Received: 6 October 2021 | Revised: 14 January 2022 | Accepted: 17 January 2022

DOI: 10.1111/csp2.12641

Conservation Science and Practice
A journal of the Society for Conservation Biology
Open Access
WILEY

PERSPECTIVE

A renewed call for conservation leadership 10 years further in the feral cat Trap-Neuter-Return debate and new opportunities for constructive dialogue

Adolphe O. Debrot[1,2] | **Martin N. M. Ruijter**[3] | **Wempy Endarwin**[4] | **Pim van Hooft**[3] | **Kai Wulf**[5] | **Adrian J. Delnevo**[6]

[1]Marine Animal Ecology Group, Wageningen University and Research, Wageningen, The Netherlands

[2]Wageningen Marine Research, Wageningen University and Research, Den Helder, The Netherlands

[3]Wildlife Ecology and Conservation Group, Wageningen University and Research, Wageningen, The Netherlands

[4]Department of Forestry, Ministry of Environment and Forestry, Indonesia, Jakarta, Indonesia

[5]Saba Conservation Foundation, The Bottom, Saba, The Netherlands

[6]Dutch Caribbean Nature Alliance, Kralendijk, Bonaire, The Netherlands

Correspondence
Adolphe O. Debrot, Marine Animal Ecology Group, Wageningen University and Research, P.O. Box 338, 6700, AH, Wageningen, the Netherlands.
Email: dolfi.debrot@wur.nl

Funding information
Wageningen University Research Center BO "policy support" program (BO-11-011-05-016) project number 4308701006 as funded by the Netherlands Ministry of Agriculture, Nature and Food Quality and Wageningen Marine Research project number 4311500013.

Abstract

It has been 10 years since a seminal paper in the journal *Conservation Biology* called for stronger leadership from the conservation community in countering the growing inappropriate use of Trap-Neuter-Return (TNR) as a method to control feral cat, *Felis catus*, populations. The practice is rapidly spreading to areas of wildlife and conservation significance, and the need to counter this development is extremely urgent. So far, the promulgation of TNR has been based on a narrow, single-species approach to animal welfare. However, a new, yet little-noticed, species-inclusive perspective on animal welfare includes the consideration of collateral animal suffering for a more equitable assessment of TNR. Each setting, depending on the level of conservation required, may call for different methods for the management of free-roaming cats. TNR is just one such method and its appropriateness depends on the specific wildlife conservation needs for each area specified.

KEYWORDS

animal ethics, animal welfare, cat colony, invasive predator, predator control, species-inclusive

Feral cats (*Felis catus* L., 1758) have devastating effects on island faunas and are a key factor in 26% of global species extinctions due to invasive mammalian predators since AD 1500. Today at least 367 extant threatened species are primarily threatened by cat predation (Doherty et al., 2016; Medina et al., 2011). The impact of cats on bird populations is well-documented and especially severe, not only on islands but also in the

continental setting and even in urban habitat (Barratt, 1997; Bonnington et al., 2013; Hawkins et al., 1999; Longcore et al., 2009; Loss et al., 2013; Van Heezik et al., 2010; Woods et al., 2003). While their impact on birds has been quite well-studied, their impact on small mammals, invertebrates, and herpetofauna remains much less well known but does contribute further to their total ecosystem impact (e.g., Frank et al., 2014; Hawkins et al., 1999; Lazenby et al., 2021; Woolley et al., 2020). Consequently, the development of effective and humane eradication and control methods have received considerable attention (Campbell et al., 2011; Hildreth et al., 2010). The capturing of feral animals to neuter them and subsequently release them back into the feral state, typically referred to as Trap-Neuter-Return (TNR), is increasingly being advocated as a humane and effective option for cat control (Kreisler et al., 2019; Spehar & Wolf, 2018; Wolf et al., 2019). However, there are many problems with the TNR-approach to cat management (see Dauphiné & Cooper, 2011; Hostetler et al., 2020 for comprehensive reviews). For instance, unmanaged feral cat populations can be subject to a wide variety of conditions deleterious to their health caused by the lack of preventative or emergency care and the consumption of garbage (Crawford et al., 2019; Hostetler et al., 2020). They can suffer from range of zoonotic diseases, such as rabies, hookworms, toxoplasmosis, and roundworms, and may carry heavy parasite loads that can infect wildlife, or pets, and are often of public health concern (Cantó et al., 2013; Gajewski et al., 2014; Gerhold & Jessup, 2013; Hostetler et al., 2020). Feral cats are also known to suffer much higher mortality rates than owned cats (Krecek et al., 2010; Ogan & Jurek, 1997; Schmidt et al., 2007). In their recent review, Crawford et al. (2019) identify 10 welfare and ethical challenges for cat TNR programs. These were the questions: (a) where the cats would live; (b) and what they would eat; (c) how they would impact pet cats; (d) humans or; (e) urban wildlife; (f) how stressful the TNR process itself is; (g) whether the cats might be more vulnerable to injury; (h) parasite loads and other diseases; (i) how to treat these potential ailments and at what cost and finally (j) are TNR cats healthy and similar in body condition compared to properly cared-for pet cats? In contrast to claims by Alley Cat Allies (2011), who believe that cats released back into the wild will lead "healthy lives outdoors," the review by Crawford et al. (2019) concludes by pointing out that in most but exceptional instances TNR seems unethical to the cats by traditional animal welfare criteria. This need not be so surprising as the (house)cat has been domesticated for almost 10,000 years (Pickrell, 2004) and might best be considered a domestic animal, in need of responsible owners and loving care. Whatever the case may be, the review has restimulated the debate about the efficacy and appropriateness of TNR as a management tool (Calver et al., 2020; Wolf et al., 2019). Criticism of the method has spurned efforts to provide additional care for the returned animals upon and/or after their release; methods alternatively referred to as "Trap-Neuter-Return Manage" (TNRM) (Nutter, 2005; https://www.oshawa.ca/residents/trap-neuter-return-manage-program.asp), "Trap-Neuter-Return-Monitor" (https://www.aspca.org/helping-people-pets/shelter-intake-and-surrender/closer-look-community-cats), or "Trap-Neuter-Vaccinate-Return" (Schaffner et al., 2019; Spehar & Wolf, 2019). The main difference between "plain" TNR and most of its variants is that the latter typically involve some level of care and subsidiary feeding to maintain high cat population densities, which may or may not be to the detriment of endangered wildlife. For the sake of our discussion, we make no further distinction and refer to all variants of TNR with any form of follow-up management or care as "TNRM."

It has now been more than 10 years since Longcore et al. (2009), Lepczyk et al. (2010), and Dauphiné & Cooper (2011) commented on the lack of leadership within the conservation and research community regarding the practice of cat TNR and the need for a more effective response to its promotion as effective and humane. The calls for conservation leadership were, in and of themselves, not really surprising since scientists (including conservation scientists) have long experienced barriers that not only tend to disengage them from ethical and societal implications of their work (McCormick et al., 2012) but also from the need to effectively communicate their results to society (Van Vliet et al., 2014). For this reason, many countries have even introduced legal and policy measures to coax academics and their institutions to help transfer their knowledge more effectively (De Jong et al., 2016; Rosenlund et al., 2017). Societal engagement is no longer an option to be conveniently relegated to other stakeholders but is today much more an actual obligation for the scientist (De Jong et al., 2016). Laurance et al. (2012) lament the poor level of translation of the results of academic conservation science into actual conservation practice and stress the critical need for much more direct and bold communication with the public and community and conservation stakeholders.

As a consequence of superior TNR advocacy and the lax conservation leadership signaled above, in the last decade, TNR seems to have gained major further traction. Lepczyk et al. (2010) even foresaw that "it may well be a generation or more before we can expect broad-scale changes in human behaviour regarding outdoor cats." While TNR is (fortunately) most-often proposed for cats

in urban and metropolitan areas, it is or has also variously been promoted or implemented in environmentally sensitive areas such as Cape May, New Jersey, San Nicholas Island, California, and Key Largo (Dauphiné & Cooper, 2011), or, for example, on the Caribbean island of Saba, adjacent to critical Red-billed tropicbird (*Phaethon aethereus*) breeding colonies (Debrot et al., 2014; Terpstra et al., 2015; Boeken, 2016).

Academic research on TNR has so far largely been conducted in English-speaking western countries. For instance, an exploratory Scopus-search we conducted on November 15, 2021, spanning the period 2000–2021, listed 103 articles with TNR in the title, keywords, or abstract. Of these articles, most had been conducted in English-speaking United States (45 publications), Australia, New Zealand, Canada, and the United Kingdom (13), followed by continental Europe (17), Asia (7), and other countries (6), while 15 of the listed publications concerned either models, broad reviews, or commentaries. Of these papers, the majority 67% date from the last 5 years (>2017) and show the rapidly increasing attention given to the subject of TNR. Even with the much-increased attention, the most recent review on the "moral pluralism" in the management of cats (Wandesforde-Smith et al., 2021) concludes that this work has provided little in the way of how to move forward and break the stalemate.

Consequently, the highly polarized pro-and-con debate continues and TNR is meanwhile spreading to the Caribbean region with programs currently active in the USA Virgin Islands (http://www.luckypawssttvi.com/catcafe.html), Puerto Rico (https://www.saveagato.com/), and the Bahamas (https://baarkbahamas.com/trap-neuter-return/) where even unwanted dogs are now also being released back to the streets and the wild. If these developments continue unchecked, conservationists might even be contending with packs of stray dogs causing, nuisance, predation, public and wildlife health issues, disease and safety risks to humans and nature (e.g., Jackman & Rowan, 2007). TNR is also spreading rapidly within continental Europe, for example, The Netherlands (https://utrecht.nieuws.nl/natuur/76664/provincie-utrecht-gaat-stoppen-met-de-jacht-op-katten/), France (http://carocat.eu/legislation-improvement-for-stray-cats-protection-in-france/, and Spain (Montoya et al., 2018). However, as TNR is quite expensive to implement (Lohr et al., 2013; Crawford et al., 2019) and as TNR-related problems continue to expand and worsen (for instance, threats to ground-burrowing owls in the United States https://www.seattletimes.com/nation-world/cat-lovers-at-google-threaten-native-owls-with-support-for-feral-felines/; endangerment of fairy terns in Australia https://www.theatlantic.com/science/archive/2019/07/cat-birds-australia/595048/), more and more of the already limited conservation budgets will be diverted away (Natoli et al., 2006) from the many more-fundamental conservation challenges (such as the multitude of other invasive species, habitat suitability and loss, ecosystem connectivity, genetic integrity and minimum viable population sizes, effects of disturbance, long-term impacts of climate change) (Hostetler et al., 2020). Will conservationists also need to divert scarce research funds to start investigating dog-"TNR" issues and fighting new misconceptions (see Bacon et al., 2019)? In our opinion, conservation science and management really have better things to do.

Simply doing more TNR research is also unlikely to help reduce or solve the threat that TNR poses to wildlife, endangered species, or conservation in general. If all the conservation-oriented TNR research that has already been done has been unable to stem or reverse the growing TNR tide, then the value of that research to actual conservation must be seriously doubted. Is doing more such research really a conservation priority worth spending our scarce resources on? Can we really expect new outcomes if we continue doing the same thing? Gerber et al. (2020) point to the need for much more actionable conservation science, which is much more than just the simple generation of new conservation-relevant knowledge.

To help resolve the stalemate, it might be especially helpful for conservation scientists to concede that TNR or its TNRM variants may be useful in certain settings and for certain purposes and as part of a total cat management package. For instance, TNR or TNRM may help reduce animal suffering in urban settings where the added damage of cat presence may do no or little real cumulative damage to nature, or in limited areas where society chooses to prefer cats over birds and other wildlife. A classic case in point is maybe the city of Istanbul, Turkey, where there is an abundance of cats and dogs on the streets that are not actually owned by anyone but which are registered, tagged, and neutered by government and fed by the inhabitants (AOD, pers. obs., September 2021). Keeping high densities of cats in a city like Istanbul may contribute to the extremely scant and depauperate avifauna (AOD, pers. obs.). However, this is arguably a choice that society might be willing to make for such crowded urban settings, which Shwartz et al. (2014) have shown to already be largely unimportant for wildlife and which need not be a priority for conservationists. On the other hand, in or near a wildlife sanctuary for sensitive fauna, the use of TNR might be contraindicated as even neutered cats when released can continue exerting predation pressure on threatened wildlife. Figure 1 shows a diagram of how the possible utility of TNR and TNRM as cat management

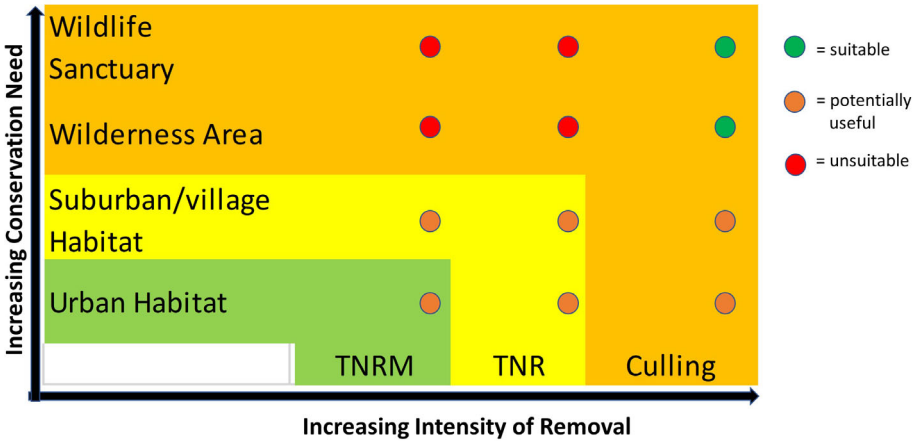

FIGURE 1 Suitability (green dots), unsuitability (red dots), and potential usefulness (orange dots) of cat management methods differing (a) in the intensity of removal and (b) according to the level of conservation required and the goals decided for each area concerned. TNRM, Trap-Neuter-Return-Manage; TNT, Trap-Neuter-Return

tools can be seen to be a function of the conservation level necessary for areas managed for different ultimate goals. In settings with less stringent conservation requirements, a wider variety, or in any case different set, of methods or tools may be applicable depending on the specific balance of cat versus wildlife interests that is decided on (Figure 1). In contrast, in certain scenarios with stringent conservation needs, anything less than lethal culling might be contraindicated (Figure 1). Not only might such a schematized approach open possibilities for parties to discuss what options are suitable for any particular area (depending on the chosen balance of cat welfare and conservation goals), but it also helps identify scenarios in which the currently opposing parties do not need to be in total disagreement at all times (as is now the case). Jaroš (2021) has already proposed the need to seek individual solutions in the management of free-roaming cats for each and every setting. Hence, opposing animal interests might start by conceding that one type of cat management cannot fit all situations (Jaroš, 2021) and that different approaches may be suitable to different situations.

Abandonment by owners is recognized as the main cause for overpopulation by stray cats and also the single greatest reason why TNR and TNRM will be ineffective in most wildlife management settings (Hostetler et al., 2020; Natoli et al., 2006). Therefore, as aptly concluded by Lohr et al. (2013), reducing the rate of cat abandonment is key to reducing feral cat populations. However, a fundament of animal welfare philosophy is the idea that it is wrong to harm beings with inherent value in order to serve any aggregate good for the whole (Abbate, 2017). Based on this thinking, it is quite understandable that animal welfare proponents could be strongly opposed to any measures to restrict, let alone kill invasive animals that cause damage in and of themselves.

Some authors even conclude that the simple neutering of invasive species is a violation of their animal welfare (e.g., Boonin, 2003). Wolf and Schaffner (2019) rightly point to the recent popular shift from a utilitarian to a zoocentric animal ethic as well as the rise of a "virtue ethic" in which "compassion" also underlies the increasing popularity of TNR. Sadly, missing from these "single-species" ethical developments is any "compassion" for the many species to which cats cause untold harm and inhumane suffering. However, in her analysis of the philosophy of animal welfare, Abbate (2017) recently demonstrated on philosophical grounds that it "is justified, and sometimes even obligatory, to cause harm to some animals in order to prevent greater harm to others." Based on this new animal welfare insight, for the first time, a "species-inclusive" perspective on welfare (i.e., including the animal welfare of the victims of feral cats into the equation) should also be allowed. If so, it follows that, any measure needed to help reduce the number of cats that kill other animals can be considered justified, if not obligatory, as long as done effectively and humanely. Abandoning neutered, unwanted cats into the wild (TNR) certainly does not qualify as such a measure (Crawford et al., 2019). Hence, from Abbate's (2017) new, and more-progressive animal-welfare viewpoint, which allows for species-inclusivity (excepting certain selective urban settings inherently unsuitable to native wildlife), TNR can never be advocated as serving animal welfare as it only propagates and magnifies animal welfare violations toward many other species.

Unfortunately, most TNR proponents, cat lovers, and animal welfare activists still seem oblivious to the fact that TNR is generally unethical to cats (Crawford et al., 2019), but above-all disregard the animal welfare of the many hundreds of hapless victims that feral cats will typically kill during the course of their lifetime (Peterson et al., 2012) and the many animals that need to be killed to feed the cats. In fact, according to McDonald et al. (2015), cat owners tend to persist in denying cat impacts on wildlife and are not influenced by ecological information. As

TABLE 1 Three of the greatest current challenges to effective feral cat control for conservation and five key actions by which to address these

(1) Failure of society to reduce their input rates to feral cat populations
(a) Invest in public awareness of the consequences of animal abandonment on animal welfare including the ethical failure of cat depredation on wildlife
(2) Inability of TNR research to help stem the spread of TNR and its variant forms to conservation-sensitive areas
(b) Refocus research effort for actionable knowledge toward effective feral cat control
(3) Lack of a constructive dialogue between conservation and TNR proponents
(c) Engage with stakeholders by conceding that TNR may not be a threat to wildlife if limited in scale and limited to urban or suburban settings
(d) Work jointly with stakeholders on reducing aggregate animal suffering by allowing for individual solutions in separate settings
(e) Refocus effort to exclude TNR only from priority wilderness and conservation areas

Abbreviation: TNR, Trap-Neuter-Return.

pointed out by Calver and Fleming (2020), communication and exchange of ideas between TNR opponents and proponents is characterized by limited dialogue between groups with opposing views. How then to achieve a more constructive, yet fact-based dialogue, in which parties with opposing interests can find common ground as a basis by which to jointly reduce aggregate animal suffering (Peterson et al., 2012)?

As pointed out above, the practice of TNR (and its variants) is rapidly spreading to areas of wildlife and conservation significance, and the need to address the TNR issue is extremely urgent. There are a few key challenges as discussed above that need to be addressed and actions to be taken if the tide of inappropriate TNR-use is to be turned. First of all, as called for by others before, it is high time for the conservation (science) community to demonstrate greater leadership (Table 1) and help to transform public thinking regarding the consequences of animal abandonment (Natoli et al., 2006). Laws on animal abandonment abound but intentional abandonment has been notoriously difficult to prove in court (https://www.humanesociety.org/resources/animal-cruelty-and-neglect-faq). Hence, public awareness is key. How should conservationists demonstrate leadership in this? Basically, by being much less hesitant to take on the discussion with TNR-advocates and also less hesitant to promulgate the heavy impact that feral cats have been found to have on wildlife. To be effective, conservation organizations must gear up to substantial public awareness campaigns about the cost of feral cats. This includes the cost of ethical failures incurred by allowing feral cat depredation of wildlife, the ethical failure of TNR programs to cats and, depending on the setting, the challenge of considering lethal control of cats. In the balance, the imperfectly-ethical lethal control may be the preferred outcome when weighed against the alternatives of unethical treatment of cats and unethical impacts of cats on wildlife. In this, use can be made of the new and innovative "emancipation" of animal-welfare thinking toward species-inclusiveness (Abbate, 2017). This may help TNR-proponents to broaden their animal welfare ethic to finally include the suffering of the many other loveable creatures that results from their use of TNR. Second, as emphasized by Gerber et al. (2020), it needs to be acknowledged that just more research is not going to change anything. TNR research, if any, needs to be rigorously rethought for actionability (Table 1). Finally, and maybe most importantly as a minimum basis for essential dialogue with all stakeholders (Table 1), conservationists need to concede that TNR may be of use as a cat management tool depending on the area and goals for which it is proposed. Hence, to be effective, conservationists also not only will need to openly and actively partake in the dialogue of goal-setting for each management area concerned but also be willing to accept that wildlife conservation cannot be the main goal for all potential "green" areas. Each setting, depending on the level of conservation required, may call for different methods or combinations of tools for the management of free-roaming cats. It does not always need to be strictly a question of red or green but there may also be shades in between.

ACKNOWLEDGMENTS

The authors are indebted to two anonymous reviewers and the Associate Editor for offering suggestions and reformulations that allowed major improvements over an earlier version of this manuscript.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

AUTHOR CONTRIBUTIONS

Adolphe O. Debrot conceived of the paper and Martin N. M. Ruijter, Wempy Endarwin, Kai Wulf, Pim van Hooft and Adrian J. Delnevo helped to prepare the first draft. Adolphe O. Debrot led the final two revisions of the paper.

DATA AVAILABILITY STATEMENT

This paper involved no data collection.

ETHICS STATEMENT

This research involved no interaction with persons or animals.

ORCID

Adolphe O. Debrot https://orcid.org/0000-0001-9406-8150

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How to cite this article: Debrot, A. O., Ruijter, M. N. M., Endarwin, W., van Hooft, P., Wulf, K., & Delnevo, A. J. (2022). A renewed call for conservation leadership 10 years further in the feral cat Trap-Neuter-Return debate and new opportunities for constructive dialogue. *Conservation Science and Practice*, e12641. https://doi.org/10.1111/csp2.12641