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Outdoor Cats: An Animal Welfare and Protection Perspective

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Outdoor Cats: An Animal Welfare and Protection Perspective

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ABSTRACT: First raised as a serious conservation issue more than 100 years ago, the impact of free-roaming cats on wildlife has been a subject of debate, controversy, and conflict since then. Cats have been tied directly to the extinction of sensitive species in island environments and implicated as major threats to certain wildlife populations elsewhere. Yet the study of free-roaming cats and the problems attributed to them lags behind the standards of research typical with more traditional vertebrate “pest” species. Alternative management approaches, ranging from traditional practices such as removal and depopulation to emerging concepts such as Trap-Neuter-Return (TNR), have yet to be subject to the scrutiny and experimental study that could lay controversial interpretations of their efficacy to rest. Here, we discuss the need for collaborative management concepts and programs to address growing concerns about cats outdoors.

KEY WORDS: birds, cats, feral cats, Hawaii, preferred management approaches, San Nicolas Island, Trap-Neuter-Return, (TNR), wildlife

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INTRODUCTION

Although recently-expressed concerns about free-roaming and feral cats as environmental threats (e.g., Jessup 2004, Longcore et al. 2009, Dauphine and Cooper 2009) might seem to be calling attention to yet another emerging environmental crisis, the fact is that cats outdoors were already being heralded as problems more than a century ago. The ornithologist Edward Howe Forbush, for one, declaimed the “wanton destruction” of song and game birds that fell into the “ravenous clutches” of cats (Forbush 1905, 1916) while his contemporary, the eminent zoologist William T. Hornaday, called for all free-roaming cats to be shot on sight, no questions asked (Hornaday 1913). Others vigorously opposed such suggestions, and a “cat vs. bird” debate took shape and moved into the public sphere (Grier 2006). To add ambiguity to the back and forth, even detractors such as Forbush held cats blameless for following what was only their nature, and in fact praised them for the role they played in helping to control rodents. To those engaged in the contemporary debate about managing outdoor cats, the past looks much like the present. What may be different about the contemporary debate is that there are now possibly many more cats, and certainly many more people who create threats of all sorts for wild species, including situations in which cats play a role.

Today, no one denies that cats cause environmental impacts, although some question their significance (Baker et al. 2003, Beckerman et al. 2007). Still, an accumulating body of information (e.g., Churcher and Lawton 1987, Dabritz and Conrad 2010, Baker et al. 2010) warrants that serious attention be focused on both the biological realities as well as social perceptions surrounding outdoor cats. The issues to be addressed are complex and in some cases critical. For conservationists, cats on islands are an urgent priority, given that predation on unique and vulnerable animals may combine with other impacts to threaten the survival of species with vulnerable populations (Nogales

et al. 2004, Medina et al. 2011, Bonnaud et al. 2011). For cat protectionists, finding humane ways to reduce populations of unowned cats and break the seemingly endless cycle of shelter surrender and euthanasia is a preeminent concern (Patronek 1998, Levy and Crawford 2004).

Doubts over whether a clear path forward exists (e.g., Lepczyk et al. 2010, 2011) no doubt exist in part because so many different communities of interest can be involved in any specific situation, including municipal animal control agencies, local humane societies, national animal welfare organizations, academics, veterinary professionals, wildlife damage managers, local, state and federal government agencies, nongovernmental organizations, and even commercial pest control companies. Ideological polarization is a major impediment to progress, and it is rare to find instances where any party professes to hold the interests of cats and wildlife as coequal.

The Humane Society of the United States (HSUS) is one organization that does. We argue for a strong animal welfare perspective when cats are managed as “pests,” in which humane treatment is made a first-order concern (Schmidt 1989). To us, conflicts over cats can only realistically be resolved through cooperative engagement on the common ground that does exist (e.g., educating the public about keeping cats indoors), leaving disagreements to be addressed through separate means. Here, we define and frame some of the important components of the commonalities we see in managing cats, as well as address some of the areas of obvious disagreement. We provide two examples of cooperative engagements that hold promise, identify a schema for a preferred management approach, and argue that it is time to move past the polemic on cat issues and engage in realistic problem-solving.

DEFINING CATS

Some twenty different terms are readily found in the literature to identify and describe cats, ranging from practically household words such as “feral” (e.g., Patronek

1998) to far less common terms such as “Inside-Outside Hunting Cat” (Kays and DeWan 2004). We recommend the term “outdoor cat” to refer to any cat that is free-roaming, whether feral, owned, lost, abandoned, or semi-owned. Feral cats are generally recognized as being truly independent of people, living without supplemental food or provided shelter (Mahlow and Slater 1996, Driscoll et al. 2009) while owned cats have homes where they may be subject to a wide range of movement restrictions (Bradshaw et al. 1999). The term “semi-owned” (Toukhsati et al. 2007) has been used to identify cats fed or given other care by individuals who do not consider themselves to be “owners.” It is important that the terminology used to describe cats becomes more standardized, not only to help clarify our thinking about cats, but more importantly to define their legal status and ensure they are afforded appropriate protections.

COUNTING CATS

If for no other reason than that it is hotly debated, another important issue with outdoor cats concerns how many of them there are, and when, how often, and for how long they may be outside and able to place potential prey species at risk. Cat populations (local, regional, or national) have not generally been well documented. The American Pet Products Association (APPA) survey of pet owners places the total population of U.S. owned cats at 86.4 million (APPA 2011), with the American Veterinary Medical Association (2007) estimating slightly fewer at 81.7 million. Estimates of unowned cats are often suggested to parallel this figure (e.g., Levy et al. 2003b, Jessup 2004, Lockwood 2005), but generally with the caveat that this comes with considerable uncertainty. One obvious cause of this comes with outdoor cat populations in warm states likely being higher than those in states with harsh winters. More reliable estimates may come from localized surveys, but even these should be interpreted cautiously. Population estimates from household survey data (e.g., Haspel and Calhoun 1990, Coleman and Temple 1993, Lepczyk et al. 2003) are likely to be less accurate than estimates derived from direct observation and analyzed through procedures such as mark-resight and distance sampling (Schmidt et al. 2007), but these have yet to be widely employed.

Even assuming that the outdoor cat population is large and trending upward (Clancy et al. 2003, APPA 2011, Chu et al. 2009), absolute numbers may not be the most relevant metric in mitigation assessment and planning, at least for owned cats. The time a cat spends outdoors is important as well, and here trends are encouraging. Approximately one-third of American households own cats (APPA 2011). Of those cats in households, nearly two-thirds (64%) are kept indoors by day and 70% at night, with both of these numbers trending consistently upwards from previous surveys (APPA 2011). In fact, rough estimates by one of us (A. Rowan) based on the above surveys and on shelter numbers, indicate that the number of outdoor “cat-days” in the U.S. is in decline, perhaps significantly.

EVALUATING IMPACTS

The impacts cats have on the environment, especially with respect to predation (and most especially on birds), are the focus for much of the controversy surrounding

these animals and their management today, as they were more than a hundred years ago. Other potential environmental impacts attributed to cats have also recently been raised, including threats from disease transmission (Dabritz et al. 2006, Dabritz and Conrad 2010), ecological competition (George 1974), hyperpredation (Baker et al. 2005), sublethal effects (Stone et al. 1994, Baker et al. 2003, Zanette et al. 2011), interbreeding (Macdonald and Burnham 2010), and even resource depletion (De Silva and Turchini 2008). Balancing these are the concerns that cat protectionists have for the impacts to rather than from cats which are created when cats roam or live outdoors (Patronek 1998, Levy et al. 2003a).

Cats are one of many anthropogenic sources of mortality of birds and other wild animals, ranging from habitat destruction, exposure to pesticides, hunting, and collisions with glass windows (Banks 1979, Klem 2009), to name just a few. Whether such impacts are compensatory or additive remains to be better determined (Baker et al. 2003, 2010, Beckerman et al. 2007), but in principle any cat-related mortality to wildlife should be avoided. Cat predation will vary seasonally, from one geographic area and landscape type to another, and ultimately from one cat to another (Barratt 1997, 1998; Fitzgerald 1998). Given that prey type, availability, and vulnerability will also vary from one place and time to another, actually mitigating cat impacts takes on the look of a complex matrix of choices deriving from situational and perhaps even idiosyncratic contingencies.

MANAGING CATS: TRAP-NEUTER-RETURN

Additional controversy over outdoors cats is focused on the practice of managing feral cats through what are commonly called Trap-Neuter-Return (TNR) programs (Longcore et al. 2009, Lepczyk et al. 2010). These types of programs began in the late 1970s in Britain and other European countries and quickly gained popularity, as cat advocates saw them as alternatives to the traditional trapping and euthanasia programs conducted by local animal control and humane organizations. This, some argue, amounts to “subsidized predation,” as cats are left outdoors with freedom to hunt and a motivation to do so that is, allegedly, not diminished by how well fed they may be (e.g., Jessup 2004).

TNR programs have been evaluated in the field, with some studies suggesting they do work (e.g., Levy et al. 2003a, Natoli et al. 2006) and others that they do not (e.g., Castillo and Clark 2003, Dauphine and Cooper 2011). Modeling studies demonstrate that both TNR and lethal control can theoretically drive cat populations to extinction (Anderson et al. 2004, Schmidt et al. 2009). In reality, neither practice seems yet well enough resourced (especially lethal control) to be effective at a population or landscape level. Additionally, if the majority of feral cats are “semi-owned” (Toukhsati et al. 2007), fed in small groups by individual homeowners (Levy et al. 2003b), and free to reproduce, then this demographic, and not cats in colonies, would arguably be the more consequential for management attention. Foley et al. (2005) suggest TNR serves a variety of purposes, among which is the stabilization of population growth. Since TNR involves an important (and fairly large) constituency of advocates willing to

help control feral cat population growth, rejecting this approach because it does not “work” is unlikely to contribute to a larger strategy that will.

BUILDING COALITIONS

San Nicolas Island

The San Nicolas Island cat removal project exemplifies a multi-organization, multi-agency effort to restore an island ecosystem to meet wildlife conservation goals held mutually between the participants. The program itself, as described by Hanson et al. (2010), involved the trapping and live removal and relocation of cats that had been feral on the island since at least the 1950s. In the draft environmental plan, lethal removal had been identified as the preferred alternative, but this changed after The Humane Society of the United States (HSUS) and other cat advocacy groups complained that non-lethal alternatives had not been sufficiently examined. This led to an agreement to allow cats to be taken off of the island and relocated to the Fund for Animals Wildlife Center in Ramona, CA. A total of 66 cats were subsequently trapped and removed, with San Nicolas now being the largest island in the world where cat removal was completed without the use of toxicants. While this project achieved its desired result, it involved obvious financial and logistical challenges that other island projects will not likely want or be able to assume. But, its principal achievement may be that it stands as an example of cooperative engagement deriving from initial confrontation. The HSUS, U.S. Fish and Wildlife Service, U.S. Navy, Montrose Trustee Council, Island Conservation, and Institute for Wildlife Studies all found ground to work together and meet mutually agreed-upon goals that might now serve as a basis for future trust and cooperation. The lessons learned from planning the removal of cats while protecting important species (the state threatened island fox [*Urocyon littoralis dickeyi*], nesting sea birds, and the island night lizard [*Xantusia riversiana*]), husbandry, behavioral assessment, and training of cats for adoptability, as well working cooperatively in a complex and challenging physical as well as social environment, have all added value to the experience.

Hawaii

In October 2009, 19 individuals representing 3 federal agencies, 4 municipal animal shelters, one state agency, a university and 2 non-governmental organizations met to launch a collaborative effort to bridge the gap between cat and wildlife interests in the common goal of reducing the number as well as impact of outdoors cats in Hawaii. Through a series of meetings and focused discussions, the group has expanded with additional representation to comprise what it is now called “The Hawaii Coalition for the Protection of Cats and Wildlife.” The group has created a mission statement (To develop and implement collaborative efforts among wildlife managers and animal welfare advocates to protect cats and wildlife), a vision concept (“A Home for Every Cat...”), and a draft principal goal statement (“To humanely and effectively reduce feral and free-roaming cat populations to reduce impacts on and protect Hawaii’s [native] wildlife”), which remains under further discussion. Importantly, the group has completed an initial survey of island households, finding that

some 19% of Hawaiians own or feed a stray/feral cat at least once a week, and more than half (52%) of cat owners allow their pets to go outdoors. Further, only 2 in 5 (38%) express some level of concern about their cats being outdoors and agree that outdoor cats have a negative impact on the bird wildlife in Hawaii, with barely 7% saying they “strongly agreed” with this statement (HSUS, unpubl. data). This suggests that a major challenge in managing outdoor cats in Hawaii might be the need for educating the general populace about outdoor cats.

PREFERRED MANAGEMENT APPROACHES

From an animal welfare perspective, Preferred Management Approaches are those in which suffering is minimized and unnecessary killing is eliminated. Such approaches can be derived from a set of general management principles already developed in other wildlife damage control contexts (e.g., Fisher and Marks 1996, Marks 1999, Littin et al. 2004, Hadidian 2011). These address both the justification for management as well as the methods to be employed in a stepwise process to meet the following criteria:

- The need to act should be clear (justification)
- Any benefits sought must be realistic (achievability)
- The methods to be employed must be able to achieve benefits (effectiveness)
- The approach must be targeted to the problem-causing individuals (specificity)
- The methods used must be the most humane available (welfare priority)
- The consequences of actions must be amenable to evaluation (monitoring)
- The benefits achieved must be maintained (follow-up)

The process is both sequential and recursive, following an Integrated Pest Management (IPM)-type approach (Hadidian 2010).

CONCLUSIONS

Cats are social constructs as well as biological and ecological realities. The control and management of the conflicts they cause will depend as much on understanding how people feel about them and the problems they cause as on any aspect of their natural history. A colony of feral cats living at a local park in a small city will have substantially different meaning to the municipal animal control staff, the colony’s caretakers, average pet owners, local birding enthusiasts, commercial pest control operators who might for a fee provide removal services, and the conservation biologist at a nearby college who may wish to study them. In any plan to act on or manage this colony, all of these disparate interests should be accounted for and respected. The fact that we as humans often fail to cope in any meaningful way with our differences is no fault of the cats, of course, and should impose on us a moral responsibility to hold them, as Eliot Howard Forbush did, blameless.

Perhaps a greater challenge than polarization among those interested in issues involving cats is the apparent general apathy felt about them by the public (Ash and Adams 2003). Both wildlife conservationists and cat protec-

tionists at least share a common goal: reducing the number and impacts of outdoors cats. This endpoint should have greater relevance in shaping management strategies than it seems to hold. While the debate over cats may be polarized, the solutions should not. Enough common ground exists to work toward a synthesis of wildlife damage management and animal welfare perspectives in which a palette of available and mutually acceptable management techniques could be applied immediately, leaving differences to be addressed elsewhere. The controversies surrounding outdoor cats have been with us for decades and will stay with us into the foreseeable future. They should not, however, impede the work that needs to be done to protect both cats and the environment.

LITERATURE CITED

- ANDERSON, M. C., B. J. MARTIN, and G. W. ROEMER. 2004. Use of matrix population models to estimate the efficacy of euthanasia versus trap-neuter-return for management of free-roaming cats. *J. Amer. Vet. Med. Assoc.* 225(12):1871-1876.
- APPA. 2011. APPA National Pet Owners Survey: 2011-2012. American Pet Products Association, Greenwich, CT. 593 pp.
- ASH, S. J., and C. E. ADAMS. 2003. Public preferences for free-ranging domestic cat (*Felis catus*) management options. *Wildl. Soc. Bull.* 31(2):334-339.
- AVMA. 2007. U.S. Pet Ownership and Demographics Sourcebook. American Veterinary Medical Association, Schaumburg, IL. 136 pp.
- BAKER, P. J., R. J. ANSELL, P. A. A. DODDS, C. E. WEBBER, and S. HARRIS. 2003. Factors affecting the distribution of small mammals in an urban area. *Mammal. Rev.* 33(1):95-100.
- BAKER, P. J., A. J. BENTLEY, R. J. ANSELL, and S. HARRIS. 2005. Impact of predation by domestic cats *Felis catus* in an urban area. *Mammal. Rev.* 35(3-4):302-312.
- BAKER, P. J., C. D. SOULSBURY, G. LOSSA, and S. HARRIS. 2010. Domestic cat (*Felis catus*) and domestic dog (*Canis familiaris*). Ch. 12 (Pp. 157-172) in: S. D. Gehrt, S. P. D. Riley, and B. L. Cypher (Eds.), *Urban Carnivores: Ecology, Conflict, and Conservation*. The Johns Hopkins University Press, Baltimore, MD. 304 pp.
- BANKS, R. C. 1979. Human related mortality of birds in the United States. Special Scientific Report – Wildlife, No. 215, USDI Fish and Wildlife Service, Washington, D. C.
- BARRATT, D. G. 1997. Predation by house cats, *Felis catus* (L.), in Canberra, Australia. I. Prey composition and preference. *Wildl. Res.* 24:263-277.
- BARRATT, D. G. 1998. Predation by house cats, *Felis catus* (L.), in Canberra, Australia. II. Factors affecting the amount of prey caught and estimates of the impact on wildlife. *Wildl. Res.* 25:475-487.
- BECKERMAN, A. P., M. BOOTS, and K. J. GASTON. 2007. Urban bird declines and the fear of cats. *Anim. Conserv.* 10:320-325.
- BONNAUD, E., F. M. MEDINA, E. VIDAL, M. NOGALES, B. TERSHY, E. ZAVALETE, C. J. DONLAN, B. KEITT, M. LE CORRE, and S. V. HORWATH. 2011. The diet of feral cats on islands: a review and call for more studies. *Biol. Invasions* 13:581-603.
- BRADSHAW, J. W. S., G. F. HORSFIELD, J. A. ALLEN, and I. H. ROBINSON. 1999. Feral cats: Their role in the population dynamics of *Felis catus*. *App. Anim. Behav. Sci.* 65:273-283.
- CASTILLO, D., and A. L. CLARK. 2003. Trap/Neuter/Release methods ineffective in controlling domestic cat “colonies” on public lands. *Nat. Areas J.* 23(3):247-253.
- CHU, K., W. M. ANDERSON, and M. Y. RIESER. 2009. Population characteristics and neuter status of cats living in households in the United States. *J. Amer. Vet. Med. Assoc.* 234(8):1023-1030.
- CHURCHER, P. B., and J. H. LAWTON. 1987. Predation by domestic cats in an English village. *J. Zool. Lond.* 212:439-455.
- CLANCY, E. A., A. S. MOORE, and E. R. BERTONE. 2003. Evaluation of cat and owner characteristics and their relationships to outdoor access of owned cats. *J. Amer. Vet. Med. Assoc.* 222(11):1541-1545.
- COLEMAN, J. S., and S. A. TEMPLE. 1993. Rural residents’ free-ranging domestic cats: A survey. *Wildl. Soc. Bull.* 21:381-390.
- DABRITZ, H. A., E. R. ATWILL, I. A. GARDNER, M. A. MILLER, and P. A. CONRAD. 2006. Outdoor fecal deposition by free-roaming cats and attitudes of cat owners and nonowners toward stray pets, wildlife, and water pollution. *J. Amer. Vet. Med. Assoc.* 229(1):74-81.
- DABRITZ, H. A., and P. A. CONRAD. 2010. Cats and *Toxoplasma*: Implications for public health. *Zoonoses Publ. Heal.* 57:34-52.
- DAUPHINE, N., and R. J. COOPER. 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. In: T. D. Rich, C. Arizmendi, D. W. Desmarest, and C. Thompson (Eds.), *Proc. Int. Partners in Flight Conf.* 4:205-219.
- DAUPHINE, N., and R. J. COOPER. 2011. Pick one: Outdoor cats or conservation. *The Wildl. Prof.* 5(1):50-56.
- DE SILVA, S., and G. M. TURCHINI. 2008. Towards understanding the impacts of the pet food industry on world fish and seafood supplies. *J. Agric. Ethics* 21:459-467.
- DRISCOLL, C. A., D. W. MACDONALD, and S. J. O’BRIEN. 2009. From wild animals to domestic pets, an evolutionary view of domestication. *Proc. Nat. Acad. Sci.* 106(1):9971-9978.
- FISHER, P., and C. A. MARKS (EDITORS). 1996. Humaneness and Vertebrate Pest Control: Proceedings of the seminar held March 27, 1996. Report Series No. 2, Vertebrate Pest Research Unit, Department of Natural Resources and Environment, Victoria, NSW, Australia. 65 pp.
- FITZGERALD, B. M. 1998. Diet of domestic cats and their impacts on prey populations. Ch. 10 (Pp. 123-146) in: D. C. Turner, and P. Bateson (Eds.), *The Domestic Cat: The Biology of its Behaviour*. Cambridge University Press, Cambridge, UK.
- FOLEY, P., J. E. FOLEY, J. K. LEVY, and T. PAIK. 2005. Analysis of the impact of trap-neuter-return programs on populations of feral cats. *J. Amer. Vet. Med. Assoc.* 227(11):1775-1781.
- FORBUSH, E. H. 1905. The decrease of certain birds in New England. *The Auk* 22(1):25-31.
- FORBUSH, E. H. 1916. *The Domestic Cat: Bird Killer, Mouser, and Destroyer of Wildlife*. Economics Bulletin 2, Massachusetts State Board of Agriculture, Boston, MA. 156 pp.

- GEORGE, W. G. 1974. Domestic cats as predators and factors in winter shortages of raptor prey. *Wilson Bull.* 86(4):384-396.
- GRIER, K. C. 2006. *Pets in America: A History*. University of North Carolina Press, Chapel Hill, NC. 377 pp.
- HADIDIAN, J. 2011. Taking the "pest" out of pest control: Humane and wildlife damage management. *Proc. Wildl. Damage Manage. Conf.* 14:95-99.
- HADIDIAN, J. 2010. Integrated pest management (IPM) for vertebrates: Do we need to broaden the concept? *Proc. Vert. Pest Conf.* 24:361-364.
- HANSON, C. C., J. E. BONHAM, K. J. CAMPBELL, B. S. KEITT, A. E. LITTLE, and G. SMITH. 2010. The removal of cats from San Nicolas Island: Methodology. *Proc. Vert. Pest Conf.* 24:72-78.
- HASPEL, C., and R. E. CALHOON. 1990. The interdependence of humans and free-ranging cats in Brooklyn, New York. *Anthrozoos* 3(3):155-161.
- HORNADAY, W. T. 1913. *Our Vanishing Wildlife*. Charles Scribner's Sons, New York, NY. 411 pp.
- JESSUP, D. A. 2004. The welfare of feral cats and wildlife. *J. Amer. Vet. Med. Assoc.* 225(9):1377-1383.
- KAYS, R. W., and A. DEWAN. 2004. Ecological impact of inside/outside house cats around a suburban nature preserve. *Anim. Conserv.* 7: 273-283.
- KLEM, D., JR. 2009. Avian mortality at windows: The second largest human source of bird mortality on earth. *In: T. D. Rich, C. Arizmendi, D. W. Desmarest, and C. Thompson (Eds.), Proc. Int. Partners in Flight Conf.* 4:244-251.
- LEPCZYK, C. A., N. DAUPHINE, D. M. BIRD, S. CONANT, R. J. COOPER, D. C. DUFFY, P. J. HATLEY, P. P. MARA, E. STONE, and S. A. TEMPLE. 2010. What conservation biologists can do to counter trap-neuter-return: Response to Longcore et al. *Conserv. Biol.* 24(2):627-629.
- LEPCZYK, C. A., A. C. MERTIG, and J. LIU. 2003. Landowners and cat predation across rural-to-urban landscapes. *Biol. Conserv.* 115:191-201.
- LEPCZYK, C. A., Y. VAN HEEZIK, and R. J. COOPER. 2011. An issue with all-too-human dimensions: It's people, not science, at the heart of the cat debate. *The Wildl. Prof.* 5(1):68-70.
- LEVY, J. K., and P. C. CRAWFORD. 2004. Humane strategies for controlling feral cat populations. *J. Amer. Vet. Med. Assoc.* 225(9):1354-1360.
- LEVY, J. K., D. W. GALE, and L. A. GALE. 2003a. Evaluation of the effect of a long-term trap-neuter-return and adoption program on a free-roaming cat population. *J. Amer. Vet. Med. Assoc.* 222(1):42-46.
- LEVY, J. K., J. E. WOODS, S. L. TURICK, and D. L. ETHERIDGE. 2003b. Number of unowned free-roaming cats in a college community in the southern United States and characteristics of community residents who feed them. *J. Amer. Vet. Med. Assoc.* 223(2):202-205.
- LITTIN, K. E., D. J. MELLOR, B. WARBURTON, and C. T. EASON. 2004. Animal welfare and ethical issues relevant to the humane control of vertebrate pests. *NZ Vet. J.* 52(1):1-10.
- LOCKWOOD, R. 2005. Cruelty toward cats: Changing perspectives. Ch. 2 (Pp. 15-26) *in: D. J. Salem and A. N. Rowan (Eds.), The State of the Animals 2005*. Humane Society Press, Washington, D.C.
- LONGCORE, T., C. RICH, and L. M. SULLIVAN. 2009. Critical assessment of claims regarding management of feral cats by trap-neuter-return. *Conserv. Biol.* 23(4):887-894.
- MACDONALD, D., and D. BURNHAM. 2010. *The state of Britain's mammals: A focus on invasive species*. People's Trust for Endangered Species, London, U.K. 31 pp.
- MAHLOW, J. C., and M. R. SLATER. 1996. Current issues in the control of stray and feral cats. *J. Amer. Vet. Med. Assoc.* 209:2016-2020.
- MARKS, C. 1999. Ethical issues in vertebrate pest management: Can we balance the welfare of individuals and ecosystems? Pp. 79-89 *in: D. Mellor and V. Monamy (Eds.), The Use of Wildlife for Research: Proceedings of a conference held at Western Plains Zoo, Dubbo, NSW, 26-27 May 1999*. AN-ZCCART, University of Adelaide, SA, Australia.
- MEDINA, F. M., E. BONNAUD, E. VIDAL, B. R. TERSHY, E. S. ZAVALETA, C. J. DONLAND, B. S. KEITT, M. LE CORRE, S. V. HORWATH, and M. NOGALES. 2011. A global review of the impacts of invasive cats on island endangered vertebrates. *Global Change Biol.* 17(11):3503-3510.
- NATOLI, E., L. MARAGLIANO, G. CARIOLA, A. FAINI, R. BONANNI, S. CAFAZZO, and C. FANTINI. 2006. Management of feral domestic cats in the urban environment of Rome (Italy). *Prev. Vet. Med.* 77(3-4):180-185.
- NOGALES, M., A. MARTIN, B. R. TERSHY, C. J. DONLAN, D. VEITCH, N. PUERTA, B. WOOD and J. ALONSO. 2004. A review of feral cat eradication on islands. *Conserv. Biol.* 18(2):310-319.
- PATRONEK, G. J. 1998. Free-roaming and feral cats – their impact on wildlife and human beings. *J. Am. Vet. Med. Assoc.* 212(2):218-226.
- SCHMIDT, P. M., B. L. PIERCE, and R. R. LOPEZ. 2007. Estimating free-roaming cat densities in urban areas: Comparison of mark-resight and distance sampling. *Wild. Biol. Prac.* 3(1):18-27.
- SCHMIDT, P. M., T. M. SWANNACK, R. R. LOPEZ, and M. R. SLATER. 2009. Evaluation of euthanasia and trap-neuter-return (TNR) programs in managing free-roaming cat populations. *Wildl. Res.* 36:117-125.
- SCHMIDT, R. H. 1989. Animal welfare and wildlife management. *Trans. N. Am. Wildl. Nat. Res. Conf.* 54:468-475.
- STONE, P. A., H. L. SNELL, and H. M. SNELL. 1994. Behavioral diversity as biological diversity: Introduced cats and lava lizard wariness. *Conserv. Biol.* 8(2):569-573.
- TOUKHSATI, S. R., P. C. BENNETT, and G. J. COLEMAN. 2007. Behaviors and attitudes towards semi-owned cats. *Anthrozoos* 20(2):131-142.
- ZANETTE, L. Y., A. F. WHITE, M. C. ALLEN, and M. CLINCHY. 2011. Perceived predation risk reduces the number of offspring songbirds produce per year. *Science* 334:1398-1401.