



Human-cat relationship in an oceanic biosphere reserve: The case of La Palma Island, Canary archipelago



Félix M. Medina^{a,b,*}, Manuel Nogales^b, Mark J. Farnworth^c, Elsa Bonnaud^d

^a Servicio de Medio Ambiente, Cabildo Insular de La Palma, Avenida Los Indianos 20, 2º, 38700 Santa Cruz de La Palma, Canary Islands, Spain

^b Island Ecology and Evolution Research Group (IPNA-CSIC), Astrofísico Francisco Sánchez 3, 38206 La Laguna, Tenerife, Canary Islands, Spain

^c School of Biological Sciences, Plymouth University, Drake Circus, Devon PL4 8AA, United Kingdom

^d Ecologie, Systématique and Evolution, UMR CNRS 8079, Univ. Paris Sud, Orsay 91405, France

ARTICLE INFO

Article history:

Received 8 April 2015

Received in revised form 21 April 2016

Accepted 22 April 2016

Keywords:

Conservation

Felis catus

Invasive species

Oceanic islands

Questionnaires

Human-animal relationship

ABSTRACT

Removal of feral cats from island environments is a useful mechanism by which their ecological impact on endangered species can be reduced or ended. Nevertheless, because cats are anthropogenic in their origins, social perceptions of management practices play a large role in their implementation. Four-hundred questionnaires were delivered (386 were returned) with 100 going to each of the following: local residents; environmental workers; tourists; and, hunters. Questions explored respondents' knowledge about island biodiversity and invasive species as well as attitudes towards cat population management methods. Habitat destruction and introduction of invasive species were considered the main threats for the conservation of island biodiversity. Most respondents considered cats to have a negative impact on biodiversity and sterilization campaigns were considered most appropriate for cat population control. Several free sterilization campaigns have been conducted in La Palma Island Biosphere Reserve in order to reduce free-ranging cats and were well received by local people. This research, which combined concepts of management, ecology and social sciences, provides valuable insights which may be applicable on several other islands where cats and people are present and in conflict with conservation priorities.

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1. Introduction

The domestic cat (*Felis silvestris catus*) originates from the Near Eastern wildcats (*F. s. lybica*) approximately 9000 years ago (Driscoll et al., 2007). This commensal relationship likely arose from the cat's ability to effectively control rodents but has, over time, developed into one of companionship (Turner, 2000). Three different statuses for cats have been broadly described depending on their associations with humans: (1) house/pet/companion cats living with people that provide food, affection and shelter; (2) stray or roaming cats linked to one or several households which receive some of their nutritional needs from people but may be required to hunt; and, (3) feral cats independent of humans that reproduce and feed independently of people and anthropogenic food sources (see Farnworth, Dye, & Keown, 2010; Liberg, Sandell, Pontier, & Natoli, 2000).

* Corresponding author at: Servicio de Medio Ambiente, Cabildo Insular de La Palma, Avenida Los Indianos 20, 2º, 38700 Santa Cruz de La Palma, Canary Islands, Spain.

E-mail addresses: fmmhijazo@gmail.com, felix.medina@cablapalma.es (F.M. Medina).

Cats, brought by people, have dispersed worldwide including to many remote islands, where populations have become feral (Fitzgerald & Turner, 2000). Once introduced, cats mainly preyed upon other introduced mammals but also native mammals, birds, reptiles and insects (Bonnaud et al., 2011), being responsible, at least in part, for 8% of global bird, mammal and reptile extinctions and the decline of almost 14% of critically endangered vertebrates on islands (Medina et al., 2011).

Predation strongly impacts upon prey population dynamics both in terms of companion (pet) cats in urban and suburban habitats (Woods, McDonald, & Harris, 2003) and stray and feral cats in uninhabited environments (Fitzgerald & Turner, 2000). For this reason, cats are considered as one of the 100 worst invasive species (Lowe, Browne, Boudjelas, & De Poorter, 2000).

Faced with issues related to cat presence, eradication campaigns have been conducted on 100 islands worldwide (DIISE, 2014) using a range of techniques including trapping, hunting, poisoning, and introduction of diseases (Campbell et al., 2011; Nogales et al., 2004). Extirpation of feral cats from islands is a powerful conservation tool strongly supported by conservation organisations (Farnworth, Watson, & Adams, 2014). Nevertheless, on inhabited islands social factors can restrict its implementation

because the opposition of cat owners or animal rights organizations (Nogales et al., 2013; Parkes, Fisher, Robinson, & Aguirre-Muñoz, 2014). Thus, other management strategies like trap-neuter release, trap-neuter release with removal of kittens for adoption, trap-test-vaccinate-alter-return-monitor, trap-euthanize, and inaction are more often accepted (Loyd & DeVore, 2010). Although potentially useful for small-managed groups of cats these processes maybe too expensive and not efficient enough to be applied across larger cat populations (Lohr, Cox, & Lepczyk, 2013; Metsers, Seddon, & van Heezik, 2010). As unowned (stray) cat numbers are positively correlated with human population density (Aguilar & Farnworth, 2012, 2013), it is crucial to obtain analyses of social, cultural, and economic issues to increase the possibility that local communities support removal management (Proulx, 1988; Opper, Beaven, Bolton, Vickery, & Bodey, 2011). Cat populations can therefore be seen as an anthropogenic problem requiring community-based solutions.

Questionnaires are suitable tools to obtain public or stakeholder perceptions regarding human impacts on ecosystems, ecological management processes as well as animal management, invasive mammal impacts and human-wildlife conflicts (Farnworth et al., 2014; White, Vaughan Jennings, Renwick, & Barker, 2005). Some of them were used to measure human attitudes toward cats specifically (Turner, 2000) and focused on different aspects like cat-human relationships (Franklin, 2007), interdependence (Haspel & Calhoun, 1990), management options (Farnworth, Campbell, & Adams, 2011), or predation rates (Tschanz, Hegglin, Gloor, & Bontadina, 2011).

In the Canary Islands owners release kittens into the wild increasing feral cat populations and generating a major issue for the conservation of endangered species (Medina & Nogales, 2009). Consequently, several control programs were conducted to regulate cat population dynamics and minimize its subsequent impact on native wildlife. To avoid undesirable conflicts between animal right organisations and conservation biologists, effective information and education campaigns were considered as a basic tool (Medina & Nogales, 2009; Rando, 2004). Despite this, few questionnaires had been carried out on islands taking into account human attitudes and social perceptions as they relate to the presence and effects of cats on island ecologies. There have been no such studies on most of the 5% of the world's 179,000 small and medium sized islands where cats have been introduced (B. R. Tershy, personal communication) including the Canaries. The main objective of this contribution is to establish, through a questionnaire, the opinion of specific groups of La Palma Island Biosphere Reserve inhabitants toward the effect of cat presence on island ecosystems. Specifically, we aim to evaluate the following: (1) the inhabitant's knowledge about island biodiversity and the consequences of invasive species; (2) the inhabitant's opinion about cat presence; and, (3) their attitude towards cat population management. Each of these is considered in light of the respondents' specific interest group those being: local residents, environmental workers, tourists, and hunters.

2. Material and methods

2.1. Study area

The Canarian archipelago is located in the Atlantic Ocean, some 100 km off the African continent. With an area of 728 km² and an altitude of 2426 m a.s.l. (Roque de Los Muchachos), the island of La Palma (28° 40'N, 17° 50'E) is located in the north-west of the archipelago. Island's climate is influenced by the ecological zones associated with its altitude, the wet north-east trade winds, and the

mountain orientation given a highly differentiated vegetation belts (see del Arco, Acebes, Pérez de Paz, & Marrero, 1999 for details).

A relative small area (511 ha) on the island was declared a Biosphere Reserve in 1983 (El Canal y Los Tiles). Nevertheless, considering both the natural value of this island and the fact that only conservation programs were carried out during a long period, the entire island was declared as Biosphere Reserve in 2002, to comply with the other two functions of these natural spaces: development and logistic (support for experimentation, research, formation, education and communication). Biosphere Reserves are recognised areas of representative environments which have been internationally designated within the framework of UNESCO's Man and Biosphere Program for their value to conservation through providing the scientific knowledge, skills and values to support sustainable development (Bridgewater & Cresswell, 1998).

2.2. Questionnaires

Based on Farnworth et al. (2014) study and on the focal species of our research (cats), four groups of respondents were sampled, using a written questionnaire. Such sampling design was adopted based on the assumption that points-of-view with respect to invasive predators (cats) and ecosystem conservation on the island would differ amongst groups of users. As per the aims of this work, exploring this dynamic is crucial to understanding conflicts which may arise. Groups included were: local residents (to provide a non-specialist perspective on the issues in the research); hunters (because they may treat cats as competitors for game species); environmental workers (who likely have a close relationship with nature conservation on the island); and, tourists (as non-specialists and non-locals). Questionnaires to local residents and tourists were freely available in public spaces while hunters and environmental workers were contacted at their respective associations or places to work. Adults from both sexes were able to respond. However, it is to be noted that more than 95% of the environmental workers and hunters in La Palma Island are known to be men, with a substantial bias towards older individuals. For this reason, sex and age biases were integral to the purposive sampling process and so were considered only in terms of their limitations for the study.

Between March and July 2012, 400 self-administered questionnaires were distributed amongst the principal villages proportional to the number of inhabitants. Direct and discrete questionnaires allowed avoidance of unintended influence by interviewers (Ash & Adams, 2003).

Questions were divided in three different sections those: (1) concerned with general aspects of biodiversity on La Palma Island Biosphere Reserve, to measure the general knowledge of people about island biodiversity and the related main conservation concerns; (2) addressing specific issues about feral cats and their perceived effects on the conservation of native species; and, (3) assessing attitudes towards issues associated with the presence of cats on the island. The questionnaire (Table 1) was distributed in Spanish, English, French and German according to the respondent encountered.

2.3. Analysis

Survey data were analysed taking into account all the answered questionnaires and using chi-square and likelihood ratio tests (G-test), which were commonly used in similar studies (Ash & Adams, 2003; Haspel & Calhoun, 1990). To answer specific questions we sub-sampled our data and when it was necessary to use the same data set and to avoid Type I error, we applied the more conservative sequential Bonferroni correction (0.05/k) proposed by Rice (1989).

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