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Editorial: Ecological impacts of domestic cat activity on wildlife

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Editorial on the Research Topic
Ecological impacts of domestic cat activity on wildlife

Introduction

The domestic cat (cat, *Felis catus*) has had a long association with humans, with evidence that cats were domesticated in the Middle East around 10,000 years ago (Driscoll et al., 2007). Useful to humans as both a companion and a controller of pest rodents, this enabled cats to be transported from their Middle Eastern origins throughout the ancient world (Ottoni et al., 2017), and ultimately throughout the whole world except Antarctica (Koch et al., 2015). However, their predatory abilities have led them to have an impact on native species, causing population reductions and extinctions (Legge et al., 2020; Loss et al., 2022). Cats not only have impacts through direct predation, but through behavioural changes to their prey (Bedoya-Pérez et al., 2021; Fardell et al., 2021), disease transmission (Mendoza Roldan and Otranto, 2023), and hybridization with indigenous local felids (Tiesmeyer et al., 2020). Management of domestic cats, however, remains difficult due to their popularity as companion animals and many owners failing to restrict their movements.

This Research Topic contains the latest research of domestic cats on wildlife. The impacts include predation on native fauna, behavioral changes of fauna in response to cats, disease transmission between cats and wildlife, hybridization between domestic cats and wild cats, and the breakdown of ecological processes due to domestic cats. The research comes from three continents: North America, Europe and Australia. These impacts are divided into the topics below.

Types of impacts of domestic cats on wildlife

Predation

Cats are extremely efficient and effective predators (Legge et al., 2020). While they are often maintained or introduced into areas in the hopes that they will control invasive prey such as rats and mice, these efforts usually have little impact as cats tend to prefer abundant, native prey (Loss et al., 2013; Parsons et al., 2018). It is possible, however, that in urban areas where non-native rodents are highly abundant, cats may be somewhat more effective

at population control (Van Heezik et al., 2010; Loss et al., 2013). Regardless, it is well established that predation by cats can have negative impacts on populations of native species (Legge et al., 2020).

In this volume, Mori et al. evaluate predation of cats on native fauna in Italy, finding several threatened and endangered species to be impacted. In addition, Herrera et al. evaluate overlap of cats with native species, which indicates potential for predation.

Fear

The effects of predation naturally go beyond removal of individual prey animals from the population. The presence of predators impacts the behavior of prey species, causing them to avoid risky areas and in some cases foregoing otherwise beneficial foraging or breeding opportunities (Brown et al., 1999). Evaluating "landscapes of fear", or spatial understanding of which parts of the landscape are viewed as unsuitable by species due to the perception of added risk, has become a critical toolset for conservation biologists (Laundré et al., 2001).

Here, Fardell et al. evaluate fear effects of both red fox (*Vulpes vulpes*) and cats on mammalian and avian prey, finding that cats were perceived as most dangerous farthest from urban development, with interesting additive effects of human disturbance. In addition, in a separate study, Fardell et al., working in yards and in edge habitat, showed specifically that wildlife increased activity for a 24 hour period while cats were absent. They suggest that this finding could be used to engage the community to reduce outdoor cat presence to protect wildlife.

Disease

Cats also carry and can transmit a number of diseases, such as toxoplasmosis, feline leukemia, and rabies that can impact wildlife and other domestic animals (Trouwborst et al., 2020). These diseases can have devastating outcomes for native species (Gerhold and Jessup, 2013). The findings from Herrera et al. have implications for disease transmission as they investigate spatial overlap between cats and other species, finding high levels of overlap in both time and space.

Competition

As cats are consuming prey, they are by definition also reducing prey availability for other species and thus introducing competitive pressures (Trouwborst et al., 2020). In Madagascar, the fossa (*Cryptoprocta ferox*) is one species that appears to be particularly limited by the consumptive effect of cats (Merson et al., 2019). These competitive effects are relatively understudied, but given the high densities of cats present in many anthropogenic landscapes and their efficiency as hunters, they are likely to be significant. Herrera et al. here evaluate overlap between cats and eight native mammal species, which has implications for potential competition.

Hybridization

Domestic cats can also in some cases hybridize with native wildcats (Trouwborst et al., 2020), which is of great concern when those species are rare (Pierpaoli et al., 2003). When hybridization and genetic swamping begin to occur, it becomes difficult to identify native species in need of protection, and the legal protected status of genetically mixed individuals can become unclear. As part of this Research Topic, Nussberger et al. give an overview of the potential impacts of hybridization between domestic cats and European wildcats (*Felis silvestris)* and make management recommendations.

Conclusions and future directions

The papers in this Research Topic add to the body of work showing the major impacts domestic cats can have on local fauna, though direct predation, behavioral modification, disease transmission and hybridization with local felids. While these certainly indicate a negative impact of domestic cats on fauna, at least at the individual level, there are also potentially larger implications. Many studies have implicated domestic cats in the decline of native fauna, especially through predation (Moseby et al., 2015; Loss and Marra, 2017) and so the next steps are to link the effects seen at the individual level to population level effects. In addition, we need further reviews into effective mitigation from the impacts of domestic cats. Domestic cats are almost unique among invasive animals in that they are highly prized as pets and have powerful groups lobbying for their protection. Non-lethal cat management programs including trap-neuter-release (Longcore et al., 2009), attaching bells to cats (Nelson et al., 2005), and the use of cat odors as deterrents (Bedoya-Pérez et al., 2019), have all found mixed levels of success. Hence, we hope that this Research Tropic will inspire further studies on cat impacts, as well as ethical and novel methods to mitigate the impacts of cats on native wildlife.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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