortality follow-up study. *Journal of Vascular and Interventional Neurology, 2*(1), 132-135. https://pmc.ncbi.nlm.nih.gov/articles/PMC3317329/

Ramos, D., Reche-Junior, A., Fragoso, P. L., Palme, R., Yanasse, N. K., Gouvêa, V. R., Beck, A., & Mills, D. S. (2013). Are cats (*Felis catus*) from multi-cat households more stressed? Evidence from assessment of fecal glucocorticoid metabolite analysis. *Physiology and Behavior, 122*, 72-75. https://doi.org/10.1016/j.physbeh.2013.08.028

Rand, J., Fisher, G., Lamb, K., & Hayward, A. (2019). Public opinions on strategies for managing stray cats and predictors of opposition to Trap-Neuter and Return in Brisbane, Australia. *Frontiers in Veterinary Sciences, 5*, Article 290. https://doi.org/10.3389/fvets.2018.00290

Read, J. L., Dickman, C. R., Boardman, W. S. J., & Lepyczyk, C. A. (2020). Reply to Wolf et al.,: Why trap-neuter-return (TNR) is not an ethical solution for stray cat management. *Animals, 10,* Article 1525. https://doi.org/10.3390/ani10091525

Reading, A. S., Scarlett, J. M., & Berliner, E. A. (2014). A novel approach to identify and map kitten clusters using Geographic Information Systems (GIS): A case study from

Tompkins County, NY. *Journal of Applied Animal Welfare Science, 17*(4), 295-307. https://doi.org/10.1080/10888705.2014.905783

Rehnberg, L. K., Robert, K. A., Watson, S. J., & Peters, R. A. (2015). The effects of social interaction and environmental enrichment on the space use, behaviour and stress of owned housecats facing a novel environment. *Applied Animal Behaviour Science, 169*, 51-61. https://doi.org/10.1016/j.applanim.2015.06.002

Richards, J. R. (2004). The 2004 American Association of Feline Practitioners position statement on free-roaming abandoned and feral cats. *Journal of Feline Medicine and Surgery, 6*(4), vii-ix. https://doi.org/10.1016/j.jfms.2004.04.003

Rijken, M., & van Beek, S. (2011). About cats and dogs … reconsidering the relationship between pet ownership and health related outcomes in community-dwelling elderly. *Social Indicators Research, 102*, 373-388. https://doi.org/10.1007/s11205-010-9690-8

Rinzin, K., Stevenson, M. A., Probert, D. W., Bird, R. G., Jackson, R., French, N. P., & Weir, J. A. (2008). Free-roaming and surrendered dogs and cats submitted to a humane shelter in Wellington, New Zealand, 1999-2006. *New Zealand Veterinary Journal, 56*(6), 297-297. https://doi.org/10.1080/00480169.2008.36850

Robbins, H. J., Casey, R. A., Clements, J., Gruffydd-Jones, T., & Murray, J. K. (2018). Assessing the imapct of a regional UK feline neutering campaign. *Veterinary Record, 182*(10), Article 291. https://doi.org/10.1136/vr.104499

Roberts, J. O., Jones, H. F. E., & Roe, W. D. (2021). The effects of *Toxoplasma gondii* on New Zealand wildlife: Implications for conservation and management. *Pacific Conservation Biology, 27*, 208-220. https://doi.org/10.1071/PC20051

Roberts, J. O., Webber, D. N., Roe, W. D., Edwards, C. T. T., & Doonan, I. J. (2019). *Spatial risk assessment of threats to Hector's and Māui dolphins (Cephalorhynchus hectori)*. New Zealand Aquatic Environment and Biodiversity Report No. 214. Fisheries New Zealand. https://www.mpi.govt.nz/dmsdocument/35007-AEBR-214-Spatial-risk-assessment-of-threats-to-HectorsMaui-dolphins-Cephalorhynchus-hectori.

Robertson, S.A. (2007). A review of feral cat control. *Journal of Feline Medicine and Surgery, 10*(4), 366-375. https://doi.org/10.1016/j.jfms.2007.08.003

Robertson, S., & Lascelles, D. (2010). Long-term pain in cats: How much do we know about this important welfare issue? *Journal of Feline Medicine and Surgery, 12*(3), 188-199. https://doi.org/10.1016/j.jfms.2010.01.002

Robley, A., Purdey, D., Johnston, M., Lindeman, M., Busana, F., & Long, K. (2007). Experimental trials to determine effective fence designs for feral cat and fox exclusion. *Ecological*

Management and Restoration, 8(3), 193-198. https://doi.org/10.1111/j.1442-8903.2007.00367.x

Rochlitz, I. (2003a). Study of factors that may predispose domestic cats to road traffic accidents: Part 1. *Veterinary Record, 153*(18), 549-553. https://doi.org/10.1136/vr.153.18.549

Rochlitz, I. (2003b). Study of factors that may predispose domestic cats to road traffic accidents: Part 2. *Veterinary Record, 153*(19), 585-588. https://doi.org/10.1136/vr.153.19.585

Rochlitz, I. (2004a). Clinical study of cats injured and killed in road traffic accidents in Cambridgeshire. *Journal of Small Animal Practice, 45*(8), 390-394. https://doi.org/10.1111/j.1748-5827.2004.tb00253.x

Rochlitz, I. (2004b). The effects of road traffic accidents on domestic cats and their owners. *Animal Welfare, 13*(1), 51-55. https://doi.org/10.1017/S096272860002666X

Rochlitz, I. (2005). A review of the housing requirements of domestic cats (*Felis silvestris catus*) kept in the home. *Applied Animal Behaviour Science, 93*(1-2), 97-109. https://doi.org/10.1016/j.applanim.2005.01.002

Rodan, I., & Sparkes, A. H. (2012). Preventive health care for cats. In S. Little (Ed.), *The cat: Clinical medicine and management* (pp. 151-180). Elsevier. https://doi.org/10.1016/B978-1-4377-0660-4.00008-9

Roe, W. D., Howe, L., Baker, E. J., Burrows, L., & Hunter, S. A. (2013). An atypical genotype of *Toxoplasma gondii* as a cause of mortality in Hector's dolphins (*Cephalorhynchus hectori)*. *Veterinary Parasitology, 192*(1-3), 67-74. https://doi.org/10.1016/j.vetpar.2012.11.001

Roe, W. D., Michael, S., Fyfe, M. J., Burrows, E., Hunter, S. A., & Howe, L. (2016). First report of systemic toxoplasmosis in a New Zealand sea lion (*Phocarctos hookeri*). *New Zealand Veterinary Journal, 65*(1), 46-50. https://doi.org/10.1080/00480169.2016.1230526

Roetman, P., Tindle, H., & Litchfield, C. (2018). Management of pet cats: The impact of the Cat Tracker Citizen Science Project in South Australia. *Animals, 8*(11), Article 190. https://doi.org/10.3390/ani8110190

Rohlf, V., & Bennett, P. (2005). Perpetration-induced traumatic stress in persons who euthanize nonhuman animals in surgeries, animal shelters, and laboratories. *Society and Animals, 13*(3), 201-201. https://doi.org/10.1163/1568530054927753

Root Kustritz, M. V. (2007). Determining the optimal age for gonadectomy of dogs and cats. *Journal of American Veterinary Medical Association, 213*(11), 1665-1675. https://doi.org/10.2460/javma.231.11.1665

Royal New Zealand Society for the Prevention of Cruelty to Animals. (2024). *SPCA Desexing*. https://desexing.spca.nz/#locations

Royal Society for the Prevention of Cruelty to Animals Australia. (2018). *Identifying best practice domestic cat management in Australia*. https://kb.rspca.org.au/bfd_download/identifying-best-practice-domestic-cat-management-in-australia-may-2018/.

Royal Society for the Prevention of Cruelty to Animals Australia. (2021). *Pre-pubertal desexing in cats*. https://kb.rspca.org.au/wp-content/uploads/2018/11/2021-06-Pre-Pubertal-Desexing-Report.pdf

Royal Society for the Prevention of Cruelty to Animals Queensland. (2017). *Operation wanted*. www.operationwanted.com.au.

Royal Society for the Prevention of Cruelty to Animals United Kingdom (RSPCA UK). (2014). *Feral cats*. RSPCA Policies on Animal Welfare. https://www.rspca.org.uk/documents/1494939/7712578/RspcaPolicies.pdf/abaa8964-9d49-6d85-c4e3-4e8dccf0af08?t=1559058681637 .

Sacramento Pet Food Bank (2011). *Titanic's Pantry The Sacramento Pet Food Bank*. www.sacpetfoodbank.org.

Saito, M., Shin, O., Kayanuma, H., Honnami, M., & Yumi, U. (2010). Evaluation of the susceptibility artifacts and tissue injury caused by implanted microchips in dogs on 1.5 t magnetic resonance imaging. *Journal of Veterinary Medical Science, 72*(5), 575-581. https://doi.org/10.1292/jvms.09-0386

Salman, M. D., Hutchison, J., Ruch-Gallie, R., Kogan, L., New Jr., J. C., Kass, P. H., & Scarlett, J. M. (2000). Behavioral reasons for relinquishment of dogs and cats to 12 shelters. *Journal of Applied Animal Welfare Science, 3*(2), 93-106. https://doi.org/10.1207/S15327604JAWS0302_2

Salman, M. D., New Jr., J. C., Scarlett, J. M., Kass, P. H., Ruch-Gallie, R., & Hetts, S. (1998). Human and animal factors related to relinquishment of dogs and cats in 12 selected animal shelters in the United States. *Journal of Applied Animal Welfare Science, 1*(3), 207-226. https://doi.org/10.1207/s15327604jaws0103_2

Sandøe, P., Jensen, J. B. H., Jensen, F., & Nielsen, S. S. (2019). Shelters reflect but cannot solve underlying problems with relinquished and stray animals. A retrospective study

of dogs and cats entering and leaving shelters in Denmark from 2004 to 2017. *Animals, 9*(10), Article 765. https://doi.org/10.3390/ani9100765

Sandøe, P., Nørspang, A. P., Forkman, B., Bjørnvad, C. R., Kondrup, S. V., & Lund, T. B. (2017). The burden of domestication: A representative study of welfare in privately owned cats in Denmark. *Animal Welfare, 26*(1), 1-10. https://doi.org/10.7120/09627286.26.1.001

Schale, S., Howe, D., Yeargan, M., Morrow, J. K., Graves, A., & Johnson, A. L. (2018). Protozoal coinfection in horses with equine protozoal myeloencephalitis in the eastern United States. *Journal of Veterinary Internal Medicine, 32*(3), 1210-1214. https://doi.org/10.1111/jvim.15127

Schilder, M. B. H. (1991). The (in)effectiveness of anti-cat repellents and motivational factors. *Applied Animal Behaviour Science*, *32*(2-3), 227-236. https://doi.org/10.1016/S0168-1591(05)80046-2

Schmidt, P. M., Swannack, T. M., Lopez, R. R., & Slater, M. R. (2009). Evaluation of euthanasia and trap-neuter-return (TNR) programs in managing free-roaming cat populations. *Wildlife Research, 36*(2), 117-125. https://doi.org/10.1071/WR08018

Schubnel, E., & Arpaillange, C. (2008). Principaux troubles de comportement du chat confiné. *Pratique Medicale et Chirurgicale de l'Animal de Compagnie, 43*(2), 63-70. https://doi.org/10.1016/j.anicom.2008.05.001

Scotney, R., Rand, J., Rohlf, V., Hayward, A., & Bennett. (2023). The impact of lethal, enforcement-centred cat management on human wellbeing: Exploring lived experiences of cat carers affected by cat culling at the Port of Newcastle. *Animals, 13*, Article 271. https://doi.org/10.3390/ani13020271

Seewagen, C. L., & Slayton E. J. (2008). Mass changes of migratory landbirds during stopovers in a New York City park. *Wilson Journal of Ornithology 120*(2), 296-303. https://doi.org/10.1676/07-087.1

Stasi, M. F., Amati, D., Costa, C., Resta, D., Senepa, G., Scarafioiti, Aimonino, N., C., & Molaschi, M. (2004). Pet-therapy: A trial for institutionalized frail elderly patients. *Archives of Gerontology and Geriatrics, 38*(Suppl 9), 407-412. https://doi.org/10.1016/j.archger.2004.04.052

Sharp, M. (2024, December 18). Compulsory microchipping and national register of cats proposed in bill. *Stuff*. https://www.stuff.co.nz/nz-news/360524839/compulsory-microchipping-and-national-register-cats-proposed-bill

Sharp, T. (2012). *Standard operation procedure CAT001: Ground shooting of feral cats*. https://www.pestsmart.org.au/wp-content/uploads/2018/02/171215-SOP_CAT001_web.pdf

Sharp, T., & Saunders, G. (2012). *Model code of practice for the humane control of feral cats*. www.pestsmart.org.au/wp-content/uploads/2012/09/catCOP2012.pdf

Shaw, S. E., Birtles, R. J., & Day, M. J. (2001). Arthropod-transmitted infectious diseases of cats. *Journal of Feline Medicine and Surgery, 3*(4), 193-209. https://doi.org/10.1053/jfms.2001.0149

Sherwood, L. J., Wilson, A. G., South, C. S., Roche, S. M., & Luszcz, T. M. (2019). Perceptions of veterinarians in British Columbia of cat management strategies to reduce cat overpopulation and impacts on wildlife populations. *Anthrozoös, 32*(5), 613-629. https://doi.org/10.1080/08927936.2019.1579473

Shore, E. R., Douglas, D. K., & Riley, M. L. (2005). What's in it for the companion animal? Pet attachment and college students' behaviors toward pets. *Journal of Applied Animal Welfare Science, 8*(1), 1-11. https://doi.org/10.1207/s15327604jaws0801_1

Shore, E. R., Petersen C. L., & Douglas, D. K. (2003). Moving as a reason for pet relinquishment: a closer look. *Journal of Applied Animal Welfare Science, 6*(1), Article 39. https://doi.org/10.1207/S15327604JAWS0601_04

Siegel, J. M., Angulo, F. J., Detels, R., Wesch, J., & Mullen, A. (1999). AIDS diagnosis and depression in the Multicenter AIDS Cohort Study: The ameliorating impact of pet ownership. *AIDS Care, 11*(2), 157-170. https://doi.org/10.1080/09540129948054

Simon, J. A., Kurdzielewicz, S., Jeanniot, E., Dupuis, E., Marnef, F., Aubert, D., Villena, I., & Poulle, M. L. (2017). Spatial distribution of soil contaminated with *Toxoplasma gondii* oocysts in relation to the distribution and use of domestic cat defecation sites on dairy farms. *International Journal of Parasitology, 47*(6), 357-367. https://doi.org/10.1016/j.ijpara.2017.01.004

Slater, M. R. (2001). The role of veterinary epidemiology in the study of free-roaming dogs and cats. *Preventive Veterinary Medicine, 48*(4), 273-286. https://doi.org/10.1016/S0167-5877(00)00201-4

Slater, M. R., Miller, K. A., Weiss, E., Makolinski, K. V., & Weisbrot, L. A. M. (2010). A survey of the methods used in shelter and rescue programs to identify feral and frightened pet cats. *Journal of Feline Medicine and Surgery, 12*(8), 592-600. https://doi.org/10.1016/j.jfms.2010.02.001

Slingerland, L. I., Hazewinkel, H. A. W., Meij, B. P., Picavet, Ph., & Voorhout, G. (2011). Cross-sectional study of the prevalence and clinical features of osteoarthritis in 100 cats. *The Veterinary Journal, 187*, 304-309. https://doi.org/10.1016/j.tvjl.2009.12.014

Somerfield, E. (2019). The state of cats in New Zealand: A precarious position. *Lincoln Planning Review, 10*(1-2), 25-32. https://doi.org/10.34900/lpr.v10i1-2.1141

Spain, C. V., Scarlett, J. M., & Houpt, K. A. (2004). Long-term risks and benefits of early-age gonadectomy in cats. *Journal of the American Veterinary Medical Association, 224*(3), 372-379. https://doi.org/10.2460/javma.2004.224.372

Spehar, D. D., & Wolf, P. J. (2017). An examination of an iconic Trap-Neuter-Return program: The Newburyport, Massachusetts case study. *Animals, 7*, Article 81. https://doi.org/10.3390/ani7110081

Spehar, D. D., & Wolf, P. J. (2018a). A case study in citizen science: The effectiveness of a Trap-Neuter-Return program in a Chicago neigpborhood. *Animals, 8*, Article 14. https://doi.org/10.3390/ani8010014

Spehar, D. D., & Wolf, P. J. (2018b). The imapct of an integrated program of Return-to-Field and Targeted Trap-Neuter-Return on feline intake and euthanasia at a municipal animal shelter. *Animals, 8,* Article 55. https://doi.org/10.3390/ani8040055/

Spehar, D. D., & Wolf, P. J. (2019). Integrated return-to-field and targeted trap-neuter-vaccinate-return programs result in reductions of feline intake and euthanasia at six municipal animal shelters. *Frontiers in Veterinary Science, 6*. https://doi.org/10.3389/fvets.2019.00077

Spehar, D. D., & Wolf, P. J. (2019b). Back to school: An updated evaluation of the effectiveness of a long-term trap-neuter-return program on a university's free-roaming cat population. *Animals, 9*(10), Article 768. https://doi.org/10.3390/ani9100768

Spehar, D. D., & Wolf, P. J. (2020). The impact of targeted Trap-Neuter-Return efforts in the San Francisco Bay Area. *Animals, 10*, Article 2089. https://doi.org/10.3390/ani10112089

Srivastav, A., Kass, P. H., McGill, L. D., Farver, T. B., & Kent, M. S. (2012). Comparative vaccine-specific and other injectable-specific risks of injection-site sarcomas in cats. *Journal of the American Veterinary Medicine Association, 241*(5), 595-602. https://doi.org/10.2460/javma.241.5.595

Stavisky, J. (2014). Too many cats: how owner beliefs contribute to overpopulation. *Veterinary Record, 174*(5), 116-117. https://doi.org/10.1136/vr.g1100

Stella, J., & Croney, C. (2019). Coping styles in the domestic cat (*Felis silvestris catus*) and implications for cat welfare. *Animals, 9*(6), Article 370. https://doi.org/10.3390/ani9060370

Stelzer, S., Basso, W., Benavides Silván, J., Ortega-Mora, L. M., Maksimov, P., Gethmann, J., Conraths, F. J., & Schares, G. (2019). *Toxoplasma gondii* infection and toxoplasmosis in farm animals: Risk factors and economic impact. *Food and Waterborne Parasitology, 12*, Article e0037. https://doi.org/10.1016/j.fawpar.2019.e00037

Sterba, J. P. (2002, October 11). Fur flies in critter crowd over fate of feral felines. *Wall Street Journal*. https://www.wsj.com/articles/SB1034285289400492436

Stewart, M. (2014). Chicken-killing Cat Prowls Unpunished. *Dominion Post*. http://www.stuff.co.nz/dominion-post/10029913/Chicken-killing-cat-prowls-unpunished

Stokke, S., Arnemo, J. M., Brainerd, S., Söderburg, A., Kraabøl, M., & Ytrehus, B. (2018). Defining animal welfare standards in hunting: Body mass determines thresholds for incapacitation time and flight distance. *Scientific Reports*, *8,* Article 13786. https://doi.org/10.1038/s41598-018-32102-0

Stoskopf, M. K., & Nutter, F. B. (2004). Analyzing approaches to feral cat management—one size does not fit all. *Journal of the American Veterinary Medical Association, 225*, 1361-1964. https://doi.org/10.2460/javma.2004.225.1361

Straede, C. M. G., & Richard, G. (1993). Psychological health in a population of Australian cat owners. *Anthrozoös, 6*(1), 30-42. https://doi.org/10.2752/089279393787002385

Strickler, B. L., & Shull, E. A. (2013). An owner survey of toys, activities, and behavior problems in indoor cats. *Journal of Veterinary Behavior: Clinical Applications and Research, 9*(5), 207-214. https://doi.org/10.1016/j.jveb.2014.06.005

Sumner, C. L., Walker, J. K., & Dale, A. D. (2022). The implications of policies on free-roaming cat welfare. *Animals, 12*(3), Article 237. https://doi.org/10.3390/ani12030237

Surma, S., Oprail, S., & Narkiewicz, K. (2022). Pet ownership and risk of arterial hypertension and cardiovascular disease. *Current Hypertension Reports, 24*, 295-302. https://doi.org/10.1007/s11906-022-01191-8

Swarbrick, H., & Rand, J. (2018). Application of a protocol based on Trap-Neuter-Return (TNR) to manage unowned urban cats on an Australian University Campus. *Animals, 8*, Article 77. https://doi.org/10.3390/ani8050077

Tan, K., Rand, J., & Morton, J. (2017). Trap-Neuter-Return activities in urban stray cat colonies in Australia. *Animals, 7*, Article 46, https://doi.org/10.3390/ani7060046

Tan, S. M. L., Stellato, A. C., & Niel, L. (2020). Uncontrolled outdoor access for cats: An assessment of risks and benefits. *Animals, 10*(2), Article 258. https://doi.org/10.3390/ani10020258

The Cat Group. (n.d.). *Policy Statement 1: Timing of neutering*. http://www.thecatgroup.org.uk/policy_statements/neut.html

Thompson, J. (1999). Important infectious diseases of cats in New Zealand. *Surveillance, 26*(2), 1-5. https://www.sciquest.org.nz/browse/publications/article/47114

Tocher, M. (2006). Survival of Grand and Otago skinks following predator control. *The Journal of Wildlife Management, 70*(1), 31-42. https://doi.org/10.2193/0022-541X(2006)70[31:SOGAOS]2.0.CO;2

Toukhsati, S. R., Bennett, P. C., & Coleman, G. J. (2007). Behaviors and attitudes towards semi-owned cats. *Anthrozoös, 20*(2), 131-142. https://doi.org/10.2752/175303707X207927

Toukhsati, S., Phillips, C., Podberscek, A., & Coleman, G. (2012a). Semi-Ownership and sterilisation of cats and dogs in Thailand. *Animals, 2*(4), 611-627. https://doi.org/10.3390/ani2040611

Toukhsati, S. R., Young, E., Bennett, P. C., & Coleman, G. J. (2012b). Wandering cats: Attitudes and behaviors towards cat containment in Australia. *Anthrozoös, 25*(1), 61-74. https://doi.org/10.2752/175303712X13240472427195

Tratalos, J., Fuller, R. A., Warren, P. H., Davies, R. G., & Gaston, K. J. (2007). Urban form, biodiversity potential and ecosystem services. *Landscape and Urban Planning, 83*(4), 308-317. https://doi.org/10.1016/j.landurbplan.2007.05.003

Travaglia, M., & Miller, K. K. (2018). Cats in the Australian environment: What's your purr-spective? *Australasian Journal of Environmental Management, 25*(2), 153-173. https://doi.org/10.1080/14486563.2017.1369465

Triebenbacher, S. (1999). Re-evaluation of the Companion Animal Bonding Scale. *Anthrozoös, 12*(3), 169-173. https://doi.org/10.1080/14486563.2017.1369465

Tschanz, B., Hegglin, D., Gloor, S., & Bontadina, F. (2010). Hunters and non-hunters: Skewed predation rate by domestic cats in a rural village. *European Journal of Wildlife Research, 57*, 597-602. https://doi.org/10.1007/s10344-010-0470-1

Turner, D. C. (2013). *The domestic cat: The biology of its behaviour*. Cambridge University Press. https://doi.org/10.1017/CBO9781139177177

Tzannes, S., Batchelor, D. J., Graham, P. A., Pinchbeck, G. L., Wastling, J., & German, A. J. (2008). Prevalence of cryptosporidium, giardia and isospora species infections in pet cats with clinical signs of gastrointestinal disease. *Journal of Feline Medicine and Surgery, 10*(1), 1-8. https://doi.org/10.1016/j.jfms.2007.05.006

Uga, S., Minami, T., & Nagata, K. (1996). Defecation habits of cats and dogs and contamination by Toxocara eggs in public park sand pits. *American Journal of Tropical Medicine, 54*(2), 122-126. https://doi.org/10.4269/ajtmh.1996.54.122

Vaccine-Associated Feline Sarcoma Task Force. (2005). The current understanding and management of vaccine-associated sarcomas in cats. *Journal of the American Veterinary Medical Association, 226*(11), 1821-1842. https://doi.org/10.2460/javma.2005.226.1821

van der Leij, W. J. R., Selman, L. D. A. M., Vernooij, J. C. M., & Vinke, C. M. (2019). The effect of a hiding box on stress levels and body weight in Dutch shelter cats; A randomized controlled trial. *PLoS ONE, 14*(10), Article e0223492. https://doi.org/10.1371/journal.pone.0223492

van Heezik, Y., Smyth, A., Adams, A., & Gordon, J. (2010). Do domestic cats impose an unsustainable harvest on urban bird populations? *Biological Conservation, 143*(1), 121-130. https://doi.org/10.1016/j.biocon.2009.09.013

Vansandt, L. M., Meinsohn, M. C., Godin, P., Nagykery, N., Sicher, N., Kano, M., Kashiwagi, A., Chauvin, M., Saatcioglu, H. D., Barnes, J. L., Miller, A. G., Thompson, A. K., Bateman, H. L., Donelan, E. M., González, R., Newsom, J., Gao, G., Donahoe, P. K., Wang, D., Swanson, W. F., & Pépin, D. (2023). Durable female contraception in the female domestic cat using viral-vectored delivery of a feline anti-Müllerian hormone transgene. *Nature Communications, 14*, Article 3140. https://doi.org/10.1038/s41467-023-38721-0

Vascellari, M., Baioni, E., Ru, G., Carminato, A., Mutinelli, F. (2009). Animal tumor registry of two provinces in northern Italy: Incidence of spontaneous tumors in dogs and cats. *BMC Veterinary Research, 5*, Article 39. https://doi.org/10.1186/1746-6148-5-39

Veitch, C. R., Gaskin, C., Baird, K., & Ismar, S. M. H. (2011). *Changes in bird numbers on Raoul Island, Kermadec Islands, New Zealand, following the eradication of goats, rats, and cats*. In: Island Invasives: Eradication and Management. Proceedings of the International Conference on Island Invasives, IUCN, Gland, Switzerland, pp. 372-376. https://oceanrep.geomar.de/id/eprint/19524/

Verstegen, J., & Onclin, K. (2003). *Mammary tumors in the queen*. Proceedings, Society for Theriogenology Annual Meeting, pp. 239-245. Columbus, OH, USA.

Veterinary Task Force on Feline Sterilization. (2016). *Recommendations for Age of Spay and Neuter Surgery*. https://kittencoalition.org/wp-content/uploads/2021/02/Fix-by-Five-focus-Veterinary-Task-Force-on-Feline-Sterilization-Rec-for-Age-of-SN-Surgery.pdf

Wagner, D., Hurley, K., & Stavisky, J. (2018a). Shelter housing for cats: Practical aspects of design and construction, and adaptation of existing accommodation. *Journal of Feline Medicine and Surgery, 20*(7), 643-652. https://doi.org/10.1177/1098612X18781390

Wagner, D., Hurley, K., & Stavisky, J. (2018b). Shelter housing for cats: Principles of design for health, welfare and rehoming. *Journal of Feline Medicine and Surgery, 20*(7), 635-642. https://doi.org/10.1177/1098612X18781388

Wagner, R. & Stallmeister, N. (2008). Cheyletiella dermatitis in humans, dogs and cats. *British Journal of Dermatology, 143*(5), 1110-1112. https://doi.org/10.1046/j.1365-2133.2000.03869x

Wald, D. M., Jacobson, S. K., & Levy, J. K. (2013). Outdoor cats: Identifying differences between stakeholder beliefs, perceived impacts, risk and management. *Biological Conservation, 167*, 414-424. http://dx.doi.org/10.1016/j.biocon.2013.07.034

Walker, I. (2014). *Toxoplasmosis in Hawke's Bay*. A report prepared by Vet Services Hawke's Bay for Hawke's Bay Regional Council, Hawke's Bay, New Zealand.

Walker, J. K., Bruce, S. J., & Dale, A. R. (2017). A survey of public opinion on cat (*Felis catus*) predation and the future direction of cat management in New Zealand. *Animals, 7*(7), Article 49. https://doi.org/10.3390/ani7070049

Wallace, J. L., & Levy, J. K. (2006). Population characteristics of feral cats admitted to seven trap-neuter-return programs in the United States. *Journal of Feline Medicine and Surgery, 8*(4), 279-284. https://doi.org/10.1016/j.jfms.2006.02.004

Webb, C. (2008). *Australia asks 'Who's for Cats?'*. In the proceedings of the AAWS International Animal Welfare Conference, Gold Coast, Australia.

Weiss, E., Patronek, G., Slater, M., Garrison, L., & Medicus, K. (2013). Community partnering as a tool for improving live release rate in animal shelters in the United States. *Journal of Applied Animal Welfare Science, 16*(3), Article 221. https://doi.org/10.1080/10888705.2013.803816

Weiss, E., Slater, M., & Lord, L. (2012). Frequency of lost dogs and cats in the United States and the methods used to locate them. *Animals, 2*(2), 301-315. https://doi.org/10.3390/ani2020301

Wellington City Council. (2024a). *Ordinary Meeting of Kōrau Mātinitini | Social, Cultural, and Economic Committee*. https://wellington.govt.nz/-/media/your-council/meetings/committees/social-cultural-and-economic-committee/2024/2024-04-10-agenda-scec.pdf

Wellington City Council. (2024b). *Animal Bylaw 2024*. https://wellington.govt.nz/your-council/plans-policies-and-bylaws/bylaws/animal-bylaw-2024#cats

Welsh, C. P., Gruffydd-Jones, T. J., Roberts, M. A., & Murray, J. K. (2014). Poor owner knowledge of feline reproduction contributes to the high proportion of accidental litters born to UK pet cats. *Veterinary Record, 174*(5), 118. https://doi.org/10.1136/vr.101909

Wiengcharoen, J., Thompson, R. C., Nakthong, C., Rattanakorn, P., & Sukthana, Y. (2011). Transplacental transmission in cattle: Is *Toxoplasma gondii* less potent than *Neospora caninum*? *Parasitology Research, 108*, 1235-1241. https://doi.org/10.1007/s00436-010-2172-8

Wilken, R. L. M. (2012). *Feral cat management: Perceptions and preferences (A case study)*. [Master thesis, San Jose State University]. https://scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=7714&context=etd_theses

Wilson, J. L., Gruffydd-Jones, T. J., & Murray, J. K. (2017). Risk factors for road traffic accidents in cats up to age 12 months that were registered between 2010 and 2013 with the UK pet cat cohort ('Bristol Cats'). *Veterinary Record, 180*(8), Article 195. https://doi.org/10.1136/vr.103859

Winter, L. (2004). Trap-neuter-release programs: the reality and the impacts. *Journal of the American Veterinary Medical Association, 225*(9), 1369-1376. https://doi.org/10.2460/javma.2004.225.1369

Wolf, P. J., & Hamilton, F. (2022). Managing free-roaming cats in US cities: An object lesson in public policy and citizen action. *Journal of Urban Affairs, 44*(2), 221-242. https://doi.org/10.1080/07352166.2020.1742577

Wood, V., Seddon, P. J., Beaven, B., & van Heezik, Y. (2015). Movement and diet of domestic cats on Stewart Island/Rakiura New Zealand. *New Zealand Journal of Ecology, 40*(1), 186-190. https://doi.org/10.20417/nzjecol.40.20

Woods, M., McDonald, R. A., & Harris, S. (2003). Predation of wildlife by domestic cats *Felis catus* in Great Britain. *Mammal Review, 33*(2), 174-188. https://doi.org/10.1046/j.1365-2907.2003.00017.x

Woolley, C. K., & Hartley, D. (2019). Activity of free-roaming domestic cats in an urban reserve and public perception of pet-related threats to wildlife in New Zealand. *Urban Ecosystems, 22*, 1123-1137. https://doi.org/10.1007/s11252-019-00886-2

World Small Animal Veterinary Association. (n.d.). *Microchip safety and efficacy*. https://wsava.org/wp-content/uploads/2020/01/Microchip-Safety-and-Efficacy.pdf

Wu, A. S., Niedra, R., Pendergast, L., & McCrindle, B. W. (2002). Acceptability and impact of pet visitation on a pediatric cardiology inpatient unit. *Journal of Pediatric Nursing, 17*(5), 354-362. https://doi.org/10.1053/jpdn.2002.127173

Yates, D., Yeates, J., & Roberts, M. (2013). Optimum age for neutering cats. *Veterinary Record, 172*(2), 53-54. https://doi.org/10.1136/vr.f147

Zak, J., Voslarova, E., Vecerek, V., & Bedanova, I. (2017). Impact of mandatory microchipping on traceability of sheltered dogs in the Czech Republic. *Journal of Applied Animal Welfare Science, 21*, 108-119. https://doi.org/10.1080/10888705.2017.1376203

Zanowski, G. N. (2012). A fresh look at spay/neuter legislation: the journey to a middle ground. *Journal of Public Health Management and Practice, 18*(3), E24-E33. https://doi.org/10.1097/PHH.0b013e318222a7f5

Zasloff, L. R., & Hart, L. A. (1998). Attitudes and care practices of cat caretakers in Hawaii. *Anthrozoös, 11*(4), 242-248. https://doi.org/10.2752/089279398787000599

Zasloff, R. L. (1996). Measuring attachment to companion animals: A dog is not a cat is not a bird. *Journal of Applied Animal Behaviour Science, 47*(1-2), 43-48. https://doi.org/10.1016/0168-1591(95)01009-2

Zaunbrecher, K. I., & Smith, R. E. (1993). Neutering of feral cats as an alternative to eradication programs. *Journal of the American Veterinary Medical Association, 203*(3), 449-452. https://doi.org/10.2460/javma.1993.203.03.449

Zimolag, U., & Krupa, T. (2009). Pet ownership as a meaningful community occupation for people with serious mental illness. *The American Journal of Occupational Therapy, 63*(2), 126-137. https://doi.org/10.5014/ajot.63.2.126

Zito, S. (2015). Understanding human factors involved in the unwanted cat problem. [Doctoral thesis, University of Queensland]. https://espace.library.uq.edu.au/view/UQ:367304

Zito, S., Aguilar, G., Vigeant, S., & Dale, A. (2018). Assessment of a targeted trap-neuter-return pilot study in Auckland, New Zealand. *Animals, 8*(5), Article 73. https://doi.org/10.3390/ani8050073

Zito, S., Morton, J., Paterson, M., Vankan, D., Bennett, P. C., Rand, J., & Phillips, C. J. C. (2016a). Cross-sectional study of characteristics of owners and non-owners surrendering cats to four Australian animal shelters. *Journal of Applied Animal Welfare Science, 19*(2), 126-118. https://doi.org/10.1080/10888705.2015.1121145

Zito, S., Morton, J., Vankan, D., Paterson, M., Bennett, P. C., Rand, J., & Phillips, C. J. C. (2016b). Reasons people surrender unowned and owned cats to Australian animal shelters and barriers to assuming ownership of unowned cats. *Journal of Applied Animal Welfare Science, 19*(3), 303-319. https://doi.org/10.1080/10888705.2016.1141682

Zito, S., Paterson, M., Vankan, D., Morton, J., Bennett, P., & Phillips, C. (2015a). Determinants of cat choice and outcomes for adult cats and kittens adopted from an Australian animal shelter. *Animals, 5*(2), 276-314. https://doi.org/10.3390/ani5020276

Zito, S., Vankan, D., Bennett, P., Paterson, M., & Phillips, C. J. C. (2015b). Cat ownership perception and caretaking explored in an internet survey of people associated with cats. *PLoS ONE, 10*(7), Article e0133293. https://doi.org/10.1371/journal.pone.0133293

Zito, S., Walker, J., Gates, M. C., & Dale, A. D. (2019). A preliminary description of companion cat, managed stray cat, and unmanaged stray cat welfare in Auckland, New Zealand using a 5-component assessment scale. *Frontiers in Veterinary Science, 6*(40), 1-10. https://doi.org/10.3389/fvets.2019.00040

Zoran, D., & Buffington, C. (2011). Effects of nutrition choices and lifestyle changes on the well-being of cats, a carnivore that has moved indoors. *Journal of the American Veterinary Medical Association, 239*(5), 596-606. https://doi.org/10.2460/javma.239.5.596

12. Appendices

Appendix A: Information about the New Zealand National Cat Management Group

Appendix B: Regional pest management plans- summary for cats

Appendix C: Best practices for TNR

Appendix D: Review of TNR studies and outcomes

Appendix E: International examples of existing cat control-specific legislation

12.1. Appendix A: Information about the New Zealand National Cat Management Group

12.1.1. Purpose of the National Cat Management Group

To proactively address the positive and negative impact of cats in New Zealand.

To develop a humane national cat management strategy through a collaborative and proactive approach that recognises the significant positive benefits of cat ownership, whilst also acknowledging the concerns about the impact cats have in New Zealand.

To encourage education of the public about the benefits of responsible cat ownership.

To lobby local and central government to enact useful legislation that facilitates sustainable humane cat management.

12.1.2. Strategic Vision of the National Cat Management Group

All cats in New Zealand are valued, responsibly owned, and humanely managed to protect their welfare and our unique environments.

12.1.3. Strategic Goals and Outcomes

The following section discusses the strategic goals and outcomes of the National Cat Management Group and provides the framework for this report.

Table A1: New Zealand National Cat Management Group strategic coals and outcomes

Strategic Goal	Strategic Outcomes
Approaches to cat management protect cat welfare.	• New Zealanders recognise the intrinsic value of cats as sentient beings. • The human-cat relationship is recognised as important for cat welfare and humans. • Improved categories of cats are used to inform cat management.
The negative impacts of current cat management on cat welfare, on communities, and ecosystems are	• The negative impacts of current cat management on domestic cat welfare are recognised, understood, and defined. • The negative impacts of current cat management in communities are recognised, understood, and defined.

recognised, understood, and better defined.	• The negative impacts of current cat management on human health are recognised, understood, and defined. • The negative impacts of current cat management on native biodiversity are recognised, understood, and defined. • The negative impacts of current cat management on pastoral industries are recognised, understood, and defined.
Humane and effective cat management is achieved through a multifaceted and integrated national management plan.	• All owned cats are desexed, microchipped, and kept at home. • There are no stray cats in New Zealand. • There are no feral cats in New Zealand. • Sensitive wildlife areas are identified and protected from the negative impacts of cats.
Humane management for all cats is supported through a comprehensive legislative and regulatory framework.	• Responsible agencies are identified to implement legislative and regulatory requirements. • A National Cat Management Act is enacted. • Local legislation supports national legislation for cat management.
Humane management is supported through a comprehensive public engagement framework.	• Responsible cat ownership is encouraged and supported. • There is public engagement on the negative impacts of cats on biodiversity. • There is public engagement on stray and feral cat management.
Cat management strategies in New Zealand are evaluated to ensure they are effective and humane.	• An ethics framework is used to help monitor and evaluate cat management activities. • An adaptive framework is used to monitor and evaluate cat management activities. • Robust data collection and management to inform cat management activities.
Humane and effective cat management is achieved through multi-stakeholder collaboration.	• New Zealand Government takes an active role in supporting multi-stakeholder oversight of cat management strategies. • Local New Zealand governments coordinate community cat management activities and liaise with national cat management activities. • Organisations representing conservation groups, animal welfare, veterinary medicine, and industry take an active role in cat management. • Individuals, including people who do and do not provide care for cats, take an active role in cat management.

12.1.4. National Cat Management Stakeholders

National Cat Management Members (year joined)

2014

- Companion Animal Veterinarians Branch of the New Zealand Veterinary Association (CAV) [a, b, c]
- Local Government New Zealand (LGNZ) [a, b, c]
- Morgan Foundation (MF) (replaced by Predator Free New Zealand Trust) [a, b]
- Companion Animals New Zealand (CANZ) (formerly New Zealand Companion Animal Council (NZCAC)) [a, b, c]
- New Zealand Veterinary Association (NZVA) [a, b, c]
- Royal New Zealand Society for the Prevention of Cruelty to Animals (RNZSPCA) [a, b, c]

2024

- Predator Free New Zealand Trust [c]
- Veterinarians for Animal Welfare Aotearoa (VAWA) [c]

National Cat Management Group Technical Advisors (year joined)

2014

- Department of Conservation (DOC) [a, b, c]

National Cat Management Group Observers (year joined)

2014

- Ministry for Primary Industries (MPI) [a, b, c]

National Cat Management Strategy Report contribution:

- a - Version 1 (2016)
- b - Version 2 (2020)
- c - Version 3 (2025)

12.2. Appendix B: Regional Pest Management Plans- Summary for Cats

The following statutory obligations of the Biosecurity Act 1993 apply for cats included in a Regional Pest Management Plan:

Section 52: Communication of pest or unwanted organisms

No person shall knowingly communicate, cause to be communicated, release, or cause to be released, or otherwise spread any pest or unwanted organism except:

a) in the course of and in accordance with a pest management plan; or
b) as provided in an emergency regulation made under section 150; or
c) for a scientific purpose carried out with the authority of the Minister; or
d) as permitted either generally or specifically by a chief technical officer.

Section 53: Duties of owners of organisms

1) Subject to subsection (2), the owner or person in charge of an organism which that person knows or suspects constitutes, contains, or harbours a pest or unwanted organism must not—

a) cause or permit that organism to be in a place where organisms are offered for sale or are exhibited; or
b) sell or offer that organism for sale; or
c) propagate, breed, or multiply the pest or unwanted organism or otherwise act in such a manner as is likely to encourage or cause the propagation, breeding, or multiplication of the pest or unwanted organism.

(2) A chief technical officer may permit an owner or person in charge of an organism to carry out an act otherwise prohibited by this section.

(3) Permission given under this section must be given either by notice in the Gazette or in writing to the owner or person in charge of an organism.

In addition to the statutory obligations listed above, Regional Pest Management Plans may also include additional rules. Rules applying to cats are listed as a pest or unwanted organism in Table A1.

Table B1: Regional Pest Management Rules for Cats[1]

Council	Status	Definition	Rule
Auckland	Unowned Cat [2] (*Felis catus)*	(a) Any cat which is not: (i) microchipped, or otherwise identified with owner's name and address; and (ii) registered on the New Zealand Companion Animal Register. (b) which is within any site that contains a resident or breeding or roosting population of any regionally or nationally threatened bird, reptile, or amphibian, and is in a rural area.	• Hauraki Gulf site-led programme 7.1.2.2: o Rule 7.1.2.2.1 No person shall move or allow to be moved any unowned cat to or among islands within the Hauraki Gulf Controlled Area. o Rule 7.1.2.2.2 No person shall bring any cat within 200m of any cat-free island within the Hauraki Gulf Controlled Area. Rule 7.1.2.2.3 All commercial transport operators moving goods or people to or among Hauraki Gulf Islands must attain and maintain Pest Free Warrant accreditation. o Rule 7.1.2.2.4 All persons intending to move a building to or among islands in the Hauraki Gulf Controlled Area must notify Auckland Council at least ten working days prior to movement, to arrange inspection and approval by Auckland Council. • Auckland region site-led control programme 7.7.4.1[3]:

[1] Bay of Plenty considers cats to be a part of the biosecurity framework but are not subjected to the RPMP. Canterbury and Chatham consider feral cats to be an organism or species of interest but are not subjected to the RPMP.

[2] Note: based on current knowledge of species distributions at time of writing, sites that meet these criteria are shown in Map 3. Note also cat control will only be undertaken on public land or on private land with consent of land occupier (see principle measures of achievement overleaf). Note: this programme does not prevent the continuing sale and distribution of cats within the region.

			○ Rule 7.7.4.1.1 No person shall abandon, or cause to be abandoned, any cat within the Auckland region. ○ Rule 7.7.4.1.2 No person shall feed any cat on any park within the Auckland region that contains a resident or breeding or roosting population of any threatened native bird, reptile, or amphibian. • Rule 7.7.4.1.3 Any owner of a cat must ensure their cat does not enter an intensively managed site.
Gisborne	Pest: feral cat	Cats without a collar/harness or microchip found outside the Gisborne urban area or a rural township. They have none of their needs provided by humans and survive by hunting their food.	• Where a Site Led Pest Management Programme has been declared, all occupiers shall on a complaints-basis, and unless otherwise agreed between the neighbours and an authorised GDC staff member, control feral cats, act to significantly reduce the chance of these pests from their property re-infesting the adjacent property.
Greater Wellington	Pest: pest cat	Pest cat means any cat within the Wellington Region that is: (i) not microchipped in an area where microchipping is compulsory, and free-living, unowned, and unsocialised, and has limited or no relationship with or dependence on humans, or (ii) not microchipped, or registered on the New Zealand Companion Animal Register, and is free-living, unowned, and unsocialised, and has limited or	• Rule 1. No person shall feed or provide shelter to pest cats on private or public land within the Wellington Region, without the permission of the occupier.

		no relationship with or dependence on humans.	
Hawkes Bay	Pest: feral cats	Any cat living in a wild state and not being kept as a domestic pet.	• All occupiers within a Predator Control Area shall maintain cats in accordance with the Hawke's Bay Regional Predator Control Technical Protocol (PN 4970).
Northland	Pest: cats (feral, stray)	Feral: Cats that have none of their needs provided by humans. Stray: Stray cats are companion/domestic cats that have been lost or abandoned. They may have many of their needs indirectly supplied by humans and live around centres of human habitation.	• None listed besides the Biosecurity act pest rules.
Waikato	Pest: feral cats	Feral cats are defined as free-living cats that have minimal or no reliance on humans, and which survive and reproduce in self-perpetuating populations (National Possum Control Agencies 2009. Feral and Stray Cats, Monitoring and Control, a Preliminary Guideline Towards Good Practice).	• No person shall knowingly abandon or release, or cause to abandon or release to the wild any cat. • No person shall actively assist in the maintenance of any feral cat.
Otago	Pest: feral cats	Wild or otherwise unmanaged	• No person shall keep, hold, enclose, or otherwise harbour in any place, either in transit to or present on Quarantine and Goat Islands any feral cats.

Southland	Pest: feral cats, Bengal cats.
	
	Pest agent: domestic cat
		Wild or otherwise unmanaged	• Rule 6: No person other than an authorised person shall possess, keep, hold, enclose, or otherwise harbour any Bengal cat within the Southland region.
			  ○ Exemptions to this will be considered by Environment Southland where it can be demonstrated that any animal has been de-sexed and micro-chipped for identification and the person is not living on, or travelling to, Stewart Island/Rakiura or any other offshore island.
			• Any person who detects or suspects the presence of any Bengal cat within the Southland region, must immediately report the pest's presence and location to Environment Southland.
			• Rule 28: Note: This is a pest agent rule. No person shall: i) keep, hold, enclose, or otherwise harbour in any place, either in transit to or present on the Stewart Island/Rakiura site any domestic cat; or ii) release into the wild on the Stewart Island/Rakiura site any domestic cat.
			  ○ Any person who is responsible for a domestic cat that is de-sexed and its identity microchipped is exempted from the provisions of Rule 28(i).

Tasman Nelson	Pest- Feral and stray cats at certain sites. Pest agent- Companion cats at certain sites.	Feral cats are cats that are born to feral or stray cats and live without direct or indirect assistance from humans and avoid human contact.	• Any person who suspects the presence of any feral or stray cat within the ATNPSLP shall report its presence and location to Tasman District Council within 48 hours of their sighting. • No person shall deliberately release into the wild (into the Abel Tasman National Park and private enclaves) any cat, including a companion cat. This is a specific pest agent cat rule for the Abel Tasman National Park and enclaves Site-led Programme. • Over the duration of this Plan, and with regard to the St Arnaud Site-led Programme, any person who suspects the presence of any feral or stray

cat observed within the mapped area shall report its presence and location to Tasman District Council within 48 hours of their sighting.

- Over the duration of this Plan, and with regard to the St Arnaud Site-led Programme:
  - No person shall keep, hold or harbour any companion cat within the mapped area unless it is desexed and its identity is microchipped, and the chip is registered on the New Zealand Companion Animal Register.
  - No person shall deliberately release into the wild (into the Nelson Lakes National Park and environs) any cat, including a companion cat.
- Over the duration of this Plan, and with regard to high value sites within Nelson City:
  - Any person who suspects the presence of any feral or stray cat in any named high value site shall report its presence and location to Nelson City Council within 48 hours of their sighting.
  - No person shall feed or shelter any feral or stray cat in any named high value site.
- No person shall deliberately release into the wild (in any named high value site in Nelson as shown on Map 25 in this Proposal) any cat, including a companion cat.

12.3. Appendix C: Best Practices for TNR

Table C1: Resources for developing and implementing TNR programmes

Organisation	Type	Resources
International Companion Animal Management Coalition	Comprehensive guidelines for implementation	Humane cat population management guidance
International Cat Care	Principles and background in determining solutions	Cat-Friendly solutions for unowned cats
Alley Cat Allies	Procedure-based instructions for TNR	A step-by-step guide to Trap-Neuter-Return
	Population monitoring	Feral cat colony tracking system
Neighbourhood Cats	Comprehensive guidelines for implementation	The Neighbourhood Cats TNR Handbook
	Population monitoring	Cat Stats
ASPCA Pro	Comprehensive guidelines for implementation	Guide to Trap-Neuter-Return (TNR) and Colony Care
	Management protocols for shelter and clinic staff	Special Considerations for Community Cats at Spay/Neuter Clinics Guide
Best Friends Animal Society	Comprehensive guidelines for implementation	Community Cat Programs Handbook
DC Cat Count	Population monitoring	Toolkit
PetSmart Charities Community TNR Tactics and Tools	Comprehensive guidelines for implementation	Community TNR Tactics and Tools*

*Email science@spca.nz for a copy

12.4. Appendix D: Review of TNR Studies and Outcomes

Table D1: Actual population decreases

Study	Methodology	Duration	Outcome
Levy et al., 2003a; USA	155 unowned cats living in colonies on a university campus over the study period; the programme included adoptions, vaccinations, euthanasia based on disease status, and controlled provision of food.	11 years	The initial census indicated 56% of the population was kittens, and 75% were unsocialised; Over the study period, 66% decrease in the cat population; with no kittens born after 4th year; 15% of cats returned; 47% of cats adopted; 6% moved to an area not under observation; 23% disappeared or died; 11% euthanased. 3/11 colonies were depleted, and colony size decreased from a range of 3-25 cats to 1-5 cats by the end of the study. Some immigration of cats into the colony (strays and abandoned cats) occurred, but new cats were desexed or adopted before they could reproduce.
Nutter et al., 2004; USA	71 female cats and 171 kittens in mixed rural and suburban settings; RCT with treatment (n=6) and control colonies with no desexing (n=3); programme included vaccination for all cats.	2 years	All TNR colonies stabilised; mean population decline of 36% in TNR colonies; 47% mean increase in control colonies. Seven-year follow-ups found TNR colonies stabilised and were declining in size while non-TNR control colonies increased in size and had a high turnover of cats. One TNR colony became extinct after 31 months, and the other colonies were reduced to five or fewer cats. Both TNR and control colonies had consistent low-level immigration.
Mendes-de-Almeida et al., 2006; BRA	Female cats from an urban zoo colony of 96 cats (80 adults, 16 kittens) were desexed and vaccinated.	3 years; annual population estimates	Population stopped growing between years of the study period with an estimated size of 59 cats at the start and 41 cats at the end. The number of immigrant cats diminished from 54% (Year 2) to 34.6% (Year 3) to 15% at the final census. The proportion of kittens in the population reduced gradually from 17% to 7% (Year 2), to 6% (Year 3), and finally to 2.5%. 22 cats died throughout the study.

Natoli et al., 2006; Italy	103 cat colonies; 8,000 cats desexed and returned; 86% of original cats desexed.	6 years	60.2% of cats desexed. Overall decrease from 1655 to 1293 cats; 55 colonies had decreased in colony size, 20 remained stable in size, and 28 had increased in size. The overall number of cats/colonies decreased over the study period from a median of 12 (range 4-50) to a median of 10 (range 2-40). TNR colonies controlled over a longer period (three, four, five or six years) decreased in size (by 16, 29, 28, and 32% respectively) whereas those TNR colonies controlled for two years or less increased in size (13%). Cat immigration is estimated at 21%.
Mendes-de-Almeida et al., 2011; BRA	The population was estimated at 26 cats at the initial census; All trapped female cats were desexed at two time points.	2 Years	The estimated colony size decreased from 26 to 17 over the study period. Kittens comprised 6% of captures in Year 1 and 0% in Year 3. Immigrant adult female cats comprised 30% of captures in Year 1 and 71% of captures in Year 3.
Tan et al., 2017; AUS	Questionnaire on TNR activities, 53 respondents; median of 69% of cats in colonies desexed; cats provided food and health care; rehoming included.	2.2 years	The median colony size decreased from 11.5 cats to 6.5 cats.
Spehar & Wolf, 2017; USA	Retrospective analysis of reports and interviews; approximately 300 cats in urban sites; vaccination and rehoming included.	17 years	The population was reduced by 1/3 through adoption and rehoming, the remaining population decreased over time. The last kittens born in the area happened in Year 6. By Year 11, 40 cats remained. By Year 17, the last observed cat died at age 16.
Bissonnette et al., 2018: CAN	RCT; 18 colonies (10 treatment, 8 control) around barns and stables. 128 adults, 15 kittens, and a median of 13.5 cats per colony. An average of 97% of cats in TNR groups were desexed.	1 year	An average of 87% of cats were sterilised at 7.5 months and 12 months after the TNR event. TNR colonies had the same number of adult cats at 7.5 months and 12 months. Control colonies had a median increase of 2.5 adults per colony at 7.5 months. On median, there were .5 more cats at 7.5 months at control colonies and a reduction of 2 cats for TNR cats. No difference between the control and TNR groups in the number of kittens.
Spehar & Wolf, 2018; USA	Colony and neighbourhood-level data for 195 cats at 20 heavily urbanised sites. 79.5% sterilised after being	10 years	92.3% (180) of cats trapped were sterilised; 79.5% (155) were sterilised after being trapped, and 12.8% 25) were previously sterilised. 30.3% of cats were adopted, 34.4% of cats disappeared, 3.1% of cats were euthanased, 1.5% died,

	trapped, 12.8% previously sterilised. 30.3% of cats were adopted, 34.4% of cats disappeared, and 7.6% other (euthanased, died, returned to the owner, relocated, or seized by animal services.		1.5% were returned to owners, and 1.5% were relocated or seized by animal services. By Year 10, 22.6% of the 195 cats remained on site. A high of 88 cats across sites was recorded in Year 3 with a subsequent 50% reduction in the number of cats across sites by Year 10. Eight colonies were eliminated, 17 colonies were reduced in size from peak levels, 11 dropped in size from initial levels, and 4 colonies had no change from initial levels.
Swarbrick & Rand, 2018; AUS	The original colony was approximately 69 cats on an urban university campus; the programme included adoption/rehoming.	9 years	122 total cats over the study period; 78% reduction of campus cat population where TNR activities took place; 30% rehomed or returned to the owner, 30% dead or euthanased, and 29% disappeared. 34 cats had immigrated to the site during the study period.
Kreisler et al., 2019; USA	Retrospective study with census data and medical records; the original colony was 455 cats in a seasonal residential coastal community near bush; included adoption, euthanasia, vaccination, and deworming.	23 years; 10 population surveys	Over the study period, 1,111 cats returned, and 1,419 cats were removed by adoption, euthanasia died in care or were dead on arrival. 55% decrease in the free-roaming cat population; 80% decrease in the number of visits to the colony veterinary clinic; increase in the average age of active cat population from 16.6 months to 43.8 months; retrovirus prevalence decreased by .32% per year.
Spehar & Wolf, 2019a; USA	Year 28 follow-up study (Year 1, Levy et al., 2003a); 204 cats desexed.	28 years	At Year 28, 10 cats remained on site; 11/16 colonies were eliminated.
Spehar & Wolf, 2020; USA	175 cats; two-mile section of a walking and cycling path, mix of roadway, grassland, meadow and marshland. 127 cats adopted or fostered; 10 relocated to barns; 20 disappeared; 35 euthanased; 31 died from other reasons, 4 migrated.	16 years	99.4% reduction in the number of cats; 258 cats enrolled in TNR throughout the programme, and 1 remains. No kittens were born after 2006. Sterilised cats spent an average of 4.7 years on-site compared to an average of 2.4 years for unsterilised cats.

Coe et al., 2021; USA	Year 5 follow-up study (Elizondo & Loss, 2016); 15 camera trapping locations in high, medium, and low urban density.	4 sampling periods over 2 months	Detection-corrected abundance estimate decreased for individual cats from 62 (Year 1) to 48 (Year 5) (non-significant); By Year 5, 27% of cats were ear-tipped compared to 0% in Year 1.
Gunther et al., 2022; ISR	20 km^2 urban area; Areas designated as low TNR and high TNR; In Phase 2 (5 Years), 10,925 cats were sterilised in select areas; In Phase 3 (4 years), 11,219 cats were sterilised in an expanded area.	12 years; sampling periods at Years 2, 3, 4, and 8 after TNR	26.5% increase of cats in Phase 2 surveyed areas; 23.1% reduction in the cat counts in the entire surveyed area in Phase 3. No significant reduction in kitten counts in the entire surveyed area. Phase 2 kitten counts increased annually by 20.2% in the low TNR area and decreased by 42.4% in the high TNR area; Phase 3 kitten count trends reversed- a 14.1% decrease in kitten counts in the low TNR area and an increase to 21.4% in high TNR areas. During Phase 3, there was a 2.25-fold increase in kitten-to-queen ratio, which indicates increased kitten survival.

Table D2: Actual population increases or no change

Study	Methodology	Duration	Outcome
Neville, 1989; UK	TNR	4 years	The population fluctuated between 19 and 17, but no decline. There is a lack of details on this study, therefore, results should be interpreted with caution.
Castillo & Clarke, 2003; USA	Colonies at two sites: a 24-ha park with forest and rockland and marina nest to a protected coastal beach area and near 365-ha park with coastal dunes, scrub, marsh, and mangroves. Adoption and feeding were included in the programme.	1 year; census taken, both sites sampled every 35-40 days based on site.	Nearly all cats were identified in the initial census and follow-up resighting sessions. There was a significant decrease in the cats from the original census at both sites. The total number of cats at one site increased over time, and there was not sufficient evidence to conclude if the other site was decreasing or increasing over time. The population increased for colonies due to the immigration of new cats dumped at or stray cats attracted to the food at the highly visible colony sites.
Gunther et al., 2011; ISR	184 cats and 76 kittens in residential urban sites; two feeding groups with TNR and two control colonies without TNR compared for immigration, emigration, and kitten survival. Vaccination was included in the programme.	1 year; weekly observations	73%-75% of the adult cats desexed in treatment groups. TNR groups had a significant increase in the number of adults, and an increase in total population due to higher immigration and lower emigration than control groups; kitten survival significantly increased in TNR colonies. The number of adults in control groups decreased significantly; the total number of cats was stable for one control group, and the other group increased significantly due to an increase in kittens. TNR groups had significantly greater immigration and less emigration than control groups.
Natoli et al., 2006; Italy	103 cats registered urban colonies; census was taken on 8,000 cats desexed and returned; 86% of original cats desexed.	10 years	60.2% of cats desexed. Overall decrease from 1655 to 1293 cats; 55 colonies had decreased in colony size, 20 remained stable in size, and 28 had increased in size. The overall number of cats/colonies decreased over the study period from a median of 12 (range 4-50) to a median of 10 (range 2-40). TNR colonies controlled over a longer period (three, four, five or six years) decreased in size (by 16, 29, 28, and 32% respectively) whereas those

			TNR colonies controlled for two years or less increased in size (13%). Cat immigration was estimated at 21%.
Spehar & Wolf, 2018a; USA	Colony and neighbourhood-level data for 195 cats at 20 heavily urbanised sites. 79.5% sterilised after being trapped, 12.8% previously sterilised. 30.3% of cats were adopted, 34.4% of cats disappeared, and 7.6% other (euthanased, died, returned to the owner, relocated, or seized by animal services.	10 years	By Year 10, 22.6% of the 195 cats remained on site. A high of 88 cats across sites was recorded in Year 3 with a subsequent 50% reduction in the number of cats across sites by Year 10. Eight colonies were eliminated, 17 colonies were reduced in size from peak levels, 11 dropped in size from initial levels, and 4 colonies had no change from initial levels.
Kilgour et al., 2017; USA	Two neighbourhoods with one treatment and control site each in a heavily urbanised area; 125 and 60 cats desexed and returned at two sites, colony cats made up 76% and 52% of cats trapped and returned at two sites, vaccination and rehoming included.	1 Year, a census was taken twice	50% increase in the number of cats sterilised in treatment areas, no significant change in the number of cats in treatment or control sites across the years. One treatment site had twice as many cats in the second census. Turnover of new cats sighted in the second year was the highest at 98% at one treatment site and the lowest at 77% at the other treatment site.

Table D3: Changes in local shelter intake or number of cats trapped

Study	Methodology	Duration	Outcome
Hughes & Slater, 2002; USA	University campus: 101/158 cats returned, concurrent vaccination, euthanasia, or adoption for cats and kittens when appropriate.	2 years	Decrease in cats and kittens caught in Year 2 (35) compared to Year 1 (123). The proportion of tame cats was significantly greater in Year 2 compared to Year 1. Decrease in complaints to university pest services.
Hughes et al., 2002; USA	Colonies at mixed urban and rural sites; 7,903 desexed.	6 years	Cat euthanasia at local municipal shelters decreased by 18% during the TNR programme; complaints of cat nuisance decreased significantly during the TNR programme.
Johnson & Cicirelli, 2014; USA	10,080/11,423 impounded cats desexed and returned in an urban county.	4 years	The number of cats and kittens impounded by the city decreased by 29.1%, and euthanasia in the animal shelter decreased from 47% to 23%. Euthanasia of cats in the shelter due to upper respiratory disease decreased by 99% and the number of dead cats collected from the streets decreased by 20%. 958 (9.5%) cats of the desexed and returned were re-impounded.
Levy et al., 2014; USA	2,366 cats (54% of the population) desexed; concurrent adoption programme in a geographically discrete urban area where shelter intake is higher than in other areas.	2 years	Per capita shelter intake was 3.5-fold higher, and euthanasia was 17.5-fold higher in the non-target area. Shelter cat intake from the target area decreased by 66% compared to a decrease of 12% in the non-target area. Only 0.5% of cats admitted to the TNR clinic in the study were euthanased due to health issues and only 0.3% of cats died peri-operatively. The study also included a concurrent nuisance counselling programme for residents.
Spehar & Wolf, 2018b; USA	Return to Field and targeted TNR combined in an urban shelter; 11,746 cats sterilised, vaccination and rehoming included.	3 years	84.1% decline in euthanasia, intake decreased by 37.6%, and live release rate increased to 47.7%. The number of complaints to the city declined.

Spehar & Wolf, 2019; USA	Return to Field and TNR combined in six diverse communities; 72,970 cats enrolled; 71,311 desexed, vaccinated, and returned.	3 years	Median reduction of 32% in intake, median decline of 83% in euthanasia, median live-release rate increased by 53%.
Zito et al., 2019; NZ	Pilot; 84% desexed and returned, 5% euthanased for health reasons, and 10% rehomed.	1 year	At local shelter near project site: 39% decrease in incoming adult strays; 17% decrease in incoming juvenile strays; 34% decrease in underage euthanasia; 7% decrease in unsocialised stray cats sterilised and returned; 47% decrease in unsocialised adult and juvenile stray cat euthanasia.

Table D4: Simulations of population changes

Study	Methodology	Duration	Outcome
Foley et al., 2005	Population modelling.	10 years; 7 years	Inconsistent reduction in per capita growth, the population multiplier, or the proportion of female cats that were pregnant.
Nutter, 2006	Population modelling of TNR.	12.8 years	Elimination of a cat population with an annual neutering rate of 75–85%.
Andersen et al., 2004	Population modelling of TNR.		Effective control of cat population with 75% desexing of female cats.
Budke & Slater, 2009	Population modelling of non-surgical compared to surgical contraception.	3 years	Stabilisation of the cat population size would require surgical desexing of over 51% of both adult and juvenile female cats annually. Once the population stabilises, approximately 14% of the total female population would require desexing annually or having 71% of the total female population and 81% of the adult female population sterilised to maintain a stable population.
Schmidt et al., 2009	Population modelling of TNR using different capture and immigration rates.	25 years	With no immigration into the colony, the cat population size decreased by 46%. A similar effect on population modelling occurred with the lethal control programme.
Jones & Down, 2011; S AFR	5 university campuses; census taken over 3 months with an estimate of 186 cats across all sites and density of 161 cats per km^2, combined with cat caregiver questionnaires; sites had a range of 8-43 cats; average sterilisation across sites 55 ± 11% (range of 0-100%).		There was a significant linear negative relationship between number of cats and sterilisation percentage. Linear equations indicated that for every 16% increase in sterilisation, the number of cats decreased by 10. % of younger cats decreased as sterilisation increased, but density increased by 1 cat per hectare. At 55% sterilisation, the population was predicted to remain stable, however, caregivers underestimated the number of cats by 7± 37%. The recommendation is to increase sterilisation to 90% to reduce population long-term.

McCarthy et al., 2013	Population modelling of lethal control, TNR, and 'trap-vasectomy-hysterectomy-return' (TVHR).	6,000 days	TVHR was superior to both lethal control and TNR in reducing cat population based on a decrease in feral cat populations at lower capture rates compared to lethal control or TNR. Cat days in the environment (one way of assessing possible cat impact on wildlife) were also predicted to decrease more rapidly with increased capture rates for TVHR).
Miller et al., 2014	Population modelling of TNR compared to 'trap and kill'.	50 years	TNR can stabilise and reduce cat populations and be effective compared to the traditional 'trap and kill'. The model assumed that trapping efficiencies for 'trap and remove' and TNR were identical potentially understating the effectiveness of TNR.
Dias et al., 2017	Population modelling of current sterilisation rate, 100% annual sterilisation of intact females, the annual removal of cats to the mainland, and the latter two strategies combined; interviews with island residents on behaviours; estimations of free-roaming cat population size and density.	50 years	Total population of cats on the island was estimated at 1287; modelling the current sterilisation rate led to a 34.3% increase in population after 50 years; modelling the 100% sterilisation rate of intact females led to a 31.2% increase in population; modelling the removal of cats required an annual removal rate of 11.7% to stabilise the population; modelling the combined annual removal and 100% sterilisation of females required a removal rate of 9.2% to stabilise the population.
Lohr et al., 2012b	Cost-effectiveness of TNR compared to trap and kill in a closed population compared to annual 10% supplementation with new cats.	30 years	With no supplementation of new cats, TNR took 30 years to extirpate cats; Trap and kill removed 30,000 cats in the first year led to extirpation in 75% of the models in the second year. With a 10% supplement of new cats each year, the colony returned to its original size in 6 years and trap and kill had to be repeated, TNR never reduced the colony size to zero.

12.5. Appendix E: International Legislation for Cat Management

In many countries, the term 'feral' may be used for 'stray' cats as defined under New Zealand law.

Table E1: Countries with cat management legislation (excluding Australia).

Country	Desexing	Microchipping	Registration
Canada*	X (10 municipalities)		X (locally)
Belgium**		X	X
Bulgaria**		X (breeding animals)	X (breeding animals)
England		X	X (microchip, non-government database)
Estonia**		X (locally)	X (locally)
France**		X	X
Germany**	X (includes stray cats)	X (includes stray cats)	X (includes stray cats)
Greece**		X	X
Italy**		X (sold and colony cats)	X (sold and colony cats)
Latvia**		X	X
Lithuania**		X	X (state database)
Luxembourg**		X	X
Malta**		X (if sold in a pet shop)	X (if sold in a pet shop)
Portugal**		X	
Slovenia**		X	
Spain**		X (locally)	X (locally)
United States***	X (locally)		

*Eight municipalities in British Columbia mandate that cats may not 'roam at large' and ten municipalities in British Columbia prohibit owner/guardians from allowing non-desexed cats to 'roam at large' (Human Canada: www.humanecanada.ca/animal_control).

** See the EU Dog & Cat Alliance National Legislation for more information.

*** See Michigan State University Animal Legal & Historical Center Detailed discussion of state spay and neuter laws.

Table E2: Australian state-based legislation for domestic cat management*

Element	ACT	NSW	QLD	SA	TAS	VIC	WA
Cat registration	No	Yes (by 6 months of age)	No	No	No	Yes (from 3 months of age)	Yes (from 3 months of age)
Collar & tag	No	No	No	No	No	No	No
Microchip	Yes (before sale/transfer of ownership and by 3 months of age)	Yes (before sale/transfer of ownership and by 3 months of age)	Yes (before 3 months of age)	Yes (before sale/transfer of ownership and by 3 months of age)	Yes (by 6 months of age)	Yes (by 3 months of age)	Yes (by 6 months of age)
Containment	Yes						
Desexing	Yes (by 3 months of age)	No	No	Yes (by 6 months of age)	Yes (by 6 months of age)	No	Yes (by 6 months of age
Breeder Registration	Yes (from 3 months of age if undesexed)	No	No	Yes (by 6 months of age)	No	Yes (if possess >3 undesexed cats)	Yes (by 6 months of age)
Breeder required to comply with standards	Yes	Yes	No	Yes	No	Yes	No

Must not abandon	No	No	No	No	Yes	Yes	No
Must not feed a feral/stray cat	No	No	No	No	No	Yes	No
Nuisance	Yes	Yes	No	No	No	Yes	Yes
Stray cats to be surrendered	No	No	No	No	No	Yes	No
Prohibited areas	Yes	Yes	No	Yes	No	No	No
Animal Management Plans	No	No	No	Yes	No	Yes	No

*****Modified from the 'Comparison of key elements of state-based cat management legislation' table in Identifying Best Practice Cat Management in Australia (RSPCA Australia 2018)

*There is no territory-based legislation relating to cat management in the NT