

Extinct flagships: linking extinct and threatened species

PETER M. KYNE and VANESSA M. ADAMS

Abstract Despite much effort to promote the conservation and recovery of threatened species, the extent of the current list of threatened vertebrates (> 7,600 species) underscores the need to develop novel communication and marketing tools to raise awareness and funding for their conservation. Although flagship species have been widely used in conservation marketing, the flagship role of extinct species has been largely overlooked and the status of lost species is rarely associated with the status of extant species facing a high risk of extinction. Some extinct species (e.g. the dodo *Raphus cucullatus* and the thylacine *Thylacinus cynocephalus*) are cultural and commercial icons and therefore familiar, and may appeal to the public as conservation flagships. We propose a wider use of extinct flagships to raise awareness for the conservation of threatened species by making a direct link between already extinct species and extant species at risk of extinction. We present examples of publicly recognized and iconic extinct species that could be used in marketing for the conservation of threatened species. These extinct species are familiar and may be readily linked to threatened species or species groups. We outline a roadmap for testing their appeal under the extinct flagship concept, through market research. If research identifies that a cognitive link is made between the fate of an extinct species (i.e. they went extinct from human causes) and what may happen to threatened species (i.e. they are at risk of extinction from human causes), extinct species may well have a wider role to play as conservation flagships.

Keywords Conservation funding, dodo, extinction, flagship species, passenger pigeon, threatened species, thylacine

Introduction

The rate of biodiversity loss is 100–1,000 times greater than estimated pre-industrial rates and exceeds planetary boundaries for biosphere integrity (Rockström et al., 2009). Since 1500 there have been 338 recorded extinctions of vertebrate species, and a further 16 species exist only in captivity (IUCN, 2014b). On the IUCN Red List of Threatened Species, 7,678 species are categorized as

Critically Endangered, Endangered or Vulnerable (IUCN, 2014b). Despite the expansion of our ecological understanding and knowledge, the number of threatened species continues to increase (Hoffmann et al., 2010).

There has been much effort worldwide to promote conservation of threatened species, including the effective use of flagship species to raise awareness and funds (Veríssimo et al., 2011a; Jepson & Barua, 2015). A flagship species is 'used as the focus of a broader conservation marketing campaign based on its possession of one or more traits that appeal to the target audience' (Veríssimo et al., 2011a). Flagship species have high public appeal and can invoke an emotive response in the public that can result in positive outcomes for biodiversity (e.g. awareness gained, funds raised; Smith et al., 2010; Jepson & Barua, 2015). One criticism of flagship species, however, is that the money raised is often tied to a particular species and is unlikely to benefit other threatened species (Joseph et al., 2011). Thus, other approaches, such as flagship projects or flagship fleets, have been proposed (Joseph et al., 2011; Veríssimo et al., 2011b, 2014), shifting the focus from individual species.

Some extinct species may be appropriate flagship species given their iconic status in popular culture. Here we outline the concept of the extinct flagship, in particular using publicly-familiar and valued (appealing) extinct species for conservation awareness, education and fund-raising. The concept recognizes the fate of lost species but explicitly links the past to the present (and the future); there may not be an opportunity to recover an extinct species but there are opportunities to recover threatened species if action is taken now.

Extinct species have been used previously in conservation marketing to raise general awareness of conservation issues. Durrell Wildlife Conservation Trust, for example, uses the dodo *Raphus cucullatus* as its logo to champion its mission 'to save species from extinction, especially those under threat and overlooked' (Durrell Wildlife Conservation Trust, undated). Similarly, Project Passenger Pigeon (2012) used the 100th anniversary of the extinction of the passenger pigeon *Ectopistes migratorius* to raise awareness of human-caused extinctions, and the passenger pigeon has been described as 'an excellent tool for conservation education' (Blockstein & Evans, 2014). However, extinct species have not been used in a formal flagship model to draw an explicit link between extinct and threatened species for targeted marketing purposes.

Conservationists have been criticized for negative messages and approaches to marketing conservation (Vasi &

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Macy, 2003; Weinstein et al., 2015). With this in mind, extinct flagship species are at the interface between negative and positive messages and marketing. On the one hand, an extinct species highlights loss and touches on emotions of guilt and sorrow. Conversely, it also inspires action ('we can't let this happen again'), with a focus on opportunities to recover or save extant species that are threatened with extinction. Rather than simply connecting extinction with broad conservation messages, as has typically been done in conservation marketing, we argue that an explicit link is needed to make extinct flagships more effective. We argue that a clear link between a single extinct species and a directly related threatened species or species group would provide a more systematic use of extinct flagships. Linking the possibly intimidating message of extinction to a call for action (including indicating how to make a difference for current threatened species) draws on evidence that combining fear with an appeal to act is an effective communication tool if the audience feels able to effect change (Rogers & Mewborn, 1976; Vasi & Macy, 2003; Weinstein et al., 2015). We use a simple method to identify possible extinct flagships, and discuss the marketing research required to assess the utility of the extinct flagship concept, with the general public as the target audience.

Identifying candidate extinct flagships

The use of extinct species in marketing conservation is not a new concept. However, and somewhat surprisingly, the use of extinct species in direct marketing of conservation projects for threatened species is not widespread. The obvious, but underutilized, link is to connect extinction with threat of extinction within the flagship species framework. The link between extinction and threatened status is made directly and the conservation message of extinct flagships is clear: we must act now to prevent other threatened species from going extinct.

Extinct flagships present an innovative solution to the issue of funds being tied to the conservation of particular threatened species; the funds raised under an extinct flagship are not tied to the conservation of that species, as it is already extinct. Funds could be spent optimally across related taxa or geographical regions, thus maximizing gains for the conservation of threatened species (Bennett et al., 2015). It has been recognized that flagships can decrease the attractiveness of non-flagship species (Douglas & Winkel, 2014) but this can be circumvented with the use of extinct species, which cannot be valued more highly than extant fauna as they no longer exist.

Not all extinct species are suitable flagship species, and here we propose three central traits of extinct flagships: (1) public familiarity, or the potential to increase familiarity through marketing; (2) a link to threatened fauna, either

TABLE 1 Relevant questions to inform the selection of extinct flagship species.

Is the extinct species familiar, or has it the potential to become familiar?
Can the extinct species be linked taxonomically to the species or group of species of conservation concern? (In all cases such a link should be tenable.)
Can the extinct species be linked geographically to the species or group of species of conservation concern? In particular cases, extinct flagships can be champions of global conservation needs (e.g. Steller's sea cow <i>Hydrodamalis gigas</i> as a champion for sirenians).
Does the extinct species have public appeal as a marketable flagship species? (This question should be answered by researching the targeted audience.)
Are the causes of extinction related to the threats facing an extant species? (This may not be essential.)
Can the extinct species be used to highlight threatening processes relevant to the threatened species?
What have we learnt from the extinct species that can be applied to the conservation and management needs of the threatened species?
Can the extinct species and target group of species fit within a flagship species selection framework (e.g. Verissimo et al., 2011a)?

taxonomically or geographically (or both); and (3) appeal (Jepson & Barua, 2015). A series of additional relevant questions can be asked in relation to candidate species (Table 1), including fitting the extinct species and target group of threatened species within existing selection frameworks for flagship species (e.g. Verissimo et al., 2011a).

As a starting point to the discussion of extinct flagships we identified potential candidates based on trait 1, public familiarity, using a simple quantitative internet search method. We conducted an image search for 'extinct species' on Google Australia (Google Inc., Mountain View, USA), and tabulated the frequency of hits by species for the first 200 images. Extinct species were restricted to those that have gone extinct since 1500 AD (following IUCN Red List guidelines; IUCN Standards and Petitions Subcommittee, 2013). We calculated a Familiarity Index as the number of species-specific hits divided by the total number of hits for all species.

Extinct flagship candidates identified by their Familiarity Index, with examples of conservation campaigns that they could champion, are listed in Table 2. This list is intended to be illustrative and to demonstrate the clear links that can be made between extinct species (the flagship) and extant species (the threatened fauna). Based on the Familiarity Index we identified the dodo (high international profile), the thylacine *Thylacinus cynocephalus* (high national profile in Australia) and the passenger pigeon (2014 marked 100 years since the death of the last known individual) as the most familiar recently extinct species. We use these as examples of extinct flagships, focusing on two traits that could be leveraged for funding: current familiarity and a link to threatened

TABLE 2 The top 8 candidate extinct flagship species, based on their Familiarity Index, and linked groups of threatened species in need of conservation action.

Extinct flagship	Linked conservation campaign (No. of extant threatened species) ¹	Familiarity Index ²
Dodo <i>Raphus cucullatus</i>	Mauritius' bird fauna (7) or threatened island endemic birds more broadly	0.301
Thylacine <i>Thylacinus cynocephalus</i>	Australia's terrestrial mammal fauna (52)	0.260
Passenger pigeon <i>Ectopistes migratorius</i>	North America's land bird fauna (25)	0.137
Pinta Island tortoise <i>Chelonoidis nigra abingdoni</i> ³	Global amphibians (1,957)	0.110
Baiji (Yangtze River dolphin) <i>Lipotes vexillifer</i>	River dolphins or threatened cetaceans more broadly (or Asian rivers as an example of a landscape-scale application)	0.055
Steller's sea cow <i>Hydrodamalis gigas</i>	Global sirenians (4)	0.055
Caribbean monk seal <i>Monachus tropicalis</i>	Global pinnipeds (9)	0.041
Great auk <i>Pinguinus impennis</i>	Global alcids (5) or threatened seabirds more broadly	0.041

¹Numbers of extant threatened species calculated from IUCN (2014a)

²Based on quantitative internet search for images (see main text for further details)

³Subspecies of Galapagos tortoise *Chelonoides nigra*

species. We identified the links to threatened species based on taxonomy and geography (Table 2). However, we would need to test their psychological impacts and behavioural outcomes among the target audience.

The dodo's familiarity

The dodo is one of the most famous birds, living or extinct, and has been described as 'a leading contender as the 'icon' of extinction' (Hume, 2006). It is estimated to have gone extinct during the late 17th century (Roberts & Solow, 2003; Hume, 2006), as a result of direct harvesting by people and the introduction of exotic animals to its Western Indian Ocean island home of Mauritius, where it was endemic (Hume, 2006).

Although long extinct, the dodo is ubiquitous in Mauritius. It features as the background of the country's immigration form, the watermark of the local currency, a figure in the country's coat of arms, and a local carnival mascot (Plate 1a). It would seem that its extinction promotes its legendary status and iconic value.

Despite the dodo's celebrity status we argue that the link between the past (extinct species) and the present (threatened species) could be used more explicitly to leverage conservation action for Mauritius, which along with the adjacent island of Rodrigues has a disproportionately high record of avian extinction. Of 34 native terrestrial birds, 19 are extinct, accounting for 13.6% of known extinct bird species globally, and seven are threatened with extinction (Fig. 1). The status of the Critically Endangered Mauritius olive white-eye *Zosterops chloronothus* (Plate 1c), for example, a small, drab songbird, is largely unknown to the general public. However, it is only one step removed from the dodo as it faces an extremely high risk of extinction.

Some of Mauritius' endemic species, for example the Mauritius kestrel *Falco punctatus* and pink pigeon *Nesoenas mayeri*, remain in existence only as a result of dedicated efforts to conserve them. They are conservation success stories (e.g. Jones et al., 1995) but these species are not recognized by the public in the way that the dodo is. Although one could argue that they are effective ambassadors for the country's threatened birds, they are not as widely known or appreciated as the dodo. Individually, resourcing the conservation of the Mauritius olive white-eye or the Endangered Mauritius fody *Foudia rubra* is likely to be a hard sell to members of the public. The government and NGOs could market these species and the other threatened birds of Mauritius as a package centred around the island's high rate of extinction, with the dodo as the flagship, to encourage a public sense of responsibility (regardless of when extinction occurred) and a sense of ownership of currently threatened species, which is valuable for leveraging funds and action. The dodo therefore presents an opportunity to create a targeted marketing message that there is a conservation crisis in Mauritius and that without sustained action a further seven native birds in Mauritius are likely to go the way of the dodo. Although the Durrell Wildlife Conservation Trust uses the emblem of the dodo in much of its work in Mauritius to remind us of the need for conservation action, it also uses the logo more broadly to champion the Trust's mission to save species from extinction. This use of the same logo for both targeted and mass marketing may dilute the message of the Mauritius conservation crisis. A targeted use of the dodo as an extinct flagship would require it to be used directly to communicate the conservation needs of threatened birds in Mauritius, rather than threatened species more broadly.



PLATE 1 Images of (a) the dodo *Raphus cucullatus* and (b) the thylacine *Thylacinus cynocephalus* used in commercial advertising; (c) the Mauritius olive white-eye *Zosterops chloronothus* and (d) the central rock-rat *Zyzomys pedunculatus*, both of which are Critically Endangered. (c) and (d) are poorly known and have less marketability as flagship species, but can be directly linked to (a) and (b), respectively, which have high conservation marketability. Photographs: Peter Kyne (a,b,c), Patrick Hodgens (d).

The thylacine's appeal

The thylacine, or Tasmanian tiger, was a dog-like carnivorous marsupial that originally occupied mainland Australia and the island state of Tasmania to the south. Its extinction on the mainland is linked to the arrival of a morphologically convergent predator, the dingo *Canis lupus dingo*, some 3,500 years ago (Fillios et al., 2012; Letnic et al., 2012); the isolated Tasmanian population remained extant until more recently given the absence of dingoes from the island. Its demise in Tasmania is attributed to direct persecution by people, as well as disease; the last known thylacine died in captivity in 1936 (Paddle, 2000, 2012). The species remains a regular subject of reported 'sightings' (e.g. Heberle, 2004) but there is no scientific evidence to support anything but its extinction. The thylacine has not been embraced widely for conservation messaging, as the continuing quest to rediscover it (Turner, 2009) distracts from accepting its status (extinction) and marketing its loss for the protection of extant threatened species.

The thylacine has been described as a 'potent cultural icon', 'functioning in effect as Tasmania's brand logo' (Turner, 2009). Depictions of the thylacine can be found across the state, including on vehicle number plates and as a logo for one of the state's largest breweries (Plate 1b). Like the dodo, the thylacine exemplifies a tendency to value a species because it is extinct, and a failing to link past extinction and current conservation status.

The thylacine is one of 21 Australian mammals declared extinct since European settlement. Australia has the highest rate of mammalian extinction of any continent, accounting

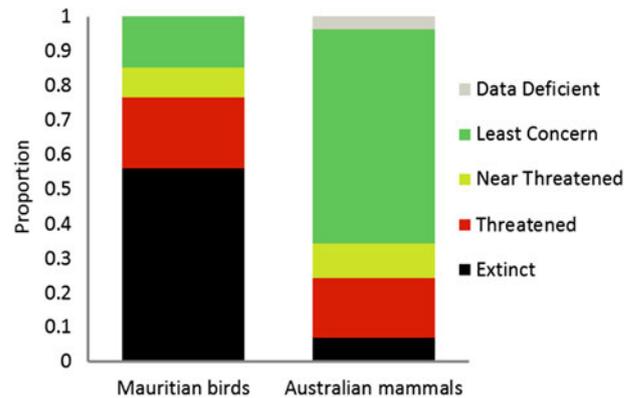


FIG. 1 IUCN Red List status (IUCN, 2014a) for Mauritian land birds ($n = 34$) and Australian land mammals ($n = 301$). EX, Extinct: 'there is no reasonable doubt that the last individual has died'; Threatened (encompassing CR, Critically Endangered: a species 'facing an extremely high risk of extinction in the wild'; EN, Endangered: a species 'facing a very high risk of extinction in the wild'; and VU, Vulnerable: a species 'facing a high risk of extinction in the wild'); NT, Near Threatened: 'does not qualify for CR, EN or VU now, but is close to qualifying for or is likely to qualify for a threatened category in the near future'; LC, Least Concern: 'does not qualify for CR, EN, VU or NT'; DD, Data Deficient: 'there is inadequate information to make a direct or indirect assessment of its risk of extinction' (IUCN, 2012).

for c. 27% of the global total of extinct mammal species (Johnson, 2006). The extant mammalian fauna are not faring well: 52 species (18.5%) are threatened with extinction (IUCN, 2014a; Fig. 1). Although a few of these have a high public profile, in particular the Tasmanian devil *Sarcophilus harrisii* and the bilby *Macrotis lagotis*, many more are not publicly recognized or charismatic (e.g. the lesser stick-nest rat *Leporillus apicalis* and the central rock-rat *Zyzomys pedunculatus*; Plate 1d).

Attempting to expand the public's understanding of, and familiarity with, an extant species such as the Tasmanian devil to include lesser known threatened species may be problematic given that marketing a single extant species can tie funds to that species only, and the recovery of that species may be seen as an end-point in the conservation campaign (i.e. it does not represent the fate of the whole community of threatened species; Joseph et al., 2011). The thylacine, however, was a unique species and has a high level of cultural and societal appeal, as demonstrated by its existing commercial use. It is a prime example of how an appealing extinct species can be linked explicitly to a group of threatened species and, in this case, the need to act to conserve Australia's threatened mammals.

The passenger pigeon's marketability

The passenger pigeon was once one of North America's most abundant birds but the last known individual,

Martha, died in the Cincinnati Zoo in 1914. The extinction of the passenger pigeon is attributed to a combination of human exploitation (e.g. reduction of suitable forest habitat and over-hunting; Halliday, 1980) and population fluctuations in response to climatic, food-resource and other ecological variations (Hung et al., 2014).

The marketability of the passenger pigeon received a boost with the wide publicity marking the centennial of its extinction, in September 2014. Project Passenger Pigeon used the 100th anniversary of the extinction 'to raise awareness of current issues related to human-caused extinction' and to recognize that 'extinction is ecologically, culturally, and morally relevant to the 21st Century' (Project Passenger Pigeon, 2012). Applying the concept of the passenger pigeon as an extinct flagship would reframe this message to draw direct links between the fate of the passenger pigeon and currently threatened species needing immediate conservation attention.

North America has 25 threatened species of land birds, and this number is likely to increase as populations of aerial insectivores and grassland birds continue to decline (Sauer et al., 2014). Some threatened species have a significant public profile; for example, the Californian condor *Gymnogyps californianus* is a cultural icon (Alagona, 2004). Others, such as the saltmarsh sparrow *Ammodramus caudacutus* and Sprague's pipit *Anthus spragueii*, have a low profile. Linking the passenger pigeon with these low-profile species could leverage marketing and fund-raising to support the management of threatened bird species in North America. Furthermore, the passenger pigeon may not be tied only to the status of North American birds; comparable population collapses have been reported in an abundant and widespread Eurasian songbird, the yellow-breasted bunting *Emberiza aureola* (Kamp et al., 2015).

Discussion: marketing extinction

The dodo, thylacine and passenger pigeon (among other species) are examples of candidate extinct flagships to support the conservation of extant threatened species. The lessons learned from these species may be leveraged to raise funds for action on species that are linked directly to the flagships by taxonomy or geography. Thus money can be raised to prevent extinctions of a clearly defined group of species, such as Mauritian birds or Australian mammals, rather than a single species. Effective flagship species bridge pre-existing frames involving the species with new frames that inform a conservation agenda in relation to a broader political or societal cause (Jepson & Barua, 2015). Extinct flagships may fulfil this criterion by bridging the fate of the extinct species to the required action to avert the loss of currently threatened species, thus informing a conservation agenda directed towards the management of threatened species.

The use of extinct flagships as a novel approach to supporting conservation of extant threatened species would need to be accompanied by carefully designed media and marketing campaigns that target the message appropriately for various segments of the audience. We identify four key research areas for determining whether extinct flagships are an effective approach for conservation marketing of threatened species: (1) Formative research to test the concept of extinct flagships; central to this is testing whether the public identifies a connection between their fate and the conservation status of threatened species. (2) If research confirms that a cognitive link can be established between the fate of extinct species and threatened species, the next step is to understand what emotions messages about extinct flagship species invoke, such as fear, loss or a connection to extant species. This is important to inform the design of further messages, such as coupling threatening messages with appeals for action (Vasi & Macy, 2003). (3) Our simple method of selecting familiar extinct species identified candidate extinct flagships; however, further research is needed to address whether these species have broad public appeal, and the cultural context in which they are embedded. This will address whether they have the potential to gain popularity and drive behavioural change that will result in conservation action for threatened species (Jepson & Barua, 2015). (4) In addition to establishing whether these species have broad public appeal, a stronger understanding of how various segments of the market respond to extinct flagships and associated messages will be critical for targeting messages to maximize conservation outcomes (e.g. Vasi & Macy, 2003; Weinstein et al., 2015). Research on these four areas will help conservation practitioners capitalize on the familiarity of popular extinct species, marketing them as flagship species to drive conservation action to save currently threatened species.

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Biographical sketches

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