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Why is it Important to Use Flagship Species in Community Education? The Koala as a Case Study

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Keywords: *koala, flagship species, umbrella species, Ballarat, management plan, community education, conservation, planning*

1. Introduction

Protecting and conserving species are complex tasks due to the tight budget allocated for conservation management. Our paper uses a case study of the iconic Australian mammal, the koala, to illustrate the flow-on benefits of using a flagship species to spearhead regional conservation and planning as well as community education. After exploring some alternative terminologies for defining iconic species, we proceed to introduce a case study of the koala as part of a community education intervention in the regional Australian city of Ballarat. Finally, we draw out from our case study the significance, some implications and conclusions about using flagship species in community education programs.

With an increasing number of species and ecosystems requiring protection and scarce funding, it is challenging to preserve biodiversity (Simberloff). For preservation purposes, surrogate species have been used by many authors as indicators of environmental changes, and to involve, or simply educate, the community in environmental issues (Caro and O'Doherty; Lambeck; Mittermeier, 'Primate Conservation Priorities in the Neotropical Region'; Rakotomamonjy et al.; Thomas; Lindemeyer et al.). Surrogate species are pragmatically required to attract community and government funding. The importance of these species' role in promoting environmental awareness and knowledge has been highlighted by many authors (Rakotomamonjy et al.; Shumway et al., 'A Mismatch of Community Attitudes and Actions: A Study of Koalas'). For example, lemurs were used to improve children's knowledge about the importance of conservation in Madagascar by highlighting the threats to the survival of this species in forest and marsh areas (Dolins et al.) and golden lion tamarins in zoos play a role in the preservation of natural habitats through research and public education on environmental issues in general (Kleiman et al.).

The context in which surrogate species are used has determined the formulation of different terminologies. The discussion that follows investigates alternative ways of defining these surrogate species, including focal, keystone, indicator or flagship species. 'Focal species' (Lambeck) is a term used to describe animal or plant species with different conservation values; their requirements for survival are important for maintaining healthy ecosystems and 'define the attributes that must be present if that landscape is to meet the requirements of the species that occur there' (Lambeck 851). However, the term focal species is sometimes used interchangeably with other terms with a similar meaning. Caro and O'Doherty suggest that

these terms have been applied loosely and interchangeably, resulting in considerable confusion. Indeed, the various terminologies have different ecological applications, for example, 'keystone species' (Paine, 'A Note on Trophic Complexity and Community Stability') are seen as affecting the integrity and stability of an ecological community through their activities and abundances. The disappearance of a keystone species would affect many other species, and these can include both herbivores and carnivores (Davic, 'Herbivores as Keystone Predators'). The term 'umbrella species' was used by Frankel and Soulé, who suggested that 'measures taken to protect the largest (or rarest) elements in an ecosystem will often provide an umbrella of security for the more dense species' (121). Moreover, by protecting viable populations of umbrella species, other species will benefit (Miller et al.); the Eastern Chimpanzee (*Pan troglodytes schweinfurthii*) is one such species attracting funding which can be used to benefit other species (Plumptre). The use of the term 'indicator species' started in Europe during the 1900s (Cairns and Pratt); these are seen as species that are sensitive to changes in their environment and that are able to be used to monitor habitat quality.

The 'flagship species' concept arose in 1988 when it was introduced in Mittermeier's 'Primate Diversity and the Tropical Forest Case Studies from Brazil and Madagascar and the Importance of the Megadiversity Countries' to indicate that 'some of the world's most spectacular mammals ... are still the best vehicle for conveying the entire issue of conservation to the public' (145). A flagship species 'is generally defined as high profile fascinating species having significant ecological roles with cultural associations' (Dietz et al. 33) and they are 'chosen for their charisma, increase public awareness of conservation issues and rally support for the protection of that species' habitat (Favreau et al. 3951). Miller et al. adds that they also have a wide appeal for education and conservation and (Good et al.) point to their ability to attract financial reward. The flagship concept is based on the idea that by raising the profile of a particular species, more support for biodiversity conservation at large can be generated when there is significant discussion on how to distribute limited funding for species conservation. Mills described flagship species as 'animals that are huge, ferocious, cuddly, cute, or of direct benefit to humans; they are the charismatic animals most likely to make people smile, feel goose-bumps, and write a check for conservation' (245). In fact, the flagship status has been applied especially to large species or megafauna: typically but not exclusively, to dolphins, rhinoceros, whales, elephants, gorillas and tigers (Davic, 'Linking Keystone Species and Functional Groups:

A New Operational Definition of the Keystone Species Concept'; IUCN, 'Flagship Species: How Protecting Rhinos Can Help Other Threatened Wildlife'; Leader-Williams and Dublin; Mittermeier, 'Primate Diversity and the Tropical Forest Case Studies from Brazil and Madagascar and the Importance of the Megadiversity Countries'). Other authors have widened their approach to include the strategic and socio-economic aspects of the flagship concept; for example, species from other taxonomic groups are sometimes used as in the case of Bride et al. who used the axolotl (*Ambystoma mexicanum*). The aim was to demonstrate that flagship species do not always have to be iconic, but may have very strong connections to the historical, cultural and economic importance of local fishermen. Hammerschlag and Austin emphasise the significance that national faunal emblems have to the national identity of many countries; they promote the use of national animal symbols as flagship species as most hold cultural and historical significance, and over half of the world's animal symbols may face future extinction.

Flagship species can represent an environmental feature (such as a species or ecosystem), cause (like climate change or ocean acidification), organisation (such as a non-governmental organisations or government department), or geographic region (such as a state or protected area). For the purposes of illustration, the World Wildlife Fund (WWF) website states that the organisation safeguards hundreds of species around the world by focusing on flagship species such as giant pandas, tigers, endangered whales and dolphins, rhinoceros, elephants, marine turtles and great apes. However, WWF also considers these same species to function as umbrella species, as they are able to attract funding to protect more species in same habitat. Animals have also come to represent a cause, such as the polar bear; images of polar bears in melting ice have become synonymous with climate campaigns (Stirling and Derocher). As a second illustration, the IUCN in 'Species and Climate Change: More Than Just the Polar Bear' has named ten flagship species to head its campaign to highlight the dangers of climate change. Amongst these, there are species of coral, fish, whales, trees, birds and terrestrial mammals including koalas.

Whatever the reasons, the importance of using iconic flagship species like koalas, kiwi and polar bears is evidenced by the community attention that these attract (Krause and Robinson; Hammerschlag and Gallagher). The relative attraction to and public support for Australian mammals over birds and also over other animals has been investigated empirically. In Tisdell, Wilson and Nantha's 2005 study the koala came out on top in terms of likeability.

Comparisons have also been made between the funding and demand for conservation of the charismatic koala and for a critically endangered wombat species (Tisdell and Nantha), suggesting that the koala may have been receiving disproportionate community funding relative to its objective conservation status at that time (2005). Thus these studies confirm that animal attraction and attraction to particularly attractive species can and do lead to broad environmental educational opportunities and larger numbers of donations. If elevated funding can be directed at also conserving non-iconic species, then community funding directed at flagship species can have additional benefits for biodiversity (Bennett et al.). In summary, aside from community likeability, an important characteristic for determining flagship species should also their conservation status, population size being one of the main key determinants (Veríssimo et al.).

1.1 Issues with the Concept of Flagship Species

Simberloff argues that flagship species might not be good surrogates for broader biodiversity or ecosystem protection and community education as they may become extinct. Instead, it would be more advantageous to educate people and fund projects that protect biodiversity. Roberge and Angelstam argue that using flagship species can influence the management and conservation priorities in their favour, but be detrimental to more severely threatened species. The authors also believe that there is a potential for conflict between the management of different flagships species. In line with Simberloff, they argue that in the worst-case scenario of the extinction of a flagship species, the attitudes of conservation stakeholders might be negatively impacted.

White warns of the potential for the single species-based approach to be uneconomic, due to the high costs involved in the conservation of a single species. As examples he highlights the conservation efforts directed at protecting the southern hairy-nosed wombat, which is threatened by destruction of habitat, shooting and poisoning. Conservation planning in South Australia included the purchase of 1215ha of land and the erection of a fence at a considerable expense, with a similar project undertaken in Queensland, to protect a very small population of wombats that were near extinction. These interventions are not only costly (Bode and Wintle), their progression is also slow because of small population numbers. Moreover their long-term success is often under a cloud because of ongoing pressures on individual animals and their

habitat (Wolvekamp et al.), and very little is achieved for the conservation of other species or for broader area conservation (Murdoch et al.).

In the case of ecotourism, for example, Di Minin et al.'s study in Africa shows differences based on the socio-economic characteristics of tourists. Wealthy tourists focused on charismatic and iconic megafauna such as large, attractive males rather than broader biodiversity. Meanwhile tourists with lower income levels were also interested in broader biodiversity and showed interest in less observable species. This pattern leads to 'conservation for ecotourism' rather than 'ecotourism for conservation', where the main focus becomes financial. The authors suggest that policy makers should develop financial mechanisms to subsidise conservation actions for less charismatic species. Furthermore, there is the risk of focusing on the cute and cuddly aspect of a flagship species while neglecting to conduct the research needed to assist the conservation of some other species with more complex or specific requirements (Barua; Frazier).

Paine, in 'A Conversation on Refining the Concept of Keystone Species', warns of an overly expansive usage of the term 'flagship' species (but also 'keystone' or 'umbrella' species) which has contributed to controversy, not only in scientific circles. A further concern raised by Barua is conservation biologists' poor explanation to the public of the meaning of such concepts. He suggests that in order to improve conservation outcomes, terms like flagship and related metaphors need to be thoroughly explained to the community and the media to avoid

misrepresentation of terminology. In fact, Mallinson writes: ‘it is easier to generate interest and pride in a spectacular national animal ... than attempting to communicate to the rank and file the complicated ecology of threatened ... habitat’.

2. Case study: Community Engagement and Education Project Based around Koalas

The koala (*Phascolarctos cinereus*) is distributed throughout the forests and woodlands of eastern Australia. The species is found in Victoria (Vic), South Australia (SA), New South Wales (NSW), Australia Capital Territory (ACT) and Queensland (Qld). Until 2009 koalas were not listed as threatened at a national level in Australia, although they were listed as vulnerable under the state legislation in South-East Qld (2004) and NSW (1992). In 2011 an Australian Senate enquiry into the koala resulted in the listing of this species as vulnerable nationally in ACT, Qld and NSW, with the exception of SA and Vic (Shumway et al., ‘Saving Our National Icon’). In these two states koalas did not meet the listing requirements due to their natural history and a large number of translocations to isolated habitats and islands where koalas thrived at unsustainable levels (Department of Environment EPBC Act: List of Threatened Fauna)..

The project related to the current case study was located in Ballarat (Vic) and ran between 2001 and 2009. This project was expressly intended to protect koalas; it was at that time not designed to test the flagship idea. However, what has been learned from the project serves as an example of the idea of a flagship species in action. Ballarat lies 100km west of the Victorian capital city, Melbourne, and its urban fringes are surrounded on three sides by significant areas of native eucalypt forest. Due to its proximity to Melbourne, Ballarat’s increase in human population is the second largest of all the regional cities in Vic (1.3% between 2004 and 2009 and 1.5% between 2010 and 2014) (Department of Infrastructure and Regional Development). This increase saw Ballarat’s urban footprint expand through the peri-urban treed areas and as a consequence, new housing developments and roads exerted additional pressure on koala habitat.

Due to concerns about the perceived decline of koala populations raised by the Ballarat community, a project employed an Australian Koala Foundation (AKF) Liaison Officer based in Ballarat (Vic). The Liaison Officer (main author) worked in conjunction with the City of Ballarat to establish a community education programme based on koalas in preparation for a Koala Plan

of Management (KPoM) (Schlagloth et al., ‘Comprehensive Koala Plan of Management for Ballarat City Council (Part 1- The Plan, and Part 2- Resource Document)’) to be introduced in the municipality to protect koala habitat and thus the local koala population threatened by development. However, as koalas in Victoria were not on the threatened species list, establishing a KPoM could have been challenging.

To gauge the attitude of the community to koalas and potential measures associated with their protection, a community engagement project was initiated with a survey of all ratepayers (Schlagloth et al., ‘Ballarat Residents - Koala Survey 2002’). The survey was an opportunity to identify the target for a community education programme based on the answers given by the respondents. More than 100 presentations were delivered to many stakeholder groups that included schools, Local, State and Federal Government representatives and industry groups, including developers. Many community activities such as tree plantings and koala art projects as well as research and tourism ventures supplemented the promotion of the education programme. All of these were widely reported on by the media.

The Ballarat project was initially intended to run for a three-year term. However, the drawing power that koalas have on people, and especially on the younger generations, had been underestimated. Due to its success, the project was extended twice until early 2009, culminating with the City of Ballarat adopting the KPoM and the introduction of protective koala habitat overlays into the urban planning scheme; a first for Victoria. The project’s scope also expanded to other communities throughout the state.

Whilst the KPoM was mainly designed to limit the impact of housing and road development on the local koala habitat, it was understood that the project might have flow-on effects for the conservation of less charismatic species including arboreal birds and mammals, and encourage a range of species dependent on mature open forest habitat. The ‘koala overlay’ on council’s planning maps was designed to regulate future development by guiding developers towards implementing new systems that would limit the impact on the forest environment, a process that was well supported by the community as a whole. This community support was demonstrated by the results of the Ballarat Residents/Koala Survey 2002 (Schlagloth et al., ‘Ballarat Residents - Koala Survey 2002’). In the absence of legislative requirements, the writing of the plan and the introduction of the measures to protect koala habitat, can be considered a success. Table 1 presents data from a survey of Ballarat residents undertaken during the project

that explored a range of options for helping to conserve the koala in Ballarat. It confirmed particularly strong support for forested habitat restoration and preservation as well as the extent to which the community was prepared to support actions for the protection of koalas in Ballarat.

Table 1. Support for Possible Actions to Help Conserve Koalas in Ballarat

Strategies	Yes %	No %	Don't know %
Traffic management or speed restrictions	77.8	11.7	10.5
Restrictions on dog ownership in certain areas	77.9	12.0	10.1
Tree preservation orders by Heritage Victoria	82.5	9.1	8.4
Tree planting and habitat restoration program	93.3	1.8	4.9
Employ a wildlife specialist within the city of Ballarat	66.5	20.5	13.0
Stronger planning controls i.e. environmental protection zones or overlays	76.9	9.7	13.5
Placing a covenant over significant habitat on your own land/title	51.5	28.3	20.2

After the completion of the KPoM, Koala Connect (KC) (Municipal Association of Victoria), a project which involved Ballarat City council and several shires surrounding Ballarat (Hepburn Shire, Moorabool Shire, and Pyrenees Shire), was funded through the Victorian Sustainability Accord. Part of the project was a survey to gain an understanding of people's attitudes towards the protection of biodiversity and koalas in particular. It was found that with the use of the koala, behaviour change was achieved.

Other councils and private enterprises such as the Tahbilk Estate (Australian Koala Foundation, *Native Vegetation in the Tahbilk Area and Its Use by Koalas*), the Macedon Ranges Shire for its Hanging Rock reserve, (Australian Koala Foundation, *Hanging Rock Koalas and Koala Habitat*), the Creswick Forest Resort (Australian Koala Foundation *Koalas, Koala Habitat and Habitat Augmentation at Creswick Forest Resort*) and the Golden Plains Shire (Australian Koala Foundation, *Koala Habitat Atlas for the Golden Plains Shire*) were encouraged to map their koala habitat as well. During the programme it was difficult to gain a clear and definite picture of the motivation for the support received from various sections of the community as no formal surveys were conducted during this time.

3. Significance and Implications of Using the Koala as a Flagship Species for Education

So why did the City of Ballarat Council so willingly approve the recommended Koala Plan of Management (KPoM)? Why didn't the new regulations and restrictions on building permits, such as mandatory retention of koala habitat trees and koala friendly fences, deter councillors' approval for the new KPoM? Why was there such a wide acceptance for this plan, to which no councillor objected? These are not easy questions to address, but if we consider the legacy of this project, it is possible to discern a pattern of community support for the protection of this iconic species and its habitat.

The koala is an attractive and charismatic species (McAlpine et al.). Its unique features and 'teddy-bear' appearance make it an attractive educational flagship species to a wide audience. It is known that koalas have more appeal on the public than other species (Bennett, Tisdell et al.); their 'young-child like' appearance (especially when sitting with legs bent), their round face and similar body to head proportion to that of a 12-18 month child, stimulate a sense of its helplessness and 'need for love and protection' (Martin and Handasyde). In short, 'its obvious visual and behavioural appeal, promotes ... concern for its welfare' (Thompson 1).

The koala has become an accepted and very recognisable icon of the Australian fauna and in the 1990s was estimated to be worth more than one billion dollars to the Australian tourism industry (Hundloe and Hamilton). Some researchers thought then, and still do now, that the koala is attracting disproportionate attention, funding and research relative to its conservation status and that it is increasingly becoming the focus of conservation management

issues in eastern Australia (Tisdell and Nantha; Kelso; Martin et al.). However, others believe that it is better to receive funding for iconic flagship species than none at all, and that, using funding for flagship species effectively maximises ‘shared benefits with other species’ (Bennett et al.; Good et al.).

Much research has been carried out, and a large number of reports, scientific papers, policies and management plans have been published on various aspects of the koala. However, if those that mention koalas as flagship species for attracting tourism (Hundloe and Hamilton), funding for conservation (Bennett) and improving diplomatic relations with other countries (Markwell and Cushing) are disregarded, there are few, if any publications, which focus on the power of this species as a flagship for education on conservation and biodiversity in its own right. Yet, the koala, as a ‘symbol’ for conservation and environmental tourism, has become the ‘mascot’ for a number of organisations that promote koala protection primarily (like AKF, Lone Pine Koala Sanctuary, or Koala-Hilfe), and environmental awareness generally (like WWF or Qld Trust for Nature). The koala’s image is also used for non-environmental matters. For example, it can be found on mathematics workbooks for primary students where the use of the species is not related at all to the subject content. It has also been used in senior school biology text books to highlight special anatomical features or explain concepts of natural resource management (Kinnear). The authors are also aware of scientific research methods relating to the koala having been applied during senior biology classes in Victoria (Santamaria, personal communication, January 2, 2012).

Public education plays a pivotal role in any management programme, particularly for a species like the koala which often occurs in densely populated urban areas (Thompson). It is important that the public be educated and informed about the conservation issues faced by local koala populations, and the measures implemented to protect them (Environmental Protection Agency [EPA]). Many government strategies acknowledge the existence and the need for further public koala education programmes (ANZECC; Australian Government). Many conservation challenges such as dog attacks on koalas and habitat loss have direct links to human behaviour. Community engagement needs to be linked to practical experiences to reinforce the sense of being part of the conservation effort (Jordan et al.). The benefits of community environmental education are evidenced through the implementation of environmental programmes, guided by the key principles and practices, which include public participation, environmental adult

education and environmental communication. These programmes can produce effective environmental outcomes by delegating ownership to community groups (Blair). Education was also recognised as having a vital role in the conservation of koalas and their habitat in NSW (Lunney et al.). Cork et al. emphasise the importance of education in the interdisciplinary effort for koala conservation. Changing behaviour towards sustainability is complex, but can be achieved with rigorous planning with programmes designed to address specific audiences (Collier and Smith).

The KPoM for Ballarat utilised these ideas, and educated the public at large on the need to, and the ways to, protect koalas and their habitat. Educational resources were developed and presented to several community groups and to various year levels in schools. It was easy to see the fascination and the curiosity of people of all ages towards the koala. The Liaison Officer spent more time answering questions than presenting material. So many were asking ‘What can we do to help?’ A follow-up study to show the success or otherwise of educating stakeholders from the community during the six year public education process as part of this KPoM was conducted and reported on by Schlagloth and is envisaged for future publication. The project culminated with the successful implementation of the KPoM into the local Council’s planning scheme.

So, how can flagship species help education for conservation and biodiversity in schools for students to grow up with a stronger sense of belonging to, and understanding of, the natural world? Education in schools plays an increasing role in student awareness of conservation biology. Educational strategies that might assist students could include more information on the threats of urbanisation, climate change, developmental biology and risks to endangered species (Camaño). Many education programmes are associated with conservation centres (for example, Daisy Hill Koala Centre) or zoos, whose aim is to increase community awareness and appreciation of koalas. Schools make very good use of these types of facilities. Educators invest considerable effort in developing environmental education programmes that address students’ knowledge, attitudes, and action competence regarding environmental issues (Ballantyne et al.). The authors’ encouraging findings were that hands-on environmental education promotes intergenerational influences, as students communicated their environmental attitudes to their parents with positive outcomes in household practices. A similar outcome was achieved in the case of an innovative education programme at a primary school in Queensland, which saw the

student classroom extended outside the school walls and in the grounds landscaped to simulate a koala corridor (Davis).

4. Conclusion

Based on an academic analysis of a practical community intervention, we conclude that koalas have been a drawcard for change in community attitudes towards conservation in a peri-urban habitat in Ballarat. The academic disagreements amongst researchers about whether or not flagship and umbrella species are useful in conservation biology have proved unfounded in this instance. Our experience has seen a change in people's attitude towards the protection of habitat in the name of the koala. This koala case study confirms the broad, short and medium term community support for protecting koalas in Ballarat. The extent of behavioural change to ensure the support for the protection of this species and its habitat over the longer term has not been established. However, the subsequent, strong interest shown for the Koala Plan of Management in Ballarat by other Councils in the region is evidence that this Ballarat-based community conservation and education project stimulated interest to replicate it, and that the koala was the driving force.

Indeed, there is little doubt that the koala, in this and other projects, has shown itself by virtue of its attractive, cuddly appearance and baby-like features, to be a very attractive flagship species for the wider protection of habitat along the east coast of Australia (Siebuhr), particularly as it inhabits many areas under pressure from urbanisation (Rhodes et al.). We conclude not only that the koala is a highly influential flagship species for the purpose of conservation education, but also that the koala can be used as an effective umbrella species for broader forest conservation and biodiversity education. Educating the public in protecting and rehabilitating koala habitat, in this case getting the Ballarat community to 'embrace the koala' (see Figure 1), enhances education in protecting and rehabilitating other fauna and flora species (McAlpine et al.).

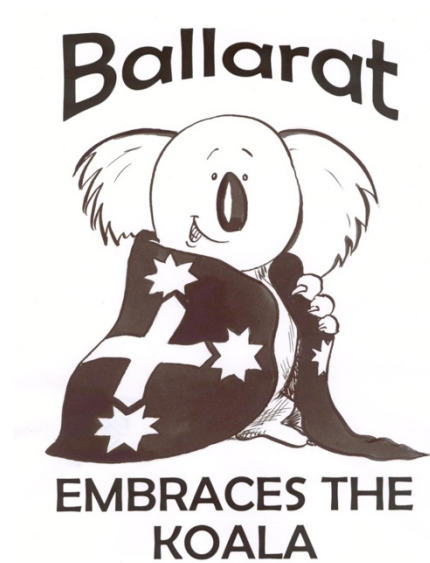


Figure 1: Ballarat Embraces the Koala (artwork by David Gibb)

Using the charismatic koala as an example, our research points to the veracity, resonance and effectiveness of the flagship species concept to increase public awareness of conservation issues and to protect other species through this umbrella effect. This case study has provided strong evidence that similar grassroots education campaigns focusing on a flagship species and targeting various community stakeholders can encourage a change in community perceptions, behaviour and policy towards the environment. It also confirms a need for conservation education to be consistent and continuous so that momentum is maintained and transferred to the next generation. We conclude that by concentrating on similarly iconic, charismatic species with broad appeal the wider community can be successfully educated to protect natural habitat which goes well beyond the benefit to one flagship species.

Works Cited

- ANZECC. *National Koala Conservation Strategy*. Canberra, 1998.
- Australian Government. 'National Koala Conservation and Management Strategy 2009–2014.' National Koala Conservation and Management Strategy Steering Committee Natural Resource Management Ministerial Council, 2009.
<http://www.environment.gov.au/biodiversity/publications/koala-strategy/index.html>. Accessed 13 October 2014.
- Australian Koala Foundation. *Hanging Rock Koalas and Koala Habitat*. Australian Koala Foundation 2008.
- . *Koala Habitat Atlas for the Golden Plains Shire*. Australian Koala Foundation, 2008.
- . *Koalas, Koala Habitat and Habitat Augmentation at Creswick Forest Resort*. Australian Koala Foundation, 2008.
- . *Native Vegetation in the Tahbilk Area and Its Use by Koalas*. Australian Koala Foundation, 2007.
- Ballantyne, Roy, John Fien and Jan Packer. 'Program Effectiveness in Facilitating Intergenerational Influence in Environmental Education: Lessons from the Field.' *The Journal of Environmental Education*, vol. 32, no. 4, 2001, pp. 8-15.
- Barua, Maan. 'Mobilizing Metaphors: The Popular Use of Keystone, Flagship and Umbrella Species Concepts.' *Biodiversity and Conservation*, vol. 20, no. 7, 2011, pp. 1427-1440.
- Bennett, Joseph R. 'Making the Most of Our Flagship Species.' *Discussion Point Online*, 2015, <http://decision-point.com.au/article/making-the-most-of-our-flagship-species/>. Accessed 12 December 2017.
- Bennett, Joseph R., Richard Maloney and Hugh P. Possingham. 'Biodiversity Gains from Efficient Use of Private Sponsorship for Flagship Species Conservation' 2015, doi:10.1098/rspb.2014.2693.
- Blair, Morag. 'Community Environmental Education as a Model for Effective Environmental Programmes.' *Australian Journal of Environmental Education*, vol. 24, 2008, pp. 45-53.

- Bode, Michael and Brendan Wintle. 'How to Build an Efficient Conservation Fence.' *Conservation Biology*, vol. 24, no. 1, 2010, pp. 182-188.
- Bride, Ian G. et al. 'Flying an Amphibian Flagship: Conservation of the Axolotl *Ambystoma Mexicanum* through Nature Tourism at Lake Xochimilco, Mexico.' *International Zoo Yearbook*, vol. 42, no. 1, 2008, pp. 116-124.
- Cairns, J. and J. R. Pratt. 'A History of Biological Monitoring Using Benthic Macroinvertebrates.' *Freshwater Biomonitoring and Benthic Macroinvertebrates*, edited by D.M. Rosenberg and V.H. Resh, Chapman and Hall, 1993, pp. 10-27.
- Camaño, José Antonio López Tercero. 'A Vision of Conservation from School.' *Conservation Biology*, vol. 25, no. 6, 2011, pp. 1091-1093.
- Caro, T. M. and G. O'Doherty. 'On the Use of Surrogate Species in Conservation Biology.' *Conservation Biology*, 1999, pp. 805-814.
- Collier, Grahame and Phil Smith. 'Beyond Lip Service: A Council Approach to Planning for Behaviour Change.' *Australian Journal of Environmental Education*, vol. 25, 2009, pp. 129-138.
- Cork, S. J., T. W. Clark and N. Mazur. 'Introduction: An Interdisciplinary Effort for Koala Conservation.' *Conservation Biology*, vol. 14, no. 3, 2000, pp. 606-609.
- Davic, Robert D. 'Herbivores as Keystone Predators.' *Conservation Ecology*, vol. 6, no. 2, 2002, p. r8.
- . 'Linking Keystone Species and Functional Groups: A New Operational Definition of the Keystone Species Concept.' *Conservation Ecology*, vol. 7, no. 1, 2003, p. r11.
- Davis, Julie M. 'Playing and Learning with and for Life: Researching Innovative Environmental Education in Primary Schools.' Southern Crossings: Pointers for Change Conference, January 1998, Sydney.
- Department of Infrastructure and Regional Development. 'State of Australian Cities 2014-15.' https://infrastructure.gov.au/infrastructure/pab/soac/files/factsheets_2014/Ballarat_Factsheet_2014.pdf. Accessed 24 April 2016.

Department of the Environment. 'EPBC Act List of Threatened Fauna.'

<http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl>.

Accessed 24 April 2016.

Di Minin, E., et al. 'Understanding Heterogeneous Preference of Tourists for Big Game Species: Implications for Conservation and Management.' *Animal Conservation*, vol. 16, no. 3, 2013, pp. 249-258.

Dietz, J. M., L. A. Dietz and E. Y. Nagagata. 'The Effective Use of Flagship Species for Conservation of Biodiversity: The Example of Lion Tamarins in Brazil.' *Creative Conservation*, edited by P.J.S. Olney, G. M. Mace and A. T. C. Feistner, Springer, 1994, pp. 32-49.

Dolins, Francine L., et al. 'Conservation Education in Madagascar: Three Case Studies in the Biologically Diverse Island-Continent.' *American Journal of Primatology*, vol. 72, no. 5, 2010, pp. 391-406.

Environmental Protection Agency (EPA). 'Addressing Threats to Koala Populations in Southeast Queensland: Premier's Koala Taskforce Report (Draft)' 2008.

Favreau, Jorie M., et al. 'Recommendations for Assessing the Effectiveness of Surrogate Species Approaches.' *Biodiversity and Conservation*, vol. 15, no. 12, 2006, pp. 3949-3969.

Frankel, Otto Herzberg and Michael E. Soulé. *Conservation and Evolution*. CUP Archive, 1981.

Frazier, J. G. 'Marine Turtles: The Role of Flagship Species in Interactions between People and the Sea.' *Maritime Studies*, vol. 3, 2005, pp. pp. 5–38.

Good, C., D. Burnham, and D. W. Macdonald. 'A Cultural Conscience for Conservation', *Animals*, vol. 7, no. 7, 2017, p. 52.

Hammerschlag, Neil, and Austin J. Gallagher. 'Extinction Risk and Conservation of the Earth's National Animal Symbols.' *BioScience*, vol. 67, no. 8, 2017, pp 744–749.

Hundloe, Torstein, John Arneson, and Clive Hamilton. *Koalas and Tourism: An Economic Evaluation*. Australia Institute, 1997.

IUCN. 'Flagship Species: How Protecting Rhinos Can Help Other Threatened Wildlife.'

[https://www.iucn.org/news_homepage/all_news_by_theme/world_heritage_news/?18357/Flagship-species-how-protecting-rhinos-can-help-other-threatened-wildlife.](https://www.iucn.org/news_homepage/all_news_by_theme/world_heritage_news/?18357/Flagship-species-how-protecting-rhinos-can-help-other-threatened-wildlife)

Accessed 15 March 2016.

---. 'Species and Climate Change: More Than Just the Polar Bear.'

https://www.iucn.org/about/work/programmes/species/our_work/climate_change___species/climate_change_species_projects_initiatives/species_and_climate_change_more_than_just_the_polar_bear/. Accessed 13 March 2016.

Jordan, Rebecca C., et al. 'Knowledge Gain and Behavioral Change in Citizen-Science Programs.' *Conservation Biology*, vol. 25, no. 6, 2011, pp. 1148-1154.

Kelso, Robert. 'All Creatures Are Equal, Though Some Are More Equal Than Others: The Moral and Political Agency of Koalas.' *Central Queensland University*, 2001, p. 178.

Kinnear, J. *Nature of Biology 1; VCE Units 1 and 2*. Wiley & Sons, 2006.

Kleiman, Devra G., et al. 'Conservation Program for the Golden Lion Tamarin: Captive Research and Management, Ecological Studies, Educational Strategies, and Reintroduction.' *Primates: The Road to Self-Sustaining Populations*, edited by Kurt Benirschke, Springer, 1986, pp. 959-979.

Krause, Monika and Katherine Robinson. 'Charismatic Species and Beyond: How Cultural Schemas and Organisational Routines shape Conservation:.' *Conservation and Society*, vol. 15, no. 3, 2017, pp. 313-321.

Lambeck, Robert J. 'Focal Species: A Multi-Species Umbrella for Nature Conservation.' *Conservation Biology*, vol. 11, no. 2, 1997, pp. 849-856.

Leader-Williams, Nigel and Holly T. Dublin. 'Charismatic Megafauna as "Flagship Species."' *Priorities for the Conservation of Mammalian Diversity: Has the Panda had its Day?*, edited by Nigel Dunstone and Abigail Entwistle, Cambridge University Press, 2000, pp. 53-81.

- Lindenmayer, David B., et al. 'Ignoring the Science in Failing to Conserve a faunal icon: Major Political, Policy and Management Problems in Preventing the Extinction of Leadbeater's Possum.' *Pacific Conservation Biology*, 2015, vol. 21, pp. 257-265.
- Lunney, D., Chris Ann Urquhart and Philip Reed. 'Koala Summit: Managing Koalas in New South Wales.' *New South Wales National Parks and Wildlife Service, Hurstville*, 1990.
- Mallinson, J. C. "'Flagship" Species Aiding the Conservation of Animals and Associated Habitat'. 46th Annual Conference of International Union of Directors of Zoological Gardens, Singapore, 1991.
- Markwell, Kevin and Nancy Cushing. 'Koalas, Platypuses and Pandas and the Power of Soft Diplomacy.' *The Conversation*, 20 May 2015, <https://theconversation.com/koalas-platypuses-and-pandas-and-the-power-of-soft-diplomacy-42051>, Accessed 12 December 2017.
- Martin, R. W. and K. Handasyde. *The Koala: Natural History, Conservation and Management*. University of New South Wales Press, 1999.
- McAlpine, C. A., et al. 'Conserving Koalas: A Review of the Contrasting Regional Trends, Outlooks and Policy Challenges.' *Biological Conservation*, vol. 192, 2015, pp. 226-236.
- Miller, Brian, et al. 'Using Focal Species in the Design of Nature Reserve Networks.' *Wild Earth*, vol. 8, 1999, pp. 81-92.
- Mills, L. *Conservation of Wildlife Populations Demography, Genetics, and Management* (2nd ed.). Hoboken, NJ: Wiley-Blackwell, 2012.
- Mittermeier, R. A. 'Primate Conservation Priorities in the Neotropical Region.' *Primates: The Road to Self-Sustaining Populations*, edited by Kurt Benirschke Springer, 1986, pp. 221-240.
- . 'Primate Diversity and the Tropical Forest Case Studies from Brazil and Madagascar and the Importance of the Megadiversity Countries.' *Biodiversity*, edited by E. O. Wilson and Frances M. Peter, National Academies Press, 1988.

- Municipal Association of Victoria. 'Koala Connect Project.'
http://www.sustainability.mav.asn.au/natural-environment/Koala_Connect_Project_Final_Report-9539. Accessed 2 March 2016.
- Murdoch, William, et al. 'Maximizing Return on Investment in Conservation.' *Biological Conservation*, vol. 139, no. 3, 2007, pp. 375-388.
- Paine, Robert T. 'A Conversation on Refining the Concept of Keystone Species.' *Conservation Biology*, vol. 9, no. 4, 1995, pp. 962-964.
- . 'A Note on Trophic Complexity and Community Stability.' *American Naturalist*, 1969, pp. 91-93.
- Plumptre, Andrew J. *Eastern Chimpanzee (Pan Troglodytes Schweinfurthii): Status Survey and Conservation Action Plan, 2010-2020*. IUCN, 2010.
- Rakotomamonjy, S. N., et al. 'The Effects of Environmental Education on Children's and Parents' Knowledge and Attitudes Towards Lemurs in Rural Madagascar.' *Animal Conservation*, vol. 18, no. 2, 2015, pp. 157-166.
- Rhodes, J. R., et al. 'Using Integrated Population Modelling to Quantify the Implications of Multiple Threatening Processes for a Rapidly Declining Population.' *Biological Conservation*, vol. 144, no. 3, 2011, pp. 1081-1088.
- Roberge, Jean-Michel and P. E. R. Angelstam. 'Usefulness of the Umbrella Species Concept as a Conservation Tool.' *Conservation Biology*, vol. 18, no. 1, 2004, pp. 76-85.
- Schlagloth, R. 'Using the Koala as a Community Education Flagship Species: For What Purposes, with What Outcomes?' Masters of Education Studies Thesis, University of Ballarat, 2014.
- Schlagloth, R., J. Callaghan and F. Santamaria. 'Ballarat Residents - Koala Survey 2002.' 2004. City of Ballarat,
<http://www.ballarat.vic.gov.au/Files/Ballaratreidentskoalasurvey.pdf> .
<http://www.ballarat.vic.gov.au/Files/Ballaratreidentskoalasurvey.pdf>, Accessed 2 March 2016

- Schlagloth, R., H. Thomson, and D. Mitchell. 'Comprehensive Koala Plan of Management for Ballarat City Council (Part 1: The Plan, and Part 2: Resource Document).' 2006. City of Ballarat, <http://www.ballarat.vic.gov.au/media/332007/ballarata%20comprehensive%20koala%20plan%20of%20management%20part%202%202006.pdf><http://www.ballarat.vic.gov.au/media/332007/ballarata%20comprehensive%20koala%20plan%20of%20management%20part%202%202006.pdf>, Accessed 2 March 2016.
- Shumway, Nicole, et al. 'Saving Our National Icon: An Ecological Analysis of the 2011 Australian Senate Inquiry into Status of the Koala.' *Environmental Science and Policy*, vol. 54, 2015, pp. 297-303.
- Shumway, Nicole, et al. 'A Mismatch of Community Attitudes and Actions: A Study of Koalas.' *Landscape and Urban Planning*, vol. 126, 2014, pp. 42-52.
- Siebuhr, L. 'Community Education in the Koala Coast.' *Conference on the Status of the Koala in 2000*, Australian Koala Foundation, 2000.
- Simberloff, Daniel. 'Flagships, Umbrellas, and Keystones: Is Single-Species Management Passé in the Landscape Era?' *Biological Conservation*, vol. 83, no. 3, 1998, pp. 247-257.
- Stirling, Ian and Andrew E. Derocher. 'Melting under Pressure.' *The Wildlife Professional*, vol. 1, 2007, pp. 24-27.
- Thomas, William A. *Indicators of Environmental Quality*. Springer, 1972.
- Thompson, Jim. 'The Comparative Ecology and Population Dynamics of Koalas in the Koala Coast Region of South-East Queensland.' PhD Diss., University of Queensland, 2006. doi:10.14264/uql.2015.743; <http://espace.library.uq.edu.au/view/UQ:158282>.
- Tisdell, Clem and Hemanath Swarna Nantha. 'Comparison of Funding and Demand for the Conservation of the Charismatic Koala with those for the Critically Endangered Wombat *Lasiorninus krefftii*'. Working Paper No. 125, 2005, Economics, Ecology and Environment, University of Queensland.

- Tisdell, Clem, Clevo Wilson, and Hemanath Swarna Nantha. 'Association of Public Support for Survival of Wildlife Species with their Likeability'. *Antrozoös*, vol. 18, no. 2, pp. 160-174. 2005.
- Veríssimo, Diogo, et al. 'Birds as Tourism Flagship Species: A Case Study of Tropical Islands.' *Animal Conservation*, vol. 12, no. 6, 2009, pp. 549-558.
- White, M. *Listen ... Our Land Is Crying. Australia's Environment: Problems and Solutions*. Kangaroo Press, 1997.
- Wolvekamp, M. C. J., et al. 'Exotic Species: A Novel Approach to Save the Critically Endangered Northern Hairy-Nosed Wombat (*Lasiorhinus Krefftii*).' *Theriogenology*, vol. 53, no. 1, 2000, pp. 345-345.
- World Wildlife Fund. 'Endangered Wildlife.'
http://www.admc.hct.ac.ae/tjohnson/3_ENDANGERED%20ANIMALS/L5-World%20Wildlife%20Fund/ENDANGERED%20ANIMALS/www.worldwildlife.org/endangered/index.html. Accessed 4 March 2016.