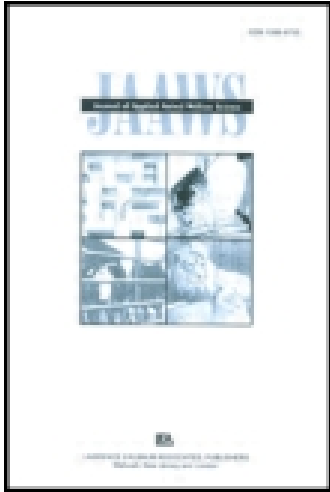


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What's in a Name? Perceptions of Stray and Feral Cat Welfare and Control in Aotearoa, New Zealand

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New Zealanders ($n = 354$) rated the acceptability of lethal and nonlethal cat control methods and the importance of conservation and welfare. Lethal control was more acceptable for feral cats than strays; for nonlethal control, the inverse was true. More than concern for the welfare of cats subjected to control, perceived conservation benefits, risk of disease transfer, and companion cat welfare dictated the acceptability of control measures. Similarly, the welfare consideration for groups of cats differed, transitioning from companion (highest) to feral (lowest). Differences in attitudes toward acceptability of control methods were evident. In particular, nonhuman animal professionals ranked lethal control as more acceptable than did nonanimal professionals. Cat caregivers (owners) considered both conservation and welfare issues of greater importance than did nonowners. Owners ranked the acceptability of nonlethal control methods higher for stray cats, but not feral, than did nonowners. This research indicates that the use of the terms *stray* and *feral* may have significant impact on cats in New Zealand. There is also a greater consideration of conservation values than of welfare in stray and feral cat control.

The domestic cat population (*Felis catus*) is currently estimated to exceed 200 million worldwide (Clutton-Brock, 2002). In a number of countries, including New Zealand, the cat's popularity as a companion exceeds that of the domestic dog (*Canis familiaris*; Bernstein, 2005). Neglect of the companion

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cat population may result in the establishment of stray and feral cat populations within both populated (Slater et al., 2008) and unpopulated areas (Burrows et al., 2003). The transition from companion to stray or feral is rapid within cats and may occur within a single generation postabandonment (Bradshaw, Horsfield, Allen, & Robinson, 1999).

The definition of the terms *companion*, *stray*, and *feral* are not consistent among studies (Farnworth, Dye, & Keown, 2010). The definitions used herein are contained within National Animal Welfare Advisory Committee (NAWAC; 2007) and are as follows:

Companion cat: A common domestic cat who lives with humans as a companion and depends on humans for care and welfare.

Stray cat: A companion cat who is lost or abandoned and who is living as an individual or in a group (colony). Stray cats have many of their needs indirectly supplied by humans and live around centers of human habitation. Stray cats are likely to interbreed with the unneutered companion cat population.

Feral cat: A cat who is not a stray cat and who has none of its needs provided by humans. Feral cats generally do not live around centers of human habitation. Feral cat population size fluctuates largely independently of humans, is self-sustaining, and is not dependent on input from the companion cat population (NAWAC, 2007).

(Editor's Note: Some terms used in this material quoted from the NAWAC have been edited to conform to *Journal of Applied Animal Welfare Science* style.)

Within these definitions, unsocialized cats who are fed by, or scavenge from, humans can be identified as falling under the category "stray." The issues surrounding this are discussed further in Farnworth et al. (2010).

Populations of stray and feral cats present a significant risk to the survival of native species that may be potential prey. This is particularly the case for ecosystems free of native terrestrial predators (Abbott, 2008; Burrows et al., 2003; Engemen, Shwiff, Cano, & Constantin, 2003; King, 1984; Nogales et al., 2004; Peck, Faulquier, Pinet, Jaquemet, & Le Corre, 2008; Rodríguez, Torres, & Drummond, 2006; Whitehead, Edge, Smart, Hill, & Willans, 2008). In New Zealand, cats are known to have caused a number of localized extinctions (King, 1984). They also potentially affect native felids in Northern Europe through habitat competition and hybridization (Biró, Szemethy, & Heltai, 2004) or act as a disease reservoir that may be transmitted to the companion cat population (Case, Chomel, Nicholson, & Foley, 2006; Luria et al., 2004).

As a result of their impact on native species, cat populations may be subject to mainland control (Algar, Angus, Williams, & Mellica, 2007; Burrows et al., 2003) or the target of eradication programs on small islands (Nogales et al., 2004). Management measures include lethal controls such as the following:

1. Poisoning (Algar et al., 2007; Burrows et al., 2003),
2. Trapping (Fitzgerald & Gibb, 2001; Peck et al., 2008), and/or
3. Hunting with dogs and/or firearms (Nogales et al., 2004; Rodríguez et al., 2006).

In New Zealand, the use of 1080 (sodium fluoroacetate) is widespread for control of Brushtail Possums (*Trichosurus vulpecula*) and rodents. This poison may cause substantial distress before death (Sherley, 2004, 2007). Worldwide such methods continue to be used for cat control (Algar et al., 2007; Burrows et al., 2003; Rodríguez et al., 2006) despite the availability of other nonlethal control methods. Such methods include the following:

1. Trap Neuter Release (TNR) (Hughes & Slater, 2002; Robertson, 2007; Wallace & Levy, 2006);
2. Contraception (Munson, 2006), which is reversible, possible, and less invasive than TNR; and
3. Trap Neuter Re-home (TNRh) (in some cases) for kittens who are caught and effectively socialized (Casey & Bradshaw, 2008).

TNR of stray and feral cats is often considered the “gold standard” (Levy, Gale, & Gale, 2003), especially in circumstances where total eradication is either undesirable or impossible. TNR maintains a nonbreeding population, which reduces the risks of reinvasion by other entire cat populations (Mahlow & Slater, 1996) or mesopredator release, where smaller predators such as rats are released from pressures of predation (Tompkins & Veltman, 2006). TNR also reduces the transfer of diseases such as Feline Immunodeficiency Virus (Norris et al., 2007), which is spread disproportionately by unsterilized roaming males (Natoli et al., 2005).

The control of stray and feral cat populations occurs within a legal framework in which the distinction between the different categories is important. Because of their impacts on native fauna, feral cats have been placed on a pest list in New Zealand (Auckland Regional Council, 2004). In both Australia and New Zealand, they may be lethally controlled if they constitute a threat to native wildlife, including by methods that significantly compromise welfare. Although feral cats in New Zealand can be lethally controlled, stray cats are required to be relinquished to the care of a nonhuman animal charity for assessment prior to rehoming or euthanasia (NAWAC, 2007).

It is unclear whether this legal distinction in categorization of different cat populations is recognized by the New Zealand public. There is widespread recognition among the public of the substantial impact that introduced mammalian predators, including cats, have on native fauna that may result in acceptance of high-impact control measures. Potts (2009) identifies that negative rhetoric

associated with the brushtail possum (*Trichosurus vulpecula*), including its status as a pest, has resulted in significant welfare compromise through increased public support for lethal control and reduced empathy for suffering in New Zealand. In contrast, there is anecdotal support for maintenance of stray cat populations in New Zealand. Internationally, there is evidence of such care provided to groups of animals referred to as “semiowned” or “colony” cats (Centonze & Levy, 2002; Toukhsati, Bennett, & Coleman, 2007).

The aim of this study was to establish the relative public acceptability of a number of control methods for free-roaming cat populations in New Zealand. By rating how acceptable the same methods were for both stray and feral cats, it was possible to identify any changes in public concern for the different subgroupings. In addition, information was gathered as to how much importance is placed on conservation concerns about the impact of cats as predators of native fauna or welfare considerations. Tests were also performed relative to demographic data, including whether differences in attitudes on the acceptability of various control measures may exist between people sampled from New Zealand’s largest urban center and a small semiurban area.

MATERIALS AND METHODS

Participants and Procedure

The study used an anonymous questionnaire to explore attitudes of adults toward stray and feral cats in New Zealand. In two locations, across all days in a 3-month period (July, August, and September 2008), the study gathered a total of 354 responses to the questionnaire. The study collected the first set of data in the central business district of Auckland, New Zealand’s most populous city (population estimate: 1.4 million). The second collection took place on the main street of Kaitaia, a small community (population estimate: 4,000; estimate for service region: 33,000) in the north of New Zealand.

Questionnaires were distributed by hand, and a number of volunteers immediately filled in participants’ responses. To avoid confusion, respondents were not required to personally fill out any sections of the questionnaire, although participants were able to view the survey and, on their request, take a copy. All assistants received instruction as to appropriate behavior and completion of the participants’ responses for analysis. Excepting one supervising individual, none of the assistants were directly associated with the research or with those who funded it. To minimize bias, every fourth person, regardless of age (unless under the age of 18), gender, or ethnicity was approached and asked to participate. If one person declined, the next available person was approached until a response was obtained. After each response, distributors once again waited for the fourth

person to pass by. To further reduce bias in the sample, prospective participants were not told the survey's content before they agreed to participate. After agreeing to participate, each participant received an information sheet outlining the questionnaire, its ethical approval status, and contact details for the primary researcher. Participants were then asked if they were prepared to continue; they were informed that in continuing they were consenting to the information provided to be used in any way the researcher considered appropriate.

Survey Structure and Content

The survey consisted of two sections. The first section collected demographic data about the respondents and included the following:

1. Age,
2. Gender,
3. Area of residence (semiurban or urban),
4. Occupation (veterinary profession, agriculture, animal welfare, conservation, companion animal trade, or other), and
5. A cat currently in residence.

Age was reported as one of six categories: 18–20, 21–30, 31–40, 41–50, 51–60, and 61+. The occupation data distinguished between those who had previously worked, or currently work, in a job concerned with animals versus those who had not worked, or do not work, with animals.

Prior to completion of Section 2, all respondents were given definitions of *companion*, *stray*, and *feral* according to NAWAC (2007). The definitions were repeated, and the respondents were asked if they understood the differences.

Section 2 asked two questions with responses entered on a 5-point Likert scale. Questions were targeted to establish (a) respondents' attitudes on methods of control for stray and feral cats and (b) major considerations that lay behind the responses. In each case, the same two questions were asked; however, the respondents were consistently requested to consider "stray" cats in their first answer and "feral" cats in the second.

Question 1: *Thinking only of stray cats (or feral cats for the second time of asking), how acceptable do you consider the following methods of control?* The methods included poisoning, shooting, lethal trapping, TNR, TNRh, and contraception. Responses ranged from 1 (*extremely unacceptable*) to 5 (*extremely acceptable*).

Question 2: *How important are the following reasons for controlling stray (or feral) cats?* Considerations included the importance of controlling cats in respect to the need for conservation of native species; to limit the potential for disease transfer; and the impact of the control measure on the welfare of

companion cats and welfare of stray or feral cats, respectively. Responses ranged from 1 (*extremely unimportant*) to 5 (*extremely important*).

Statistical Analysis

Data were entered and analyzed, using SPSS 16.0 for Windows. Statistical significance was indicated by a p value $\leq .05$. A Chi-square analysis assessed gender bias, common in voluntary surveys. Mean score for acceptability of control methods and reasons for control were compared between those concerning stray cats and those concerning feral cats. The study used a Wilcoxon signed rank test to establish a comparison of differences in attitude toward stray and feral cats for each control method and reason for said control. Differences in attitudes toward stray and feral cats, dependent on demographic data, were analyzed using a Mann-Whitney U test. Demographics used in the analysis included the following:

1. Age,
2. Sex,
3. Location,
4. Occupation,
5. Cat ownership, and
6. Awareness of animal welfare legislation.

If respondents had not answered a question, their information was included in the database; however, the datum point was identified as missing and, therefore, not included in any analysis that required it to be present.

RESULTS

General Demographics

For analysis, the age of respondents was condensed into two categories: those under 40 (<40) and those 41 and over (41+). Distribution of age varied across the sample (≤ 20 :86, 21–30:101, 31–40:58, 41–50:45, 51–60:27, and $61 \geq$:35). For the entire sample, 19.3% of respondents had an animal occupation; the majority of these fell in the category “other” (8.5%) followed by agricultural (5.6%) and veterinary (2.8%) professions. Original analysis of occupation showed no clear differences between the different categories of animal employment; this was therefore consolidated into two categories: “animal occupation” and “nonanimal occupation.”

A total of 99 of 354 responses (28%) were from individuals living in a semi-urban location (Kaitia), and 255 (72%) were from urban dwellers (Auckland).

Almost half (42.7%) of those questioned were cat caregivers (owners), and the majority of respondents were not aware of the Animal Welfare Act of 1999 (54.7%), New Zealand's primary legislation covering the welfare of animals, including cats.

There was a small but significant bias in sex distribution with more female respondents than male (56.2% vs. 43.8; $\chi^2 = 5.469$, $df = 1$, $p = .019$), which has been previously identified in self-selected surveys (O'Rourke & Lakner, 1989).

Acceptability of Control Methods

Following analysis using a Wilcoxon signed rank test, with the exception of TNR, nonlethal control methods were clearly considered more acceptable for stray cats and less acceptable for feral cats (Figure 1). The converse was true for lethal methods, which were more acceptable for feral cats and less acceptable for stray cats.

A range of demographic characteristics affected the acceptability of the control methods irrespective of whether the cats in question were stray or feral. Females, those not in an animal-related profession, and those under 40 scored the acceptability of lethal control measures significantly lower than did males, those in an animal occupation, and those over 40 (Tables 1 and 2). Conversely females, those not in an animal profession, and those under 40 scored the acceptability of nonlethal methods significantly higher than did their counterparts. However, unlike age and occupation, sex did not have a significant effect on the acceptability of TNR or lethal trapping (Mann-Whitney U test; Tables 1 and 2). This suggests that these methods are equally acceptable (or unacceptable) for both sexes.

Semiurban individuals showed a significantly higher acceptability of lethal control for stray and feral cats. However, for the nonlethal control of stray cats there was no significant difference between the acceptability scores of semiurban and urban respondents. Nonlethal control measures, specifically TNR and contraception, were ranked significantly lower for feral cats by semiurban, as compared with urban, respondents.

Cat owners differed significantly from non cat owners with respect to the control of stray cats. Acceptability rankings for poisoning, shooting, TNRh, and contraception for stray cats differed significantly between the two groups; cat owners scored lethal control methods as less acceptable and nonlethal methods more acceptable than nonowners. Similar to sex effects, lethal trapping and TNR were not significantly different. Excepting contraception, cat owners' acceptability scores showed no significant difference with respect to control methods for feral cats when compared with nonowners' scores.

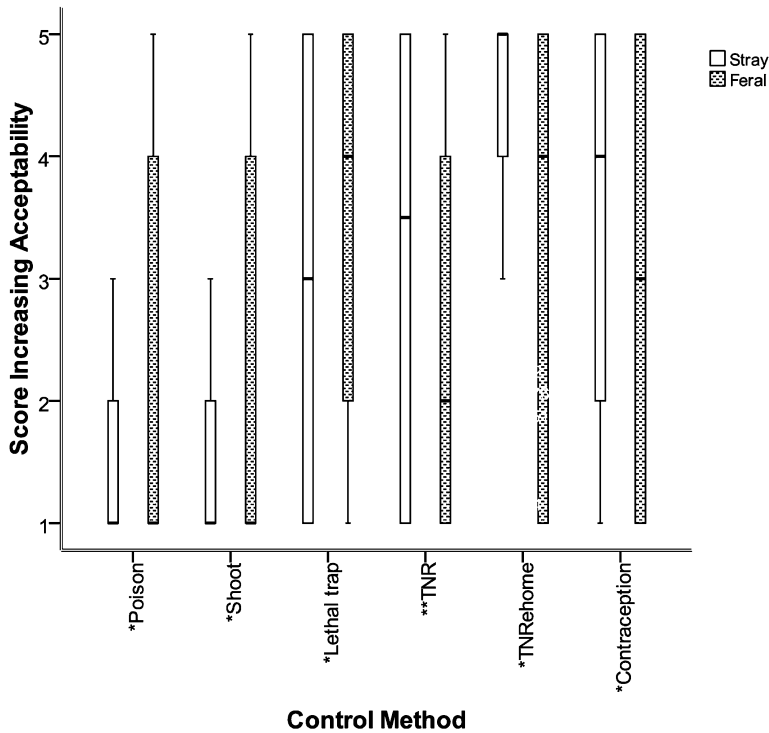


FIGURE 1 Respondents' ($n = 354$) acceptability of control methods for stray and feral cats. Bar represents median value, asterisks indicate statistical significance using a Wilcoxon signed rank test (*: $p < .0001$, **: $p = .02$). Z values for significant results are -8.219 , -8.030 , -6.292 , -2.318 , -10.281 , -4.801 sequentially. TNR = Trap Neuter Release.

Reasons for Control

Issues around “conservation” and “spread of disease” and “companion cat welfare” were routinely scored as being more important in dictating the acceptability of control measures than “stray/feral cat welfare” (Figure 2). Following a Wilcoxon signed rank test, the only significant difference between any of these factors, as they related to stray versus feral cats, was found in the impacts of control on the welfare of either group. Mean score for the importance of the welfare of both stray and feral cats was lower than that of companion cats: feral cats differed significantly from strays ($Z = -7.223$, $p < .0001$).

Respondents over 40 consistently ranked conservation as more important than other groups within the sample. Those in an animal occupation, as well as semiurban respondents, significantly scored the welfare of both feral and stray

TABLE 1
Mean Score, by Demographic, for Acceptability of Control Methods for Feral Cats

Demographic		Feral Cats					
		Poison	Shoot	Trap/ Euthanize	Trap/ Neuter/ Release	Trap/ Neuter/ Rehome	Contraception
Sex	Male	2.62	2.85	3.47	2.71	3.22	2.58
	Female	2.18	2.22	3.52	2.95	3.52	3.13
Age	<40	p < .011	p < .001	<i>p = .723</i>	<i>p = .183</i>	<i>p = .122</i>	p = .002
	41+	2.56	2.86	3.72	2.10	3.04	2.58
		<i>p = .473</i>	p = .026	<i>p = .95</i>	p < .0001	p = .022	p = .45
Employ	Animal	2.55	3.19	4.06	2.24	2.75	2.06
	Nonanimal	2.32	2.31	3.35	3.00	3.56	3.11
Location		<i>p = .493</i>	p < .0001	p < .0001	p = .001	p < .0001	p < .0001
	Semiurban	2.91	3.41	3.99	2.55	3.13	2.56
	Urban	2.17	2.14	3.31	2.96	3.49	3.02
Cat owner		p = .001	p < .0001	p < .0001	p = .035	<i>p = .148</i>	p = .025
	Yes	2.19	2.36	3.42	2.96	3.51	3.13
	No	2.52	2.60	3.55	2.77	3.30	2.72
	<i>p = .062</i>	<i>p = .130</i>	<i>p = .394</i>	<i>p = .394</i>	<i>p = .174</i>	p = .022	

Note. Statistically significant differences are presented in bold type.

TABLE 2
Mean Score, by Demographic, for Acceptability of Control Methods for Stray Cats

Demographic		Stray Cats					
		Poison	Shoot	Trap/ Euthanize	Trap/ Neuter/ Release	Trap/ Neuter/ Rehome	Contraception
Sex	Male	2.00	2.28	3.20	2.85	4.13	2.99
	Female	1.44	1.58	2.87	3.17	4.70	3.50
Age	<40	p < .0001	p < .0001	<i>p = .063</i>	<i>p = .086</i>	p < .0001	p = .004
	41+	1.62	1.75	2.89	3.33	4.53	3.39
		1.84	2.13	3.34	2.34	4.42	2.94
Employ	Animal	<i>p = .284</i>	p = .046	p = .042	p < .0001	<i>p = .257</i>	p = .046
	Nonanimal	1.82	2.34	3.57	2.61	4.10	2.80
Location		1.65	1.78	2.89	3.12	4.53	3.39
		<i>p = .632</i>	p = .009	p = .002	p = .027	p = .031	p = .011
	Semiurban	2.04	2.57	3.56	2.77	4.32	3.15
Cat owner		1.55	1.63	2.80	3.12	4.50	3.33
	Yes	p = .014	p < .0001	p < .0001	<i>p = .085</i>	<i>p = .425</i>	<i>p = .472</i>
	No	1.41	1.66	2.86	3.15	4.67	3.55
	1.90	2.06	3.13	2.93	4.28	3.08	
	p = .003	p = .032	<i>p = .1</i>	<i>p = .273</i>	p = .001	p = .006	

Note. Statistically significant differences are presented in bold type.

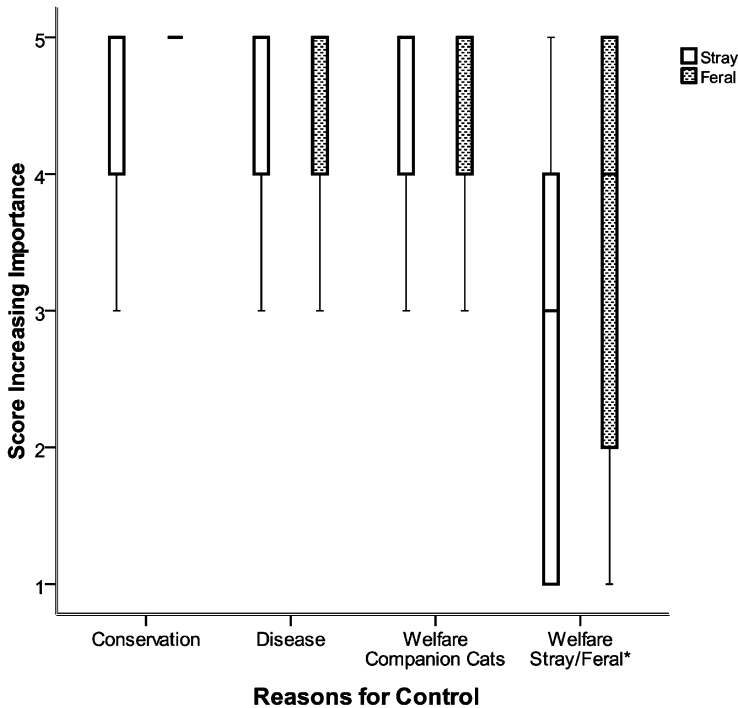


FIGURE 2 Respondents' ($n = 354$) importance of major considerations for the control of stray and feral cats. Bar represents median value, asterisk denotes statistical significance using a Wilcoxon signed rank test ($Z = -7.223$, $^* : p < .0001$).

cats as less important considerations for control than urban respondents and those who do not work with animals. When compared with women, men placed a significantly lower importance on the welfare of feral cats; however, there was no significant difference in importance for stray cats (Tables 3 and 4).

By far, the largest influence on response was seen in those identified as cat owners. For both stray and feral cats, they consistently scored all four reasons (with the exception of "disease transfer" of feral cats) as significantly more important than nonowners.

DISCUSSION

This work clearly demonstrates that designation of cats as stray or feral has an impact on the acceptability of different population control measures for these animals. Lethal control methods are consistently more acceptable for feral cats

TABLE 3
Mean Importance Score, by Demographic, for Major Considerations
in the Control of Stray Cats

<i>Demographic</i>		<i>Conservation</i>	<i>Disease Transfer</i>	<i>Companion Cat Welfare</i>	<i>Stray Cat Welfare</i>
Sex	Male	4.57	4.37	4.16	3.01
	Female	4.53	4.58	4.16	3.46
Age		<i>p</i> = .361	<i>p</i> = .014	<i>p</i> = .561	<i>p</i> = .121
	<40	4.50	4.52	4.23	3.34
	41+	4.79	4.34	3.94	3.21
Employ		<i>p</i> = .005	<i>p</i> = .275	<i>p</i> = .111	<i>p</i> = .124
	Animal	4.57	4.44	4.21	2.78
	Nonanimal	4.54	4.50	4.15	3.38
Location		<i>p</i> = .486	<i>p</i> = .827	<i>p</i> = .645	<i>p</i> = .003
	Semiurban	4.58	4.48	4.20	2.88
	Urban	4.53	4.49	4.15	3.41
Cat owner		<i>p</i> = .153	<i>p</i> = .939	<i>p</i> = .280	<i>p</i> = .039
	Yes	4.68	4.60	4.31	3.56
	No	4.45	4.41	4.05	3.05
		<i>p</i> = .028	<i>p</i> = .048	<i>p</i> = .013	<i>p</i> = .013

Note. Statistically significant differences are presented in bold type.

TABLE 4
Mean Importance Score, by Demographic, for Major Considerations
in the Control of Feral Cats

<i>Demographic</i>		<i>Conservation</i>	<i>Disease Transfer</i>	<i>Companion Cat Welfare</i>	<i>Feral Cat Welfare</i>
Sex	Male	4.56	4.43	4.17	2.51
	Female	4.54	4.57	4.14	2.74
Age		<i>p</i> = .416	<i>p</i> = .116	<i>p</i> = .597	<i>p</i> = .006
	<40	4.50	4.52	4.18	2.73
	41+	4.79	4.47	4.09	2.44
Employ		<i>p</i> = .009	0.732	0.672	0.621
	Animal	4.63	4.46	4.22	2.16
	Nonanimal	4.53	4.52	4.14	2.75
Location		<i>p</i> = .178	<i>p</i> = .577	<i>p</i> = .652	<i>p</i> = .006
	Semiurban	4.63	4.57	4.26	2.38
	Urban	4.52	4.49	4.12	2.74
Cat owner		<i>p</i> = .108	<i>p</i> = .350	<i>p</i> = .072	<i>p</i> = .008
	Yes	4.69	4.61	4.37	2.88
	No	4.45	4.44	4.00	2.46
		<i>p</i> = .015	<i>p</i> = .079	<i>p</i> = .002	<i>p</i> = .002

Note. Statistically significant differences are presented in bold type.

than for stray cats; nonlethal methods are less acceptable. In addition, attitudes on the acceptability of different control measures are driven by the potential conservation and disease costs of the presence of free-roaming populations of cats rather than concern for the welfare costs to the cats who are the target of the control measure (Figure 2).

In this respect, the view of the population sampled here is consistent with the view that the legal distinction between the two categories of cat has consequences for different control measures considered appropriate in the two cat populations. The legal frameworks under which control measures are applied are The New Zealand Conservation Act (1987) and The Biosecurity Act (1993), which govern the control of “pest” species. The appropriateness of control of stray populations needs to be evaluated under the Animal Welfare Act (1999) and, more recently, NAWAC (2007). The congruence between the public perceptions of control and the legislative divisions suggests that there is influence from an underlying social mechanism, potentially the importance of, and rhetoric around, conservation and biosecurity. As is the case for possums (Potts, 2009), this construct may result in a reduced capacity to empathize with the welfare of cats in different groupings.

This is the first demonstration of such a division of public sympathies for cats and provides argument against the creation of different legislative precedents based on descriptive constructs. This is of particular importance if cats as a species, irrespective of their human-defined status, are going to be humanely controlled.

This clear distinction in public attitudes on the appropriateness of particular control measures is likely to be related to the strong conservation movement in New Zealand and, associated with this, the high awareness of biosecurity issues associated with the establishment of introduced invasive organisms. Whether such distinctions in attitudes occur in other countries where threats to native fauna are less and, consequently, not as highly profiled, awaits testing.

Of particular interest is the acceptability of TNR. Although acceptability score is higher than both shooting and poisoning, it is not higher than lethal trapping. This suggests that TNR in New Zealand may have a number of associated issues. Given the consistently high importance of conservation within this sample (Figure 2), it is possible that TNR is viewed as a method that is no more compatible with conservation aims of cat control within New Zealand than lethal trapping despite it being considered the ethical “gold standard” for the control of cats elsewhere (Levy et al., 2003).

The similarity in acceptance of contraception and TNR (Figure 1) may also be linked with the inability of the two methods to cause the immediate cessation of stray and feral cat impact on the local ecology. Rehoming is strongly supported as the main method of control for stray cats despite not all stray cats being sufficiently socialized to be rehomed. Much like lethal trapping for feral cats, which is also the most acceptable method (Figure 1), rehoming is potentially

seen as a major route by which cats are “removed” from the local environment and their concomitant impact on native fauna diminished. To some extent, this is encouraging as the current definition of “stray” within NAWAC (2007) is intended to allow shelters to assess these cats’ suitability for rehoming prior to euthanasia.

Demographic Differences

The finding that, in general, males rate lethal control measures more acceptable than females is consistent with work that shows males consistently display lower empathy ratings than females (Hagelin, Hau, & Carlsson, 1999; Taylor & Signal, 2005). However, there was no apparent effect of sex in the consideration of TNR and trap-and-euthanize (Tables 1 and 2). As previously asserted, this supports the suggestion that in New Zealand consideration of, and rhetoric concerning, conservation issues may function to raise concerns about the benefits of TNR while concentrating attention on the inability of TNR to “deal with” the cat population’s perceived immediate impact on native fauna.

Age was also found to have significant effect on responses. In this case, those in the category 41+ consistently ranked lower with regard to nonlethal control methods, particularly TNR (see Tables 1 and 2). This may be compared with results from Tables 3 and 4, which demonstrate a significantly higher ranking for those 41+ when considering conservation as a reason for control.

Occupation and education have previously been identified as having both a positive (Signal & Taylor, 2007) and negative (Henning, Heuer, & Davies, 2005; Martin & Glover, 2008) effect on considerations for animals. However, in this study, the difference was counterintuitive; individuals employed in an animal profession considered lethal control more acceptable than individuals outside the animal profession. This is likely to reflect the relatively high proportion of individuals engaged in the agricultural, conservational, and animal health sectors. They may be more readily accepting of the conservation imperative in New Zealand associated with control of wild cat populations. This may be further supported by the finding that those from a semiurban location routinely scored the welfare of stray and feral cats as less important than did urban dwellers. They also considered lethal control more acceptable than nonlethal control for both stray and feral cats. Those living in a semiurban environment are more likely to be closely associated with agriculture (increasing the likelihood of a utilitarian approach to animals) and to be familiar with the impacts of introduced pest species such as rabbits (Henning et al., 2005).

Consistent with expectations, cat owners considered lethal methods of control for stray cats significantly less acceptable than non cat owners. Cat owners also found nonlethal methods significantly more acceptable for stray cats than nonowners did. These significant findings did not extend to feral cats despite a

significantly greater concern for feral cat welfare in the cat-owning respondents. This suggests that the conservation imperative outweighs welfare concerns for cat owners and that feral cats are possibly considered discrete from companion and stray cats. This concept is perpetuated by current definitions that denote a “feral” cat as a cat who “has none of its needs provided by humans” (NAWAC, 2007). This may allow feral cats to be more easily viewed as “outsiders” and their impacts on native animals accentuated as they are, in essence, lone hunters outside human control. Overall, cat owners were significantly more likely to score all reasons for control as more important than were non cat owners. The effect of increased empathy, resulting from positive exposure to companion animals, has previously been demonstrated (Driscoll, 1992; Prokop, Kubiak, & Frančovičová, 2008; Wells, & Hepper, 1997) and is indicated here by a greater concern for conservation, biosecurity, and animal welfare among cat owners.

CONCLUSION

In New Zealand, there is strong evidence that the manner in which cats are described has significant impact on the public acceptability of methods used to control them. It also has an impact on the public’s perception of their welfare and value. Such findings are particularly relevant to countries where the cat represents a nonnative species that can be considered both a pest and a valued companion animal. Similarly, it has been demonstrated that a number of demographic groups view the welfare and control of cats differently. This information may prove valuable when targeting educational materials and processes for the improvement of cat welfare in general.

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REFERENCES

- Abbott, I. (2008). The spread of the cat (*Felis catus*) in Australia: Re-examination of the current conceptual model with additional information. *Conservation Science Western Australia*, 7, 1–17.
- Algar, D., Angus, G. J., Williams, M. R., & Mellica, A. E. (2007). Influence of bait type, weather and prey abundance on bait uptake by feral cats (*Felis catus*) on Peron Peninsula, Western Australia. *Conservation Science Western Australia*, 6, 109–149.

- Auckland Regional Council (Te Rauhitanga Taiao). (2004). *Animal pests of the Auckland region: (Version 1.3)* [Brochure]. Auckland, New Zealand: Author.
- Bernstein, P. (2005). The human-cat relationship. In I. Rochlitz (Ed.), *The welfare of cats* (pp. 47–89). Dordrecht, The Netherlands: Springer.
- Biró, Z., Szemethy, L., & Heltai, M. (2004). Home range sizes of wildcats (*Felis silvestris*) and feral domestic cats (*Felis silvestrisf. catus*) in a hilly region of Hungary. *Mammalian Biology*, 69, 302–310.
- Bradshaw, J. W. S., Horsfield, G. F., Allen, J. A., & Robinson, I. H. (1999). Feral cats: Their role in the population dynamics of *Felis catus*. *Applied Animal Behaviour Science*, 65, 273–283.
- Burrows, N. D., Algar, D., Robinson, A. D., Sinagra, J., Ward, B., & Liddelow, G. (2003). Controlling introduced predators in the Gibson Desert of Western Australia. *Journal of Arid Environments*, 55, 691–713.
- Case, J. B., Chomel, B., Nicholson, W., & Foley, J. E. (2006). Serological survey of vector-borne zoonotic pathogens in pet cats and cats from animal shelters and feral colonies. *Journal of Feline Medicine and Surgery*, 8, 111–117.
- Casey, R. A., & Bradshaw, J. W. S. (2008). The effects of additional socialisation for kittens in a rescue centre on their behaviour and suitability as a pet. *Applied Animal Behaviour Science*, 114, 196–205.
- Centonze, L. A., & Levy, J. K. (2002). Characteristics of free-roaming cats and their caretakers. *Journal of the American Veterinary Medical Association*, 220, 1627–1633.
- Clutton-Brock, J. (2002). Cats in ancient times. In J. Clutton-Brock (Ed.), *The British Museum book of cats ancient and modern* (pp. 26–49). London, UK: British Museum.
- Driscoll, J. W. (1992). Attitudes towards animal use. *Anthrozoös*, 5, 32–39.
- Engemen, R. M., Shwiff, S. A., Cano, F., & Constantin, B. (2003). An economic assessment of the potential for predator management to benefit Puerto Rican parrots. *Ecological Economics*, 46, 283–292.
- Farnworth, M. J., Dye, N. G., & 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, 180–188.
- Fitzgerald, B. M., & Gibb, J. A. (2001). Introduced mammals in a New Zealand forest: Long-term research in the Orongorongo Valley. *Biological Conservation*, 99, 97–108.
- Hagelin, J., Hau, J., & Carlsson, H. E. (1999). Undergraduate university students' views of animals in biomedical research. *Academic Medicine*, 74, 1135–1137.
- Henning, J., Heuer, C., & Davies, P. R. (2005). Attitudes of New Zealand farmers to methods used to control wild rabbits. *Preventive Veterinary Medicine*, 67, 171–194.
- 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, 15–28.
- King, C. (1984). *Immigrant killers: Introduced predators and the conservation of birds in New Zealand*. Oxford, UK: Oxford University Press.
- Levy, J. K., Gale, D. W., & Gale, L. A. (2003). 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, 42–46.
- Luria, B. J., Levy, J. K., Lappin, M. R., Breitschwerdt, E. B., Legendre, A. M., Hernandez, J. A., ... Lee, I. T. (2004) Prevalence of infectious diseases in feral cats in Northern Florida. *Journal of Feline Medicine and Surgery*, 6, 287–296.
- Mahlow, J. C., & Slater, M. R. (1996). Current issues in the control of stray and feral cats. *Journal of the American Veterinary Medical Association*, 209, 2016–2020.
- Martin, F., & Glover, S. (2008). Veterinary students' views regarding the legal status of companion animals. *Anthrozoös*, 21, 163–180.
- Ministry of Agriculture and Fisheries. (1987). *The Conservation Act: Public Act 1987 No. 65*. Date of Assent March 31, 1987. Retrieved from www.legislation.govt.nz

- Ministry of Agriculture and Fisheries. (1993). *The Biosecurity Act: Public Act 1993 No. 95*. Date of Assent August 26, 1993. Retrieved from www.legislation.govt.nz
- Ministry of Agriculture and Forestry. (1999). *The Animal Welfare Act: Public Act 1999 No. 142*. Date of Assent August 26, 1999. Retrieved from www.legislation.govt.nz
- Munson, L. (2006). Contraception in felids. *Theriogenology*, *66*, 126–134.
- National Animal Welfare Advisory Committee (NAWAC). (2007). *Animal welfare (companion cats) code of welfare 2007*. Auckland, New Zealand: New Zealand Ministry of Agriculture and Forestry.
- Natoli, E., Say, L., Cafazzo, S., Bonanni, R., Schmid, M., & Pontier, D. (2005) Bold attitude makes male urban feral domestic cats more vulnerable to Feline Immunodeficiency Virus. *Neuroscience and Biobehavioral Reviews*, *29*, 151–157.
- Nogales, M., Martín, A., Tershy, B. R., Dolan, J. C., Veitsh, D., Puerta, N., . . . Alonso, J. (2004). A review of feral cat eradication on islands. *Conservation Biology*, *18*, 310–319.
- Norris, J. M., Bell, E. T., Hales, L., Toribio, J.-A. L. M. L., White, J. D., Wigney, D. I., . . . Malik, R. (2007). Prevalence of feline immunodeficiency virus infection in domesticated and feral cats in eastern Australia. *Journal of Feline Medicine and Surgery*, *9*, 300–308.
- O'Rourke, D., & Lakner, E. (1989). Gender bias: Analysis of factors causing male underrepresentation in surveys. *International Journal of Public Opinion Research*, *1*, 164–176.
- Peck, D. R., Faulquier, L., Pinet, P., Jaquemet, S., & Le Corre, M. (2008). Feral cat diet and impact on sooty terns at Juan de Nova Island, Mozambique Channel. *Animal Conservation*, *11*, 65–74.
- Potts, A. (2009). Kiwis against possums: A critical analysis of anti-possum rhetoric in Aotearoa New Zealand. *Society and Animals*, *17*, 1–20.
- Prokop, P., Kubiátko, M., & Frančovičová, J. (2008). Slovakian pupils' knowledge of, and attitudes towards, birds. *Anthrozoös*, *21*, 221–236.
- Robertson, S. A. (2007). A review of feral cat control. *Journal of Feline Medicine and Surgery*, *10*, 366–375.
- Rodríguez, C., Torres, R., & Drummond, H. (2006). Eradicating introduced mammals for a forested tropical island. *Biological Conservation*, *130*, 98–105.
- Sherley, M. (2004). The traditional categories of fluoroacetate poisoning signs and symptoms belie substantial underlying similarities. *Toxicology Letters*, *151*, 399–406.
- Sherley, M. (2007). Is sodium fluoroacetate (1080) a humane poison? *Animal Welfare*, *16*, 449–458.
- Signal, T. D., & Taylor, N. (2007). Attitude to animals and empathy: Comparing animal protection and general community samples. *Anthrozoös*, *20*, 125–130.
- Slater, M. R., Di Nardo, A., Pediconi, O., Villa, P. D., Candeloro, L., Alessandrini, B., & Del Papa, S. (2008). Free-roaming dogs and cats in central Italy: Public perceptions of the problem. *Preventive Veterinary Medicine*, *84*, 27–47.
- Taylor, N., & Signal, T. D. (2005). Empathy and attitudes to animals. *Anthrozoös*, *18*, 18–27.
- Tompkins, D. M., & Veltman, C. J. (2006). Unexpected consequences of vertebrate pest control: Predictions from a four-species community model. *Ecological Applications*, *16*, 1050–1061.
- Toukhsati, S. R., Bennett, P. C., & Coleman, G. J. (2007). Behaviours and attitudes towards semi-owned cats. *Anthrozoös*, *20*, 131–142.
- Wallace, J. L., & Levy, J. K. (2006). Population characteristics of feral cats admitted to seven trap-neuter-release programs in the United States. *Journal of Feline Medicine and Surgery*, *8*, 279–284.
- Wells, D. L., & Hepper, P. G. (1997). Pet ownership and adults' views on the use of animals. *Society and Animals*, *5*, 45–63.
- Whitehead, A. L., Edge, K., Smart, A. F., Hill, G. S., & Willans, M. J. (2008). Large scale predator control improves the productivity of a rare New Zealand riverine duck. *Biological Conservation*, *141*, 2784–2794.