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Identifying ambassador species for conservation marketing

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ABSTRACT

Conservation relies heavily on external funding, much of it from a supportive public. Therefore it is important to know which species are most likely to catalyse such funding. Whilst previous work has looked at the physical attributes that contribute to a species' appeal, no previous studies have tried to examine the extent to which a species' sympatriots might contribute to it's potential as flagship for wider conservation. Therefore, here we estimate 'flexibility' and 'appeal' scores for all terrestrial mammals (n = 4320) and identify which of these might serve as ambassadors (defined as both highly appealing and flexible). Relatively few mammals (between 240 and 331) emerged as ambassadors, with carnivores featuring heavily in this group (representing 5% of terrestrial mammals but 39% of ambassadors). 'Top ambassadors' were defined as those with both flexibility and appeal scores greater than 1 standard deviation above the mean. Less than a quarter of the 20 most endangered and evolutionary distinct species in this study were classed as ambassadors, highlighting the need for surrogate species to catalyse conservation effort in areas with such priority species. This is the first global analysis bringing together flexibility and appeal for all terrestrial mammals, and demonstrates an approach for determining how best to market species in order to achieve maximal conservation gain in a world with urgent conservation need but limited resources.

1. Introduction

Conservation efforts are needed urgently, with ever-increasing threats posed to the world's biodiversity, largely due to anthropogenic factors (Butchart et al., 2010; Dirzo et al., 2014). Addressing threats of this scale will require significant global engagement and funding, running into billions of dollars annually (Lindsey et al., 2016). This will require commitments not only from governments but also from the general public, who are increasingly being empowered to engage with specific political and social issues via the internet and online social media (Macdonald et al., 2016a). Therefore, society's delivery of biodiversity conservation in the future hinges not only on the expertise and priorities of scientists and policymakers, but also

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on the support and engagement of numerous stakeholder groups, including the electronically-connected middle classes who tend to be most open to such engagement (Balmford and Cowling, 2006; Macdonald et al., 2016a). In order to maximise the engagement of that public, and the impact of their support, conservation campaigns should carefully consider which species are likely to be highly appealing to the public.

1.1. Flagship species

The term 'flagships' for conservation has been widely discussed in the literature and undergone several reinterpretations (Caro and O'Doherty, 1999; Favreau et al., 2006; Heywood, 1995; Simberloff, 1998). The review of the concept by Verissimo et al. (2011) focuses clearly on the concept's usefulness for conservation marketing. This focus on conservation marketing can be applied at a range of scales, from raising awareness about a region's biodiversity among a local community (Veríssimo et al., 2014) to widespread national and international campaigns that can raise many hundreds of thousands of dollars. Being able to identify which species have the highest potential to act as flagship species is important for the success of these campaigns.

The effectiveness of campaigns depends largely upon public perceptions; from nematodes to gorillas, it is obvious that people do not view all animal species equally (Macdonald et al., 2006) and a growing number of studies is attempting to quantify their preferences. Frequently, the most high profile species are large mammals (Caro and O'Doherty, 1999; Clucas et al., 2008; Johnson et al., 2010; Macdonald et al., 2006; Smith et al., 2012), however it is important to note that while these species may dominate the headlines in the western media, they may not be so highly regarded in other regions where peoples' perceptions and experiences may differ widely (Bowen-Jones and Entwistle, 2002; Douglas and Veríssimo, 2013; Macdonald et al., 2016b). In order for marketing campaigns to be successful it is important to consider both the target audience for the campaign as well as the stated use of the flagship species, for instance the polar bear (*Ursus maritimus*) might represent a good flagship to raise international awareness about the impacts of climate change, but a grey wolf (*Canis lupus*) might not be the optimal flagship amongst the shepherding community for species reintroduction campaigns in the Scottish highlands (Barua et al., 2011; Linnell et al., 2000; Sandom and Macdonald, 2015).

Accounting for stakeholder preferences and the purpose of the flagship, a species' appeal is an important dimension of its potential to lever public support for its conservation and, indeed, for conservation marketing more widely (Kontoleon and Swanson, 2003; Veríssimo et al., 2009). It is possible that different species have certain characteristics that make them more or less likely to be successful flagships. For instance, Macdonald et al. (2015) explored the impact of characteristics such as size, rarity, orientation of eyes etc. on peoples' preferences for different species in the context of conservation prioritisation and found that these could be used to predict respondent preferences with high reliability.

1.2. Umbrella species

As with the term "flagships", there are many different interpretations of the term "umbrellas" (Caro, 2010), and loose terminology has hindered debates about the efficacy of the concept. However a common theme among different definitions (and types of umbrella species) is the use of one species (or group of species) to act as a surrogate for the conservation of other "background" species through their association with viable populations, protected areas or management actions (Caro, 2010). The efficacy of "umbrella" species is hotly debated in the conservation literature with some studies casting doubt on the ability of one species (or group of species) to act as surrogates for another (Roberge and Angelstam, 2004) while others find support for the idea (Branton and Richardson, 2011; Burnham et al., 2012; Fleishman et al., 2000). Recently, Di Minin and Moilanen (2014) and Di Minin et al. (2016) have shown that inclusion of charismatic flagship species can improve surrogacy strategies, and explored the capacity of Carnivores to act as surrogates for a wide range of birds, mammals, amphibians, reptiles and ecoregions. These species that combine the marketing characteristics of flagship species, and the ecological benefits of umbrella species have been termed "flagship umbrella species" (Caro, 2010) and have been considered in the context of both forest and marine conservation (e.g. (Dinerstein et al., 2010; Oviedo and Solís, 2008)).

However, a species' ability to act as a flagship-umbrella for other species is not confined to its capacity to facilitate the delivery of effective conservation on the ground. Some species may be appropriate flagships for a wide range of conservation and environmental issues, while others may be effective only in certain circumstances. In a study of how international conservation NGOs used threatened mammal species as flagship species, Smith et al. (2012) found that only a small proportion of campaigns raised funds for broader campaigns, and echoed concerns about how the flagship approach has focused funds towards a small number of species (Joseph et al., 2011); it is therefore important that they "*broaden the conservation benefits of their fundraising*". NGOs can achieve this in several ways, for instance if a campaign raises more than a specified amount then the excess can be spent on different projects, or by using traditional flagship campaigns to secure new donors who can subsequently be approached to fund broader projects (Smith et al., 2010). Other approaches to broadening conservation fundraising have included strategies such as "biodiversity hotspots" (Myers et al., 2000) or clearly costed prioritisation strategies (Joseph et al., 2009, 2011) however while these approaches may offer a more nuanced approach to conservation prioritisation they may also lack the clear and charismatic message of conventional flagship campaigns. We therefore suggest that considering a species' "flexibility" in terms of its ability to act as a flagship for a wide number of other species. Under the appropriate circumstances, wide ranging species may have the ability to act as flagships for a wider range of issues and species. In this sense, a species' ability as a flagship may be judged both on the appeal to the target audience of its