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1 **Increased conservation marketing effort has major fundraising**
2 **benefits for even the least popular species**

3

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29 **Abstract**

30 Conservationists often complain that their study species are ignored by donors. However,
31 marketing theory could help understand and increase the profile and fundraising potential of
32 these neglected species. We used linear regression with multimodel inference to analyse
33 data on donation behaviour from the World Wildlife Fund-US (WWF-US) and Zoological
34 Society of London's EDGE of Existence programme (EDGE), in order to understand how
35 species traits and marketing campaign characteristics influenced online flagship-based
36 fundraising efforts. Our analysis accounted for species traits through variables such as
37 appeal and familiarity, and marketing campaign characteristics through measuring the order
38 in which the species were presented and the amount of information provided. We found that
39 species traits were key for the WWF-US website, with appealing and threatened non-
40 mammal species the most popular with donors. This was probably because WWF-US used
41 well-known flagship species and so marketing had little impact. The EDGE website used a
42 wider variety of species and in this case both species traits and the marketing campaign
43 characteristics were important, so that appealing species and well-promoted species did
44 best. We then predicted outcomes for a hypothetical EDGE fundraising campaign with
45 varying degrees of marketing effort. We showed that additional marketing can have a large
46 impact on donor behaviour, increasing the interest of potential donors towards unappealing
47 species by up to 26 times. This increase would more than equal the amount raised by
48 campaigns using appealing species without additional promotion. Our results show
49 marketing can have a large impact on donor behaviour and suggest there is scope for
50 successful marketing campaigns based on a much wider range of species

51

52 **Keywords:** Conservation, Donations, Flagship species, Fundraising, Internet, Marketing,
53 NGO, Online

54 **1 Introduction**

55 Patterns of conservation funding and research effort show strong biases towards some
56 species (Bakker et al. 2010; Metrick and Weitzman 1996). These biases are driven not only
57 by the species traits but also by the nature of a species' interactions with people, the social
58 and cultural context where these interactions take place and by the sensory nature of how
59 humans perceive their surroundings (Lorimer 2006; Lorimer 2007). Marketing theory offers a
60 new set of techniques that could help understand and increase the profile and fundraising
61 potential of the neglected species (Jenks et al. 2010; Tisdell 2006; Veríssimo et al. 2011).
62 Despite this potential, we lack empirical evidence on whether conservation marketing can
63 change people's behaviour or whether the characteristics of some species make them
64 inherently ineffective for fundraising is concerned. Thus, there is a pressing need to measure
65 the potential power of marketing in conservation, especially as reversing the current rate of
66 biodiversity loss depends on raising funds and support for a wider range of species (Bennett
67 et al. 2015; Butchart et al. 2010; McCarthy et al. 2012).

68
69 There is no doubt that some species are more popular with the public and these species,
70 generally large mammals and birds, are frequently used as flagships in conservation
71 marketing campaigns (Clucas et al. 2008; Entwistle 2000; Leader-Williams and Dublin 2000).
72 Much has been written on the drivers of this preference but a central concept is animal
73 charisma, which is divided into three key components when related to non-specialist
74 audiences: detectability and distinctiveness; aesthetics; and functional value (Lorimer 2006;
75 Lorimer 2007). The first, and perhaps most fundamental component, conditions how people
76 perceive a species, most often through sight and hearing, and reflects their ability to
77 distinguish it from other species (Lorimer 2006). The second component relates to the
78 aesthetic characteristics of a species, such as shape and colour, and is often influenced by
79 human social norms (Lorimer 2006; Lorimer 2007). The third, and last dimension, refers to

80 the current or historical functional values of different species so that, for example, agricultural
81 pests are generally seen as uncharismatic (Lorimer 2006).

82

83 Yet, despite this widespread reliance on so called charismatic megafauna, the majority of
84 published evidence for their popularity with the public is based on attitudinal data derived
85 from questionnaire surveys (Gunnthorsdottir 2001; Knight 2008; Tisdell et al. 2007). These
86 studies provide useful information but we need behavioural data to truly understand the
87 relative popularity of different species (Schultz 2011; Veríssimo 2013). Fortunately, the
88 increase in online donations makes information on such “revealed preferences” more
89 available, so here we use species-specific online fundraising data from two conservation
90 organisations to explore how the public respond to different species.

91

92 The broader goal of this study is to understand the extent to which marketing can play a role
93 in raising the profile of flagships with different levels of public awareness and appeal, and
94 how that role compares to the influence of more widely studied species-specific traits (e.g.,
95 body size, taxonomic group). In particular, we test the following hypothesis (1) species-
96 specific traits influence a species’ fundraising performance, (2) the marketing context
97 influences a species’ fundraising performance, and (3) increasing the marketing effort for
98 less appealing species would reduce the current disparity in fundraising performance when
99 compared to the most appealing species. Thus, our study uses linear regression and multi-
100 model inference to identify the species- and marketing-based factors that best determine
101 donation behaviour for two international Non-Governmental Organisation flagship online
102 campaigns.

103

104 **2 Materials and methods**

105 **2.1 Data**

106 The first organisation we focused on was the World Wildlife Fund-US (WWF-US). Its flagship
107 campaigns are based on “adopting” a wide range of charismatic species, including
108 mammals, birds, reptiles and fish. This approach seeks to maximise fundraising for global
109 conservation efforts, including work on species conservation, habitat loss and climate
110 change. The second organisation was the Zoological Society of London (ZSL) which, in
111 contrast to WWF-US, raises funds directly for particular species through their EDGE
112 (Evolutionarily Distinct, Globally Endangered) of Existence programme. There are EDGE
113 campaigns for amphibians, birds and corals but our study focused on the mammal campaign,
114 which has been running the longest. These EDGE flagship species are more varied in terms
115 of appeal and familiarity because they include species such as rodents and bats, which are
116 generally seen as less appealing (Knight 2008).

117

118 The data on donation behaviour were obtained from the WWF-US and EDGE websites, both
119 of which made it clear that any donations would be spent directly on conservation. Both
120 websites also contained a web page describing each of their flagship species using a
121 standard organisation-specific template, but they differed in how links to these pages were
122 presented. WWF-US offered adoption packages for mammal, bird, reptile, amphibian, fish
123 and invertebrate flagship species and these were all presented simultaneously on a specific
124 webpage. A photo of each WWF flagship species labelled with its name is listed by default
125 on this page based partly on previous popularity and novelty. In contrast, the top 100 EDGE
126 mammal species were profiled ten per web page and the default order was fixed and
127 depended on their EDGE score, which is based on their phylogenetic distinctiveness and
128 conservation status (Isaac et al. 2007). Both of these ordering systems were designed to
129 highlight the highest scoring species and so were also likely to influence donation levels
130 (Buda and Zhang 2000). Thus, we included variables related to this ordering in our models,
131 “Alphabetic Order” for WWF-US and “Webpage Order” for EDGE, to ensure the influence of
132 other factors was investigated effectively.

133

134 We used the available WWF-US data on the number of adoption packages for each of their
135 97 species, which covered the period of 2007 to 2011. These data were converted to ranks
136 to preserve market sensitive information. For the EDGE data the available information was
137 from 2008, and we used this proxy indicator to measure the ability of each of the top 100
138 EDGE mammals to elicit interest in donating, based on Google Analytics data on the number
139 of clicks on the “Support EDGE” button on the online profile of each species. To understand
140 the drivers of donations to WWF-US and EDGE we considered the characteristics of each
141 marketing scheme, which we grouped into: (a) species traits, based on the species’
142 biological traits that were identified as important in previous studies, and (b) marketing
143 characteristics, based on how the species was presented on the website. The species traits
144 used for both WWF-US and EDGE were body mass, threat status, possession of forward-
145 facing eyes, appeal and familiarity. We included body mass because previous research
146 found that larger-bodied species are preferred in fundraising campaigns targeted at non-
147 specialist audiences, by conservation Non-governmental Organizations (NGOs) when
148 promoting their work and by politicians in the policy making process (Knegtering et al. 2011;
149 Martin-Lopez et al. 2008; Smith et al. 2012). This is likely because these species are easier
150 to detect and distinguish, making them more salient in human cultures (Lorimer 2006). We
151 included species conservation status because species seen at greater risk of extinction are
152 commonly prioritized by non-specialist audiences and conservation NGOs, probably because
153 their conservation is seen as more urgent (Bowen-Jones and Entwistle 2002; Veríssimo et al.
154 2009). We included whether the species have forward-facing eyes because the importance
155 of this trait has also been identified in previous studies (Smith et al. 2012), probably because
156 it makes the species more anthropomorphic and species that resemble humans are often
157 perceived as more charismatic and important (Lorimer 2007; Root-Bernstein et al. 2013). We
158 included species appeal as a proxy for the overall aesthetic attributes of a species, such as
159 colour and shape, which are key elements of charisma (Lorimer 2006). Aesthetics have been

160 shown by previous research to drive human preferences, with appealing species receiving
161 more attention (Knight 2008; Stokes 2007; Veríssimo et al. 2009). Lastly, we included a
162 measure of species familiarity, as target audience generally donate to species they already
163 know (Frynta et al. 2013; Martín-López et al. 2007; Schlegel and Rupf 2010). Based on
164 similar cases in the marketing literature, this preference probably stems from familiarity being
165 used as a choice heuristic, with consumers selecting a product simply because they already
166 know it (Macdonald and Sharp 2000). For WWF-US, we investigated the difference between
167 mammals and other taxonomic groups. We used this typology because mammals are the
168 taxa most commonly associated with human preference and flagship roles (Martin-Lopez et
169 al. 2008).

170

171 Data on body mass in grams were collected from the PanTHERIA database (Jones et al.
172 2009), peer-reviewed literature (Briggs 2008; Herman 1988) and scientific online databases
173 (Myers et al. 2013; Palomares and Pauly 2013). For species with no available data (n=6 for
174 the WWF-US dataset; n=16 for the EDGE dataset) we used the median for the genus or
175 family (when the genus was monotypic). Following a previous study (Smith et al. 2012) the
176 data were log transformed. We collected data on conservation status from the International
177 Union for Conservation of Nature (IUCN) Red List (as of 2007) in the case of the EDGE
178 dataset, and from the WWF-US website in the case of the WWF-US dataset, reflecting the
179 information available to the users of each website. This conservation status was coded
180 based on the three groupings used on the two websites (WWF-US: 0 for Near Threatened
181 and Least Concern, 1 for Vulnerable and Endangered, 2 for Critically Endangered and
182 Extinct in the Wild; EDGE: 0 for Vulnerable, 1 for Endangered, 2 for Critically Endangered).
183 Data on whether the species has forward facing-eyes were gathered by the authors through
184 an online survey (n=23) and complemented by the data collected in a previous study (Smith
185 et al. 2012).

186

187 We collected data on species appeal and familiarity through an online survey (Fig. 1) that
188 was posted by WWF International and EDGE on their Facebook pages (WWF-US n = 441;
189 EDGE n = 445). In the survey we used the same photos displayed on the websites of the
190 NGOs, so as to more closely resemble the experience of potential donors. To determine
191 species appeal we asked each respondent to rank 10 randomly selected species from one of
192 the datasets, according to appeal. Here we use appeal to encompass both aesthetic and
193 socioeconomic aspects of nonhuman charisma, which account for both the visual impact and
194 affections triggered by an organism's appearance and the cultural biases that can develop
195 throughout the interaction of humans with a given species (Lorimer (2007). These partial
196 rankings were then reduced to paired comparisons and used to produce an overall ranking
197 based on a standard Bradley-Terry model for paired comparisons fitted to the data using the
198 R package BradleyTerry2 (Turner and Firth 2010). To determine species familiarity we then
199 asked if they had seen any of the 10 previously assigned species, either live, in a
200 documentary or a book. The percentage of respondents that claimed to have seen each
201 species was then calculated. For the species without a photo, or where the photo
202 represented only a part of the animal, we used the median appeal and familiarity value for
203 the species of the same family. Lastly, for WWF-US we investigated the difference between
204 mammals and other taxonomic groups by using the IUCN Red List taxonomy to code 0 for
205 non-mammal and 1 for mammal.

206

207 In terms of marketing characteristics, the WWF-US and EDGE flagship campaigns shared
208 two aspects: distinctiveness and online information. We measured distinctiveness because
209 marketing theory suggests campaigns based on similar species may target similar audience
210 groups and thus compete for public attention (see Weinberg and Ritchie 1999). We
211 measured this as the number of species in the same taxonomic Family for a given flagship
212 based on the taxonomic standards used by the IUCN Red List. We measured the amount of
213 online information about each species because this could influence the preferences of

214 donors visiting the website, although previous work has shown that donors respond more to
215 visual cues than written content (Perrine and Heather 2000). This online information, other
216 than that found on the standardised flagship pages, was located on different pages
217 throughout the WWF-US and EDGE websites and we were unable to measure whether each
218 donor had found each of the relevant pages. Instead, we measured the number of pages on
219 the NGOs' websites mentioning the species name, using this as a proxy for the probability of
220 a donor reading the relevant information. For the EDGE dataset, we conducted Google
221 searches for the species common name while restricting the search to the EDGE Internet
222 domain and to 2008. For the WWF-US dataset, we conducted Google searches for the
223 species common name while restricting the search to the WWF-US Internet domain and to
224 the period 2007 to 2011.

225

226 Furthermore, we considered four campaign-specific marketing characteristics on the different
227 websites. For the WWF-US dataset site there was alphabetic order, as people could order
228 the species by their common name and might be more likely to look at species at the top of
229 the page (Colléony et al. 2016; Huck and Rasul 2007); this information was obtained from
230 the WWF-US website. For the EDGE dataset there were three campaign characteristics:
231 webpage order, as people were more likely to look at species that were higher up on the
232 page (Huck and Rasul 2007); focal species, as these species were often featured separately
233 on the EDGE website and received more press coverage; and conservation attention, as the
234 public might be more interested in supporting the conservation of neglected species (Sitas et
235 al. 2009). Webpage order was based on EDGE score, which is partly based on conservation
236 status, but there was no correlation between species conservation status and order on the
237 webpage, so we decided to use both in the analysis. Thus, for webpage order we recorded
238 the position of each species on the EDGE website. For EDGE Focal species we identified
239 the 10 species that were selected by the EDGE programme staff at project inception and
240 were used in 2008. Conservation attention was based on the information given on the EDGE

241 website about whether the species was the target of existing conservation efforts, which was
242 coded as 0 for “None”, 1 for “Limited” and 2 for “Active”).

243

244 **2.2 Statistical Analysis**

245 For the WWF-US data, the number of species available for adoption increased over the
246 study period, from 80 in 2007/08 to 102 in 2010/11, so we standardised the yearly rank of
247 each species, calculated their mean average rank and inverted the values to make
248 interpretation of the results more intuitive. For the EDGE data, we applied a square root to
249 the variable describing the number of clicks of the “Support EDGE” button on the online
250 profile of different species to normalise variance. The Blunt-eared Bat *Tomopeas ravidus* was
251 excluded due to lack of data on its appearance and natural history, which were needed in
252 later analysis.

253

254 We analysed the WWF-US and EDGE data separately. All variables were initially checked
255 graphically for heterogeneity of variance, residual normality and influential data points. We
256 then used the R packages AED and car to assess, respectively, collinearity and the impact of
257 potential outliers (Zuur et al. 2010). We found that collinearity between variables was
258 negligible, with all variable inflation factors being smaller than 4. We found that individually
259 excluding the outlier points considered to be statistically influential did not change the
260 interpretation of the results.

261

262 We used the R package MuMIn to model the probability of a species eliciting a donation
263 using linear regression with multimodel inference (Burnham and Anderson 2002). We
264 considered candidate models comprising of all subsets of variables and ranked these by
265 Akaike’s information criterion corrected for small sample size (AICc) (Burnham and Anderson
266 2002). We then selected models within 2 AICc units of the lowest AICc value and calculated
267 model-averaged parameter estimates (Burnham and Anderson 2002). We also calculated

268 the overall measures of fit and the relative importance of each variable within the averaged
269 model by summing Akaike weights (w_i) of those models within 2 AICc units of the lowest
270 AICc value. We identified those variables for which the model-averaged 95% confidence
271 intervals did not include zero and which had an Akaike weight of at least 0.7 as being
272 “strongly” supported by the model (Gray et al. 2009).

273
274 Lastly, we used the R package MuMIn to predict, based on the averaged EDGE model
275 (Table 2), the impact of improving marketing effort for the 10 EDGE species with the highest
276 and the lowest appeal scores, which we obtained through the online survey conducted to
277 measure species appeal and familiarity. We did this in stages by modelling the likelihood of
278 each species in the highest and lowest appeal groups eliciting interest from potential donors
279 based on: (i) “No Marketing”, where the species was not given any additional marketing
280 boost; (ii) “Focus”, where the species was featured as an EDGE Focus species; (iii) “Focus +
281 Order”, where the species was featured as an EDGE Focus species and also shown on the
282 first webpage.

283

284 **3 Results**

285 **3.1 Donations to WWF-US**

286 The three most commonly adopted species were the polar bear (*Ursus maritimus*), tiger
287 (*Panthera tigris*) and grey wolf (*Canis lupus*), while the three least adopted species were the
288 mandrill (*Mandrillus sphinx*), pileated woodpecker (*Dryocopus pileatus*) and bighorned sheep
289 (*Ovis canadensis*). Donation rank for each species was best explained by species appeal,
290 whether a species was a mammal or not, and conservation status, with appealing,
291 threatened non-mammals receiving the most donations (Table 1). The model had moderate
292 explanatory power ($R^2 = 0.28$).

293

294 **3.2 Donations to EDGE**

295 The three species that received the most interest from potential donors were the baiji
296 (*Lipotes vexillifer*), long-eared jerboa (*Euchoreutes naso*) and red slender loris (*Loris*
297 *tardigradus*), while there were twelve species that received no interest, all of which were
298 rodents, insectivores and bats. Interest was best explained by species appeal, the order in
299 which the species appeared on the webpage and whether it was an EDGE focal species:
300 with greater interest in appealing and EDGE focal species that appeared on the initial web
301 pages (Table 2). The model had strong explanatory power ($R^2 = 0.64$).

302
303 In terms of understanding the impact of marketing, the EDGE model predicted that increased
304 marketing effort had a positive impact on interest received by both the most and the least
305 appealing species. Although the most appealing species were always expected to have more
306 potential donors than their least appealing counterparts under the same marketing
307 conditions, unappealing species could attract on average 60% more potential donors than an
308 appealing species if supported by a greater marketing effort (Fig. 2). This increase would be
309 achieved by turning the least appealing species into focal species, which we estimate would
310 increase the number of potential donors to those species by a factor of 15, and by also
311 placing them on the first web page, would increase the same number nearly 26 times.

312

313 **4 Discussion**

314 The number of people donating to charity via the Internet is increasing rapidly (Hart 2002;
315 Waters 2007). This has implications for how conservation marketing campaigns are
316 conducted but also creates new research opportunities, by providing inexpensive and
317 accessible data. In particular, it can provide data on donation behaviour, which can differ
318 considerably from the donor attitudes measured in previous studies (Martin-Lopez et al.
319 2008) and thus allow for a more effective tailoring of fundraising appeals (Sargeant 1999;

320 Wenham et al. 2003). In this study, we pioneer the use of behavioural data to understand the
321 factors influencing flagship species campaign success and then model the potential impacts
322 of increasing marketing effort on interest from potential donors. Such an approach brings
323 challenges, as the data were collected to fulfil the needs of the respective NGOs rather than
324 for our later analysis, but it also helped ensure the relevance of the research. Developing
325 such campaigns will always be organisation and context specific, but our results provide
326 general insights on the important factors that drive donor behaviour.

327

328 Understanding the importance of the different species traits involves recognizing that the two
329 campaigns use flagships in different ways: WWF-US uses flagship species as the
330 recognisable face for a broad range of conservation projects, while EDGE raises money
331 specifically for each flagship species. This probably explains why only one trait was shared
332 by the two models and this was species appeal, which is well known for driving donor
333 preferences (Martin-Lopez et al. 2008; Veríssimo et al. 2014; Veríssimo et al. 2009).

334 Conservation status was only important for predicting WWF-US donation behaviour, and this
335 may be because their flagships have a range of threat statuses. In contrast, all the EDGE
336 species are classified as threatened in the IUCN Red List and donors did not seem to
337 distinguish between whether they were Vulnerable, Endangered or Critically Endangered
338 (Smith et al. 2012). The WWF-US flagships also came from a wider range of taxonomic
339 groups, which allowed us to investigate the importance of that trait. We found taxonomic
340 group was important but the pattern was the opposite of what we expected from the literature
341 (Martin-Lopez et al. 2008), with the 23% of non-mammal flagship species being more
342 popular with donors. This was despite some mammals ranking amongst the species that
343 received the most donations and may have been partly because of the type of non-mammal
344 used, which included charismatic species such as marine turtles, whale sharks and
345 hummingbirds. This suggests that choice of broad taxonomic group (e.g., at the class level)
346 is less important, as long as the traits of the species are appealing to potential donors. We

347 thus find support for our first hypothesis, that species-specific traits have impact in a species
348 fundraising performance.

349
350 Potentially more surprising was the two factors that were not important for explaining
351 donation behaviour in either campaign. The first of these was familiarity, which is in contrast
352 to marketing studies that show that consumers generally prefer well-known brands (Hoyer
353 and Brown 1990; Macdonald and Sharp 2000). This difference might be because marketing
354 studies generally focus on scenarios where consumers must choose between similar
355 products with little additional information provided (Hoyer and Brown 1990; Macdonald and
356 Sharp 2000). In contrast, both WWF-US and EDGE provide standardised information about
357 the behaviour, conservation and ecology of each species as part of the flagship campaign,
358 although the fact that information about each species on the website was also not important
359 for explaining donation behaviour suggests it is not sufficient to provide such details
360 elsewhere on the website. In addition, for the EDGE campaign which includes less well-
361 known species, it could be that donors trusted the NGO to only highlight important species
362 and so were willing to fund species they had not encountered before (Smith et al. 2010).

363
364 The second unimportant factor was body mass, which contradicts findings from previous
365 studies (Clucas et al. 2008; Smith et al. 2012). For the WWF-US campaign, this was possibly
366 because the flagship species are generally large and so the variation of body mass values
367 was too narrow to identify significant differences. For the EDGE species it might be the
368 nature of the campaign that was important, as it was framed around the “weirdness” of each
369 flagship and this might have attracted donors who were less interested in traditional larger-
370 bodied flagship species.

371
372 None of the marketing characteristics were important for explaining the WWF-US donation
373 behaviour. This was probably because many of these species are used in a number of other

374 NGO campaigns, making it difficult to detect the influence of the WWF-US marketing effort.
375 In contrast, marketing characteristics were crucial in the EDGE results, and the most
376 important factor was whether a flagship was one of their ten focal species. The order of the
377 species on the EDGE website was also important, as visitors browsing through the ten
378 webpages containing the species profiles would commonly encounter those species on page
379 one first. This result is supported by the literature on charity fundraising which shows that the
380 first options presented are commonly preferred (Buda and Zhang 2000). We thus find
381 support for our second hypothesis that the marketing context has impact in a species
382 fundraising performance, only for EDGE.

383

384 Given all the above, EDGE and WWF-US could maximise the fundraising potential of their
385 online campaigns by adopting some new strategies. WWF-US would probably attract more
386 donors by increasing the number of appealing and threatened non-mammal species, while
387 removing mammal species that are attracting few donations (such as big-horned sheep).
388 EDGE could probably increase their fundraising revenue by redesigning their website so that
389 it was easier to see more species on each page and by increasing the number of appealing
390 species in their focal list. However, the increase in species number may lead to a decrease in
391 the attention received by each, unless the additional species were able to attract new
392 audience groups. These trade-offs should be considered in the context of the organisations'
393 conservation goals, which need to balance conservation priorities with fundraising potential
394 (Veríssimo et al, 2011).

395

396 Producing the EDGE model also let us investigate how changing the marketing effort for
397 EDGE species might impact donation behaviour. We found that if EDGE selected their ten
398 most appealing species as focal species then this could more than triple the number of
399 people willing to donate to those species, while also placing the most appealing species on
400 the first web page would quadruple this number. We found a similar pattern with the ten least

401 appealing species, although the change was even more pronounced. Thus, making them
402 focal species and also placing them on the first web page would increase the number of
403 people willing to donate to those species by nearly 26 times. However, achieving these large
404 relative increases in one group would require the recruitment of new donors, as previous
405 studies on online charitable giving show there is a somewhat fixed pool of resources to be
406 allocated by donors (Meer 2014). This expansion of the donor pool could be achieved by
407 increasing the overall marketing effort or by focusing on less mainstream species with the
408 potential to attract new donors. These donor groups are likely to be comparatively small but
409 as they remain largely untapped by conservation NGOs, donations could be larger.

410

411 There are two key results to stress from this model. The first is that the most appealing
412 species are always more popular with donors when marketing effort is similar, which justifies
413 traditional approaches for selecting flagships to raise funds for broad conservation projects.
414 The second is that marketing could make a large difference to donation behaviour, for both
415 the most and least appealing species, although this effect is more pronounced for the least
416 appealing species. Thus, a least appealing species that is marketed in the two ways could
417 substantially outperform an appealing species without these marketing boosts in terms of
418 number of donors attracted. Thus, we find partial support for our third hypothesis on the
419 ability of least appealing species to rival more appealing species through improved
420 marketing, as this is only true when the gap in marketing effort between the two groups is
421 very substantial.

422

423 Scientists working with species other than large mammals and birds often blame donors'
424 obsession with charismatic megafauna for the lack of funding for their study subjects.
425 Similarly, these groups of people traditionally view marketing as undesirable or overly
426 expensive (Andreasen and Kotler 2003; Kotler 1979; Wenham et al. 2003). However, our
427 results show marketing can have an important impact on fundraising potential and suggests

428 there is much scope for raising funds and support for currently neglected species. This would
429 give NGOs the flexibility to allocate funding based on criteria such as threat and cost-
430 effectiveness, rather than on aesthetic factors, thus increasing investment in the species that
431 would benefit most (Metrick and Weitzman 1996; Richardson and Loomis 2009). This would
432 directly help campaigns that fundraise for specific species, which are the most common
433 campaign type used by international conservation NGOs (Smith et al. 2010).

434

435 This increased focus on marketing is particularly important at a time when biodiversity
436 conservation efforts continue to be underfunded (Hein et al. 2013; McNeely and Weatherly
437 1996; Waldron et al. 2013) and conservation needs to expand its donor base beyond the
438 traditional western target audiences to the newly emerging economies (McNeely and
439 Weatherly 1996). This increase in marketing effort will require more investment in research,
440 so conservationists can better understand the values, preferences and social norms of new
441 audiences, a key process for implementing marketing efforts. Conservation scientists and
442 ecologists could play a major role in the development of this biodiversity marketing, as
443 conservation NGOs are understandably reluctant to publish research that forms part of their
444 marketing strategy. Thus, by conducting research on marketing and making their findings
445 publicly available, scientists could help broaden support for biodiversity and help practitioners
446 improve the effectiveness of their conservation marketing campaigns (Bennett et al. 2015).

447

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451

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583

584

Start the survey...

STEP 1

Rank the pictures below from most appealing(1) to least appealing(10)
Click the left mouse button to drag each image to right position
Please note that drawings and photographs may not be to scale.

1 (most appealing)

2

3

4

5



6

7

8

9

10 (least appealing)

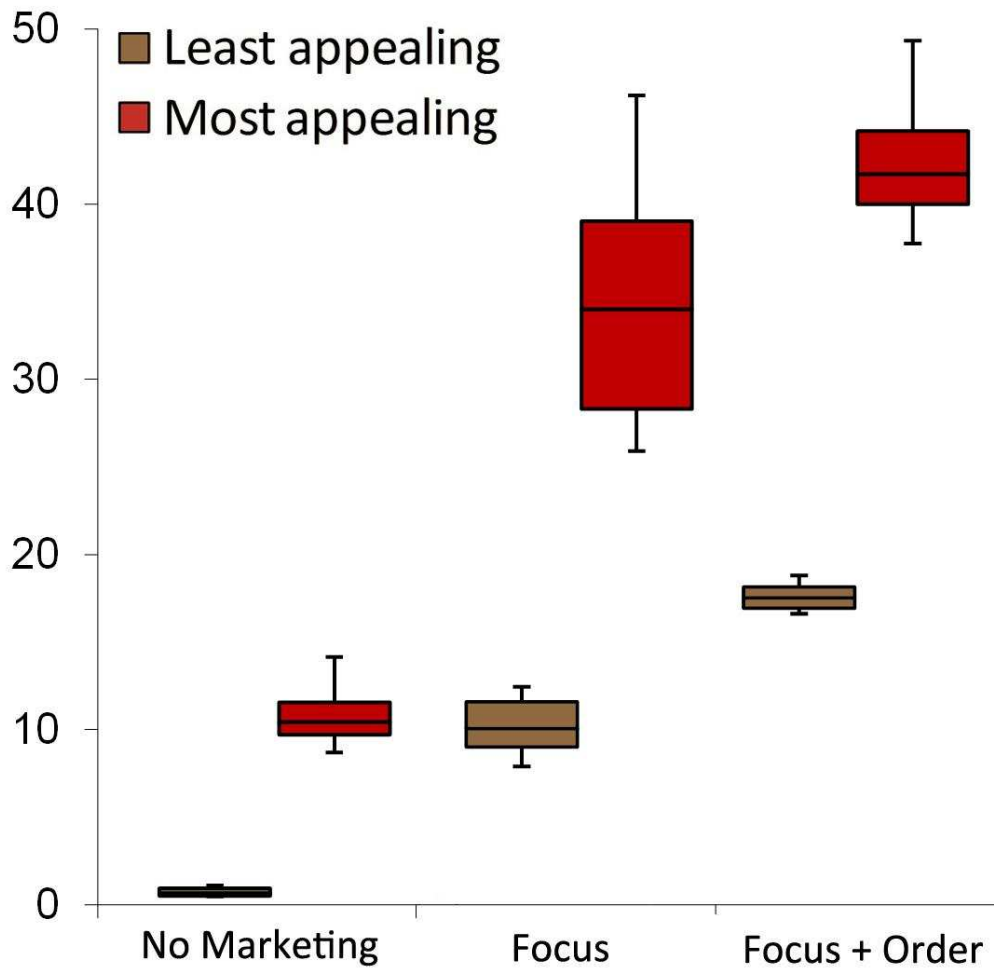
NEXT
QUESTION

585

586 Figure 1 – Layout of the survey used to determine species appeal and familiarity. Each
587 respondent was asked to order 10 species assigned randomly by dragging and dropping the
588 photos in their corresponding places. Respondents were then asked to rate each species in
589 the rank by indicating if they had seen it before either live or through documentaries,
590 museums or books.

591

592



593

594

595 Figure 2 – Boxplots of the modelled impact of improving different aspects of a species
 596 marketing strategy on the likelihood of eliciting a donation. The solid line inside the box
 597 represents the median of the data for the 10 most and least appealing species, the bottom
 598 and top of the box represent, respectively, the 1st quartile and 3rd quartile of the data, and
 599 the individuals error bars are the minimum and maximum. Interest in donating was measured
 600 by the number of clicks of the “Support EDGE” button on the online profile of different
 601 species in the EDGE of existence programme Top 100 mammals.

602

603

604

605 Table 1 - Model-averaged estimates for coefficients (β) and standard errors (SE) for WWF-US online species adoptions. Variables are
606 ranked by the sum of Akaike weights (W_i) of all the candidate models containing that variable.

607

Variable	β	SE	Lower 95% CI	Upper 95% CI	Akaike weight
Appeal	0.679	0.162	0.361	0.997	1
Mammal	-0.531	0.217	-0.957	-0.106	1
Threat status	0.374	0.134	0.112	0.637	1
Information	0.274	0.231	-0.179	0.726	0.33
Alphabetic Order	-0.053	0.088	-0.224	0.119	0.19

608

609

610

611 Table 2 - Model-averaged estimates variables of coefficients (β) and standard errors (SE) for species traits **eliciting online donations** to the
612 EDGE of Existence programme. Variables are ranked by the sum of Akaike weights (W_i) of all the candidate models containing that
613 variable.

614

Variable	β	SE	Lower 95% CI	Upper 95% CI	Akaike weight
Appeal	0.842	0.188	0.474	1.21	1
Focal	2.605	0.376	1.87	3.343	1
Webpage Order	-0.016	0.004	-0.024	-0.008	1
Familiarity	-0.921	0.575	-2.048	0.206	0.6
Distinctiveness	-0.079	0.07	-0.217	0.059	0.26
Threat status	-0.169	0.19	-0.541	0.202	0.21
Conservation attention	0.165	0.189	-0.206	0.536	0.11

615

616