

Wildlife Tours in Australia: Characteristics, the Place of Science and Sustainable Futures

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Wildlife tourism is one of the fastest growing tourism sectors worldwide. Across the world the number of tourists seeking close interaction with wildlife in their natural environment is growing. Understanding the interface between visitors (social) and wildlife (environmental) can make a critical contribution to the sustainability of this industry. This study examined wildlife tours in Australia. Questionnaires were posted to wildlife tour operators in Tasmania, Western Australia and Northern Territory, seeking information on the characteristics of tours, and the place of science and monitoring in their business. The results illustrate several similarities between wildlife and ecotourism, suggesting the benefits of increasing education and interpretation, both central features of ecotourism, to enhancing the sustainability of wildlife tourism. For tour operators, interactive activities included feeding, swimming with and touching wildlife, and the level of interaction was identified as high, making it imperative to better define interaction and develop species or group-specific protocols for sustainably managing these interactions. Lastly, this study showed a low level of engagement of scientists in protecting the wildlife of interest to tours. Given the centrality of science to sustainability, mechanisms for increasing this involvement particularly in impact research, through partnerships and other means, are critical for the long term sustainability of this industry.

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Introduction

Natural area tourism is a major growing global industry. A key component is the desire to experience a change from the workday environment and to access the natural environment (Buckley, 2000). The natural environment is considered to be crucial to the attractiveness of almost every travel destination and/or recreational area (Farrell & Runyan, 1991). Tourists have developed an increasing desire for interaction with the natural environment including wildlife populations. For centuries people have been captivated and fascinated by animals and in recent years tourists have developed an increasing desire to see wildlife in their natural environment. This desire has led to the sub-sector of tourism now known as wildlife tourism (Duffus & Dearden, 1990; Reynolds & Braithwaite, 2001). This sub-sector is becoming an increasingly important component of tourism worldwide (Roe *et al.*, 1997).

The term wildlife tourism developed out of natural area tourism to better deal

with any concerns and issues peculiar to wildlife which are often lost in nature-based tourism and ecotourism (Braithwaite & Reynolds, 2002). Nature-based tourism occurs in natural settings but includes emphasis on fostering understanding and conservation. Ecotourism is similar to nature-based tourism but includes education and interpretation while aiming to be ecologically sustainable (Newsome *et al.*, 2002, 2005). Wildlife tourism is distinct to both of these as it is where tourists are specifically interested in seeing wildlife. Although the term wildlife often refers to both fauna and flora, in common usage and the tourism industry it is generally understood to mean only fauna (animals) (Braithwaite & Reynolds, 2002; Higginbottom *et al.*, 2001; Shackley, 1996). However it must be noted that while ecotourism, nature-based tourism and wildlife tourism are not one and the same, neither are they exclusive as there is a good deal of overlap between them.

Across the world the number of tourists seeking interactions with wildlife in their natural environment is increasing (Duffus & Dearden, 1990; Higginbottom, 2004). Participants in wildlife tourism have a wide range in ages, socioeconomic backgrounds and motivations (Braithwaite & Reynolds, 2002). Factors contributing to the overall growth in wildlife tourism and an associated interest in closer interactions with animals include cheaper and faster access to destinations along with increased 'green' awareness (Shackley, 1996). Also significant is the increase in leisure and paid vacation time coinciding with larger disposable incomes (Flather & Cordell, 1995). Other contributors are increasing social concerns about the quality of the natural environment, coinciding with higher educational levels resulting in the growth of general learning activities such as wildlife viewing (Eagles *et al.*, 2002).

The International Ecotourism Society, (TIES, 2000) combined figures from a variety of sources to illustrate that 20–40% of all international tourism is wildlife related. Worldwide, wildlife oriented tourism is estimated to generate an annual revenue of US\$47–\$155 billion (Wildlife Tourism Australia, 2004). In 2001, nearly one-third of all American adults (more than 66 million) participated in either feeding, photographing or observing wildlife and in doing so spent more than \$40 billion (Winkler, 2002). Wildlife viewing is predicted to continue to increase in popularity (Higginbottom, 2004; Newsome *et al.*, 2005; Walsh *et al.*, 1989).

For countries such as Australia, the presence of diverse and unusual wildlife is a major influence on visitors choosing Australia as a destination (CRC for Sustainable Tourism, undated). Approximately 20% of international visitors are motivated to choose Australia as their destination largely to view terrestrial wildlife (Higginbottom & Buckley, 2003). In the year ending December 2004 there were 2.21 million domestic wildlife tourism visitors to Australia (wildlife tourism is visitors who engage in the activities of whale and dolphin watching or visit wildlife parks, zoos and aquariums [Tourism Queensland, 2005]). Hundloe and Hamilton (1997) estimated that the total annual value of wildlife to overseas tourism in this country was in the range of \$1.8–\$3.5 billion. In Australia, over 600,000 people participate in dolphin and whale watching, generating more than \$AUD8.9 million (CRC for Sustainable Tourism, 2002).

Wildlife tourism can be categorised in four ways. In the first category tourism focuses on large numbers of large animals such as in Eastern and

Southern Africa. The second is a focus on a single iconic species, such as the grizzly bear in Alaska. Third, and applicable to Australia, is where the diverse wildlife contribute to, but are only one component of, the natural environment (Higginbottom & Buckley, 2003). Fourth, and also applicable to Australia, is the opportunity to view a wide variety of rare, endangered or unique species (Bentrupperbäumer, 2005; Shackley, 1996). The presence of diverse, rare and endangered wildlife are a major influence on visitors choosing Australia as a destination (CRC for Sustainable Tourism, undated; Rodger & Moore, 2004).

In Australia wildlife tourism is made up of a vast array of activities as well as involving a large range of species. Some examples of activities and species include snorkelling or scuba diving on coral reefs, swimming with whale sharks, feeding of dolphins, viewing of glow worms in caves through to spotting animals and birds whilst walking in national parks. All of these activities involve wildlife as an important part of the tourism experience.

Wildlife tourism, as well as encompassing an array of activities and species, is also characterised by a range of levels of interaction. Visitors may observe animals from a distance, e.g. birdwatching through to swimming, touching or feeding wildlife (Newsome *et al.*, 2005). In the past, close interactions with animals often meant the death or removal of species from their natural environment (Duffas & Dearden, 1990). However, in recent years interaction with wildlife has become increasingly less destructive and more focused on observing, feeding, touching, swimming with, and photographing animals in their natural habitat (Duffas & Dearden, 1990; Green & Higginbottom, 2001; Higginbottom & Buckley, 2003; Knight & Gutzwiller, 1995; Orams, 2002; Rodger & Moore, 2004). At this stage the importance of these interactions to the tourism industry and their impacts on many species of wildlife is not well known.

As with many of the nature-based tourism sectors, sustainability is of critical and increasing concern (Reynolds & Braithwaite, 2001). Wildlife tourism is no exception. A reasonable amount is known about the economic sustainability of the wildlife tourism industry (see Tisdell & Wilson, 2004), and increasing attention is being paid to its social aspects, especially visitors' perceptions of wildlife (see Moscardo & Saltzer, 2004). Environmental impacts have also been reviewed in recent years (see Higginbottom, 2004; Newsome *et al.*, 2005). It now remains of critical importance to investigate the interface between visitors (social) and wildlife (environmental). Examining this interface will contribute to our understanding of sustainability.

The contribution of science is a central aspect in understanding impacts. Even though there has been a wider application of science in wildlife tourism in recent years, there is still a dearth of information. This paper explores, from the perspective of tour operators in Australia, what their industry entails and how they associate with scientists and exchange scientific knowledge. The central purpose of this paper is to explore where scientific findings make a contribution at the interface between tourists and wildlife, critical to the sustainable management of this industry. Wildlife tours in Australia are the focus. The characteristics of the tour companies and the wildlife of interest are described, as are the activities and extent of interaction. The place of research in these wildlife tourism

ventures, given the contribution of science to sustainability, is also investigated. The paper concludes with comments on tour operators' perspectives of the wildlife tourism industry including interactions and sustainability as well as the positioning of science.

Methods

Wildlife tours in three of Australia's nine states (including two territories) were the focus. Collectively, the states of Tasmania, Western Australia (WA) and the Northern Territory (NT) cover the variety of Australia's environmental conditions and habitats and associated wildlife tourism opportunities. Together they include the warm moist tropics, through arid deserts to the cool temperate highlands and forests of Tasmania. The wildlife viewing opportunities are similarly diverse.

All three states emphasise wildlife in their tourism marketing. Lastly, and again collectively, these three states represent and contain the breadth of experiences for which Australia is renowned – for example, estuarine tourism in the NT, terrestrial and marine tourism in Tasmania (Kriwoken *et al.*, 2001), and an abundance of terrestrial wildlife tourism in WA (Higginbottom & Buckley, 2003).

Information on wildlife tours was sought from tour operators. Wildlife tour operators were defined as those who marketed viewing wildlife as a key component to their tours. Included were those viewing non-consumptive, non-domesticated, free-ranging wildlife in their natural environment – such as nature-based tours. Excluded from this research were consumptive wildlife tours such as fishing and hunting. The tours generally included wildlife viewing, research or educational tours, as well as specialised tours. Names and addresses of marine and terrestrial tour operators were obtained from the states/territory's tourism web pages, newspaper advertisements, government web pages, yellow pages advertising as well as general web searching.

In August 2002 188 questionnaires were posted to wildlife tour operators in Tasmania, WA, and the NT. A mail out questionnaire was chosen due to the wide geographical area that could be reached and the lower costs involved (Neuman, 2000). Steps were taken to increase the response rate by including a postage-paid self-addressed envelope and addressing each questionnaire to a specific person (Babbie, 1999; Neuman, 2000).

The questionnaire had two main areas of focus containing a mixture of 18 open and closed-ended questions. The first related to tour characteristics and interactions with wildlife. Respondents were asked for details on their company and the destinations sought, plus activities undertaken and the wildlife of interest. They were also asked about the extent of interaction between visitors and wildlife and how they protected wildlife from potential impacts. For this part a mixture of open and closed-ended questions was used. The second area of focus was research-related. Respondents were asked, using open-ended questions, about the extent of involvement by scientists and managers in researching and monitoring the wildlife of interest. Operators were also asked about future research they would like to see done. Also pursued was infor-

mation on the working relationships between operators, park managers and scientists.

Analysis of tour characteristics involved descriptive statistics, percentages and statistical analysis with results presented in both graphic and tabular form. Tour operators' views on science and scientific research derived through open-ended questions are presented in tables.

Results

Of the 188 questionnaires posted 22 were returned to sender due to closure of the business and/or change of address. The number of businesses that fail in nature-based tourism is regarded as high even though quantitative evidence is lacking (McKercher, 1998). The response rate excluding this non-deliverable fraction was 58% (96 surveys), therefore analysis and reporting are acceptable (Babbie, 1999).

Industry characteristics

Just over half (51%) of the tour operators indicated they had been in business five years or more (Figure 1). And, almost half (48%) responded they had less than 1000 tourists (clients) per annum (Figure 2). Only a small number (<10%) had more than 10,000 clients per annum.

Wildlife tours were found to operate mainly on government land (72%), 33% of tours operate on government water, while 30% operate on privately owned land. A total of 10% of tours visit Aboriginal lands while only 6% reported that they operate on privately owned water (pre-identified categories were used). Activities undertaken as a part of the wildlife tour included viewing scenery (80%), seeing animals in their natural state (78%) and photo opportunities (76%) (Table 1). The least common activities (less than 10% of respondents) were swimming with marine animals (8%), and feeding (7%) and touching animals (7%).

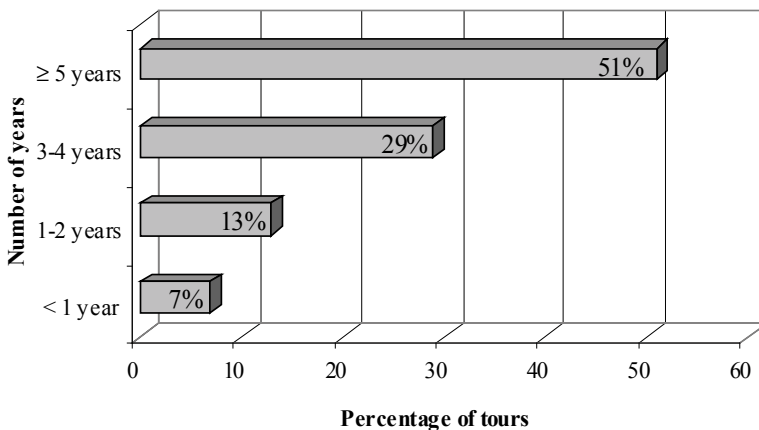


Figure 1 Years of operation for wildlife tours ($n = 96$)*

* (Question: How long have you had this business? Pre-identified response categories used)

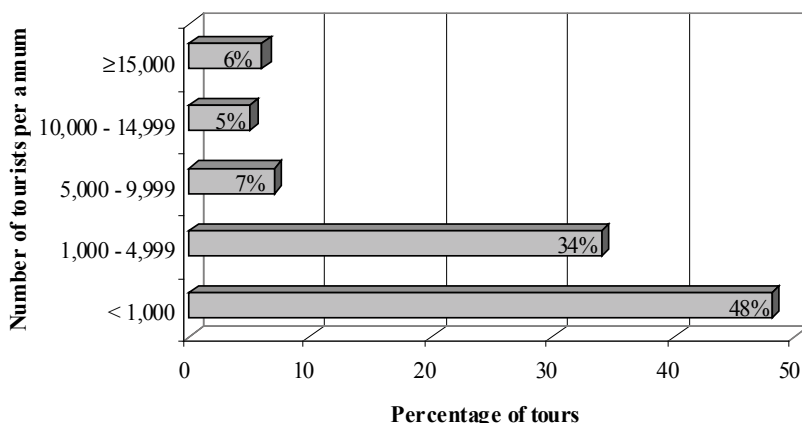


Figure 2 Size of wildlife tours* (*n* = 96)
 (*Question: Approximately how many tourists does your company have per year? Pre-identified response categories used)

Table 1 Activities undertaken as part of tour *

<i>Activity</i>	<i>% of respondents**</i>	<i>Activity</i>	<i>% of respondents**</i>
Viewing scenery	80	Viewing wildflowers	39
Seeing wildlife in natural state (i.e. not in enclosures) (w)	78	Watching wildlife with binoculars (w)	27
Opportunities to photograph wildlife (w)	76	Spotlighting wildlife (w)	15
Enjoying remoteness	71	Swimming with marine wildlife (w)	8
Watching wildlife without binoculars (w)	55	Feeding wildlife (w)	7
Associated activities – bushwalking, canoeing etc	54	Touching wildlife (w)	7
Travelling to/ from attraction	50		

*Question: Which of the following do you consider to be important parts of the tourism experience you offer? Pre-identified response categories used
 **Does not sum to 100% because some tour operators provided more than one response (*n* = 96); (w) = wildlife-related activities.

Wildlife viewing

Tour operators were asked about the wildlife they seek out. The results are divided according to whether the wildlife were terrestrial or marine (including estuarine). In terms of terrestrial wildlife, birds were sought by two-thirds of tour operators (68%) (Table 2). Almost half of these terrestrial tours sought out reptiles (49%), followed closely by wallabies (48%). For tours with a marine

Table 2 Terrestrial wildlife tour operators seek out*

<i>Wildlife</i>	<i>% of respondents**</i>	<i>Wildlife</i>	<i>% of respondents**</i>
Birds	68	Bandicoots	9
Reptiles	49	Frogs	7
Wallabies	48	Ring Tailed Possums	6
Kangaroos	25	Echidnas	6
Dingoes	22	Wombats	5
Rock Wallabies	21	Koalas	5
Tasmanian Devils	18	Quolls	4
Brush Tailed Possums	17	Quokkas	1
Platypus	12		

* Question: What wildlife, if any, do you actively seek out on your tours? Pre-identified response categories used

**Does not sum to 100% because some tour operators provided more than one response ($n = 96$)

Table 3 Marine wildlife tour operators seek out*

<i>Wildlife</i>	<i>% of respondents**</i>	<i>Wildlife</i>	<i>% of respondents**</i>
Fish	29	Stingrays	9
Whales	20	Manta Rays	6
Crocodiles	20	Seals	6
Turtles	18	Dugongs	4
Penguins	18	Whale Sharks	2
Dolphins	13	Sharks	1
Sea Lions	10	Sea Dragons	1

* Question: What wildlife, if any, do you actively seek out on your tours? (pre-identified response categories used)

** Does not sum to 100% because some tour operators provided more than one response ($n = 96$)

focus, fish were sought by 29% of tour operators followed by whales (20%) and then crocodiles (20%) (Table 3). Operators involved with marine wildlife are more inclined to seek out a small number of species (1–2) compared to those with a terrestrial focus, who tend to be more generalist (Figure 3).

Tour operators were asked to identify the level of interaction between tourists and wildlife. Over half (54%) reported the level of interaction as none to low (Table 4). To better understand the relationship between the type of wildlife tourism activity and the level of interaction, a chi-square analysis was conducted. The wildlife activities in Table 1 were divided into two categories assigned by the first author – ‘observation’ or ‘interactive’. Observation activities – where tourists observe rather than engage with animals – include photo opportunities, watching with and without binoculars and spotlighting. Interac-

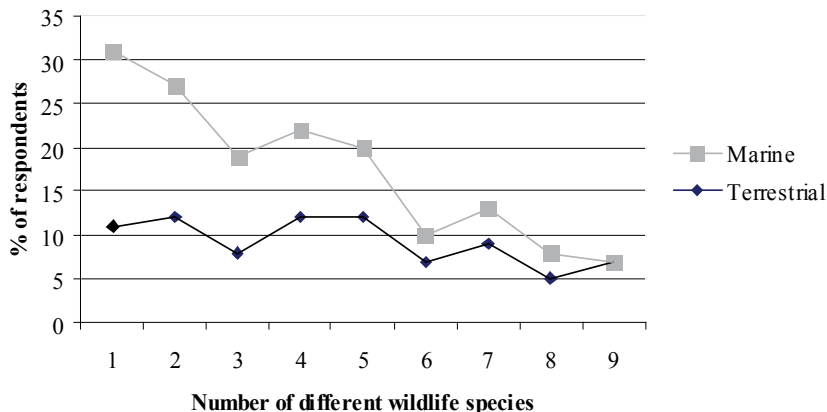


Figure 3 Number of different wildlife species that tour operators actively seek out (*n* = 96)

Table 4 Level of interaction between tourists and wildlife*

<i>Level of interaction</i>	<i>% of respondents</i>
None	12
Low	42
Intermediate	21
High	12
No response	13

(*n* = 96)

*Question: What level of interaction is there between tourists and wildlife? Pre-identified response categories used

tive activities include swimming with marine animals and touching and feeding wildlife (Table 1). A significant association was found ($X^2 = 25.468$; $df = 3$; $p = 0.000$) between the activity type (interactive versus observation) and the level of interaction (none, low, intermediate, high), with interactive activities, such as swimming and feeding, being identified by operators as having higher levels of interaction (e.g. intermediate, high).

Measures taken by tour operators to protect the wildlife they view (Table 5) included maintaining a minimum distance between wildlife and tourists (77%), and no feeding (73%) or touching wildlife (60%).

Science and monitoring

Tour operators were asked ‘Are there scientists that you rely on/help you with protecting the wildlife you visit?’. Two-thirds of tour operators (65%) did not rely on or receive help from scientists, 13% were unsure and 22% stated yes. Of the 22% that answered yes, further questions were asked including ‘How did they come to be helping you?’. The involvement of scientists primarily came at the instigation

Table 5 Measures taken to protect wildlife *

<i>Measures to protect wildlife</i>	<i>% of respondents**</i>	<i>Measures to protect wildlife</i>	<i>% of respondents**</i>
Maintaining distance	77	Minimal touching	17
No feeding of wildlife	73	Low intensity lighting	13
No touching of wildlife	60	Feeding natural foods	6
Education (brochures, talks, etc.)	53	Physical barriers	4

* Question: Which of the following measures do you use to protect the wildlife? Pre-identified response categories used

**Does not sum to 100% because some tour operators provided more than one response ($n = 96$)

Table 6 Contributions by scientists to wildlife protection

<i>Contribution by scientists*</i>	<i>Illustrative questionnaire ** responses</i>
Information & Interpretation (36%)	<ul style="list-style-type: none"> • Providing information and research advice • To learn identification, food chain, habitat needs • Provide knowledge of area and wildlife
Conservation Issues (24%)	<ul style="list-style-type: none"> • Protection of wildlife and breeding areas • Conservation and management
Management (24%)	<ul style="list-style-type: none"> • General management • Appropriate behaviour with wildlife in natural state in national parks
Research (12%)	<ul style="list-style-type: none"> • Research and details on whale sharks

* Does not sum to 100% because some tour operators provided more than one response ($n = 17$)

** The question was: 'What do scientists help with?'

of tour operators who either consulted or employed a scientist. As one respondent commented: 'we organised for them to come to our office for meetings with our staff' and 'our company employs a biologist for interpretation'. One tour operator responded that it was a requirement of their licence to have scientists involved.

Tour operators were then asked 'What do they help with?'. Their responses were divided into four categories assigned by the first author. Scientists help tour operators by providing information and interpretation (36%), conservation issues (24%), management (24%) and research (12%) (Table 6).

When asked 'Are the managers of the land (where the tours operate) involved in this research?' out of the 22% of tour operators that identified involvement by scientists, 33% reported that managers were involved while 50% responded 'no'. A further 17% of tour operators did not answer this question. Further questioning, including 'What assistance do they provide?', revealed managers assist scientists by providing information (67%) and data collection (67%), with responses such as 'Providing information' and 'Observations and recordings of wildlife'. Tour operators also identified managers as helping with conservation

(50%) and maintenance of species (17%), with responses such as ‘Protection of threatened species’ and ‘Island and breeding zone maintenance’.

In terms of monitoring, tour operators were asked ‘Are the wildlife you visit monitored?’. About half of the operators (52%) noted that the wildlife of interest was monitored, while a third (32%) said no and the remainder were unsure (16%). When asked who does the monitoring, 70% responded that it was the managers of the land/ water (Table 7). Monitoring was characterised by nearly all respondents (96%) as being animal surveys.

Only 25% of respondents answered the open-ended question ‘What scientific research/ monitoring would you like to see done?’. For those who responded, the main concerns were tourism impacts (28%), feral animals (23%), clearing and burning (18%), tourism regulation (12%) and the impacts of 1080 (5%). Sodium monofluoroacetate or 1080 is a naturally occurring compound found in about 40 species of native Australian plant. It has been widely used in Australia to control introduced pest animals (DPIWE, 2004). Reasons for a lack of research associated with wildlife tourism include lack of financial support for research (26%), apathy of government (8%) and political reasons (8%) (Table 8).

Table 7 Individuals involved in monitoring wildlife of interest to tour operators*

<i>Individuals</i>	<i>% of respondents**</i>
Land/ water managers	70
Tour operators	37
Scientists	33
Other	5

* Pre-identified responses used

**Does not sum to 100% because some tour operators provided more than one response (n = 43)

Table 8 Reasons for lack of research and monitoring*

<i>Reason</i>	<i>% of respondents**</i>	<i>Reason</i>	<i>% of respondents**</i>
No response	27	Lack of partnership between government and operators	4
Lack of financial support for research	26	Remoteness of where tours operate	4
Apathy of government/ managers	8	Industry pressure to not conduct research	4
Political	8	Lack of foresight of managers	2
Not sure	6	Attitude scientists/ managers	1

*Question: What do you think is preventing research and monitoring from being done?

**Does not sum to 100% because some tour operators provided more than one response (n = 96)

Table 9 Tour operators working relationship with a variety of organisations*

<i>Individual/ organisations</i>	<i>Excellent – Good</i>	<i>Satisfactory</i>	<i>Poor – Inadequate</i>	<i>Relationship score**</i>	<i>No response</i>
Local businesses	69	16	8	91	7
Park managers	63	18	12	87	6
Local councils	46	29	14	84	10
Volunteers	28	18	14	77	41
Government scientists	28	13	22	65	39
Universities	24	14	19	67	44
NGO scientists	13	10	15	60	62

($n = 96$) *Question: How would you define your working relationship with the following organisations?

** Relationship score is derived by summing the excellent–good and satisfactory results and dividing the result by the total responses (minus the ‘no response’).

Finally, operators were asked about their working relationship with park managers and scientists as well as a variety of other individuals and organisations (Table 9). Almost 70% described their working relationship with local businesses as excellent to good. A similar number (63%) described their working relationship with park managers as excellent to good. In contrast, many operators did not respond regarding their relationships with government scientists, volunteers, universities and scientists from non-government organisations (NGOs) (Table 9). This lack of response can be interpreted as indicative of an absence of relationships.

Calculating a relationship score controls for the influence of those that did not respond for whatever reason and gives a slightly different interpretation to the results. Based on the relationship scores, the relationships fall into two groups – those with a higher score including local businesses, park managers, local councils and volunteers and those with a lower score including government scientists, universities and NGO scientists (Table 9).

Discussion

Industry characteristics

Not surprisingly the results from this study emphasise a number of similarities between wildlife tourism and ecotourism, including tour size and destinations, activities undertaken, and measures taken to protect the features of interest, whether wildlife or the natural environment more generally. Almost half of the wildlife tour operators (48%) had been in business for five years or more, have less than 1000 passengers per annum (46%) and operate on government managed land (72%). Higginbottom and Buckley (2003) noted that the majority of terrestrial wildlife tourism operators in Australia are small businesses. Small groups of people who visit natural or protected areas are important features of

the ecotourism industry (Wearing & Neil, 1999), which is characterised by small tour sizes to ensure minimum impact on destinations (Gilbert, 1997; Lindberg & Hawkins, 1993).

Wildlife tour operators are predominantly conducting their tours on government lands, including national parks and nature reserves. The ecotourism industry in Australia similarly relies on protected areas (Buckley, 2000), with national parks the most common destination for non-consumptive tourism activities (Roe *et al.*, 1997). Australia has over 4000 protected areas, representing 13% of the continental mass (World Resources Institute, 2003). Such areas are expected to continue to increase in popularity for wildlife and ecotourism, in large part due to their conservation ethos (Boo, 1990; Buckley, 2000; Roe *et al.*, 1997).

For both wildlife tours and ecotourism, the tourism product includes a number of other features associated with the natural environment. In this study, viewing scenery, feelings of remoteness, and activities such as bushwalking and canoeing were also important parts of the tour. According to Moncrieff *et al.* (2001) activities and attractive scenery are just as important as viewing wildlife for those on wildlife tours. Ecotours similarly encompass the whole trip, including visits to wilderness, national parks, hiking through to viewing wildlife, trees and wildflowers (Diamantis, 1999; Herbig & O'Hara, 1997). Both wildlife and ecotour operators promote the whole experience (Newsome *et al.*, 2002).

The measures taken by operators to protect wildlife identified in this study are consistent with the ecotourism principle of minimising impacts through leading by example (Lindberg & Hawkins, 1993). Over two-thirds of tour operators (77%) maintained distance between their clients and wildlife. A similar number of tour operators do not feed the wildlife they view, while 60% of tour operators do not allow their passengers to touch wildlife. These measures all aim to minimise impacts on the natural environment, including the wildlife, and are also encouraged by the ecotourism industry.

Over half of wildlife tour operators (53%) regarded education as important for protecting the wildlife they view. Education aims to reduce inappropriate behaviour (Orams, 1996), and along with interpretation are central tenets of ecotourism (Blamey, 2001; Gilbert, 1997). For wildlife tourism too, they are important tools in minimising the negative impacts of tourism on wildlife. Education and interpretation increase visitor satisfaction as well as positively influencing their attitudes to conservation (Davis *et al.*, 1997; Higginbottom & Buckley, 2003; Orams, 1996).

Wildlife viewing

Birds are actively sought by two-thirds of tour operators with a terrestrial focus (Table 2). In WA the group most targeted by operators is birds (Moncrieff *et al.*, 2001). Tours focus on locations where there is either a large number of species or the opportunity to see a particular species (Jones & Buckley, 2000). Australia offers a wide range of bird species (nearly 500 breeding species), with exceptionally high endemism and a number of species which are endangered (Higginbottom & Buckley, 2003; World Resources Institute, 2003). Birdwatching in Australia is currently growing, leading to an increase in specialised tour operators who aim to provide high level naturalist and local knowledge (Valentine & Birtles, 2004).

Studies of wildlife popularity reveal mammals as the most, and invertebrates as the least popular (Moscardo *et al.*, 2001; Surinova, 1971). Yet, this survey (Table 2) showed that almost half of all tour operators (49%) seek reptiles. Australia offers good opportunities for reptile enthusiasts with over 700 species, with over 600 of these endemic (Higginbottom & Buckley, 2003). Australia has more species of lizards, pythons and blind snakes than any other country (Higginbottom & Buckley, 2003). Furthermore, wildlife tour operators in more arid zones are often reliant on reptiles (e.g. thorny devils, lizards and skinks) as the only wildlife they reliably see, as many mammal species are small and nocturnal. This leads to wildlife tour operators seeking reptiles for their reliability.

After birds and reptiles, tour operators sought wallabies, kangaroos, dingoes and rock wallabies (Table 2). Tourists often choose these larger mammals as the focus of their wildlife experience (Braithwaite & Reynolds, 2002). Furthermore, wallabies and kangaroos tend to have iconic status, in particular for international visitors, because they are endemic to Australia, and are the animals that international visitors most want to see (Higginbottom, 2003; Higginbottom & Buckley, 2003).

Endangered species are often the focus of wildlife tourism. Such species hold a special appeal (Reynolds & Braithwaite, 2001). The Tasmanian devil (*Sarcophilus harrisii*), for example, is of increasing importance to tourism and has been promoted as a tourism icon. It is extinct on mainland Australia and now can only be found on the island of Tasmania.

Fish, whales, turtles and penguins (Table 3) are all sought out by marine tour operators. Marine wildlife of interest are often larger animals which are easily seen. Tourists are also increasingly seeking opportunities for interactions, by swimming with animals or feeding them. The focus tends to be on one or two species, contrasted to terrestrial settings where a wide range of wildlife is sought (Figure 3). As many terrestrial species are nocturnal and cryptic, tour operators will tend to seek out any wildlife that is accessible. The single or limited species approach of marine wildlife tourism today (e.g. whales, shark and whale watching), however, contrasts with earlier reports on the industry where tours focused on multiple species (Birtles *et al.*, 2001).

Given the wide understanding of the word interaction this survey aimed to tease out tour operators' perceptions of what this word means in the context of wildlife tourism. Over half of the tour operators reported none to low levels of interaction, even though tourists are demanding ever closer interactions with wildlife in natural settings (Braithwaite & Reynolds, 2002; Gauthier, 1993; Moscardo *et al.*, 2001). Orams (2002) understood wildlife interaction to include observation, feeding, touching, photographing or just experiencing wildlife. However, The Conservation Council of Western Australia took this one step further and defined human-wildlife interaction to be any action by humans towards wildlife which influences the behaviour of animals to interact with humans in natural settings or modifies natural behaviour. Wildlife observation, in contrast, is where participants observe wildlife from a distance (Conservation Council of Western Australia, 2004). Tour operators' responses show similarity with the Conservation Council of Western Australia definition of interactive activities. Tour operators ranked touching and feeding as high level interaction, while observing and photographing were categorised as low to no interaction.

Wildlife interaction is different to wildlife observation and hence needs to be managed differently. Moreover, the distinction between the two often becomes blurred as interaction tends to vary according to target species and can be part of the process of observation (Conservation Council of Western Australia, 2004; Newsome *et al.*, 2005).

The handling and feeding of wildlife is of concern to both wildlife managers and tour operators (Moscardo *et al.*, 2001). This concern was evident from this study where over half of the tour operators did not allow touching of wildlife and almost two-thirds did not feed wildlife (Table 3). Feeding of wildlife is a highly contested practice (see Conservation Council of Western Australia, 2004; Green & Higginbottom, 2001; Newsome *et al.*, 2005). Feeding at regular intervals often increases the possibility of animals being present. Many tour operators rely on a predictable occurrence of the wildlife of interest within a fairly small spatial area (Duffas & Dearden, 1990). However, this activity can have detrimental impacts on wildlife and tourists. For example, feeding of bottlenose dolphins (*Tursiops aduncus*) at Monkey Mia WA has led to an increased risk of dolphin disease, injury and death due to close contact, and changed foraging behaviour leading to the death of juvenile dolphins (e.g. Wilson, 1994). On Fraser Island, Queensland, the feeding of wild dingoes over numerous years is believed to have contributed to the mauling of a young boy in 2001 (Burns, 2001).

Science and monitoring

According to the results of this study, tour operators rely on or receive very little help from scientists in protecting the wildlife viewed by tours, with only 22% of operators indicating the involvement of scientists. Where scientists were involved, it was at the instigation of the tour operator. This lack of engagement means that scientific information on the species' behaviour and ecology, that could potentially enhance and sustain viewing opportunities, is not available to operators. This means that scientific information on how to sustain species in the longer term is not being acquired by tour operators. The other benefit, which also is not currently available, is operators being able to better educate tourists using information provided by scientists (Van Oosterzee & Preece, 1998).

Tour operators commented that scientists' contributions included providing information and interpretation, plus helping to conserve and manage wildlife. Few tour operators (12%) commented that scientists contribute through research. Particularly interesting is that no tour operator responded that scientists, which they rely on for help to protect the wildlife they visit, were involved in studies of the impacts of tourism on wildlife. A number of studies note the lack of research into the biophysical and behavioural impacts of tourism on wildlife (Braithwaite & Reynolds, 2002; Green & Higginbottom, 2001; Higginbottom & Buckley, 2003; Reynolds & Braithwaite, 2001; Rodger & Moore, 2004; Roe *et al.*, 1997; Shackley, 1996). Tour operators may be unaware of what scientists are doing and the potential contributions they can make to the wildlife tourism industry (Rodger & Moore, 2004) because science has different meanings for people in different situations (Wynne, 1991).

One possible explanation for this perceived lack of involvement is that tour operators are unaware of what scientists are studying and how the findings might be relevant to them. Scientists have long been judged poor communica-

tors (Gray, 1999) and they may not be communicating their activities or findings to operators. However, there is increasing evidence that many scientists do not find researching the interactions between tourists and wildlife and the associated potential impacts of tourists on wildlife intrinsically or professionally appealing as there are few professional rewards and recognition (Rodger & Calver, 2005; Rodger & Moore, 2004). The latter point in particular seems the most likely reason for the observed low level of engagement. This explanation is further strengthened by few tour operators identifying good working relationships with scientists (government, university, NGO) (Table 9). Many scientists are geographically remote from where the tour operators work. The organisations and individuals in closer geographic proximity to tour operators were identified as having better relationships, for example, the relationships between tour operators and park managers and local businesses. This finding suggests that geographical separation may be another part of the reason why there is limited engagement by scientists with tour operators and their wildlife interests.

Although the role of science and scientists was limited, half of the tour operators responded that the wildlife they view were monitored. They noted that managers, scientists and operators themselves were involved in monitoring, predominantly through animal surveys. Particularly interesting is tour operators' identification of who monitors. Slightly more respondents identified operators as doing the monitoring, compared to scientists (37% versus 33%, see Table 7). Monitoring is clearly not the sole preserve of scientists. It can be undertaken by protected area managers, tourism operators, and consultants as well as by scientists (Buckley, 2003; Green & Higginbottom, 2001). In recent years guidelines have been published encouraging tour operators to monitor the wildlife they view (Higginbottom, 2004), however, fundamental to all monitoring is good design. Little has been reported on the monitoring designs that tour operators use, raising concerns about the objectiveness of the monitoring as tour operators are also involved with potentially causing the impacts.

The lack of research and monitoring detected in this study was attributed to a lack of financial support. Funding for scientific research has become highly competitive in recent years (Turpin, 1997). Additionally tour operators highlighted the lack of partnerships between scientists and their industry, with operators identifying poor to non-existent relationships. The ties between industry and public research institutions in Australia have traditionally been weak, with insufficient levels of funding and political commitment (Higginbottom *et al.*, 2001). Government reviews of Australian research arrangements have resulted in the establishment of new research centres (e.g. Cooperative Research Centre for Sustainable Tourism) in a variety of areas to encourage direct industry ownership of joint scientific facilities. These centres have the aim of bringing researchers and industry together to diffuse knowledge between the two (Turpin, 1997).

In addition to research into tourism impacts, tour operators would like to see a continuation of research on the impacts of burning, clearing and feral animals. These impacts have received far more research attention than the impacts of tourism, in large part due to their widespread and extensive impacts on Australia's natural environment (Buckley, 2000; Higginbottom *et al.*, 2001). The impacts of fire and feral animals on wildlife continue to be the focus of wildlife research

in Australia because of their current and potential impacts on the nation's biodiversity (Andersen & McKaige, 1998; Higginbottom *et al.*, 2001).

Conclusions and Sustainable Futures

This study has explored the interface between tour operators, tourists and wildlife, with a focus on the role of science, as a critical contribution to the sustainable management of this industry. The information provided by wildlife tour operators through this study provides clear signposts for how this fledgling industry can be maintained and progressed.

Almost three-quarters of tours are operating on government managed land, principally protected lands and waters. Such areas are managed for the dual mandate of environmental protection and meeting visitor needs, in so far as they are compatible with maintenance of these environmental values (Worboys *et al.*, 2001). Such areas continue to struggle to access adequate public funding and yet their maintenance and protection of the wildlife they contain provides the essential platform for three-quarters of the wildlife tour industry in Australia. It is essential that the financial benefits of protected areas to this industry are properly included in the financial accounting and negotiations associated with protected area funding and management (see Carlsen & Wood, 2004).

Given the similarities between wildlife tourism and ecotourism, the approaches to sustainability taken in the ecotourism industry should be equally applicable to wildlife tourism. In particular, the ecotourism industry's emphasis on education and interpretation could benefit the wildlife tourism industry, particularly where interactions between tourists and wildlife have the potential to damage one or both parties. Both industries also rely on a number of facets of the natural environment – scenery, remoteness, activities and wildlife. As such, marketing and pre-visit expectations can be managed to reduce the emphasis on sighting particular wildlife species, thus managing visitors' expectations and potentially enhancing their overall experience. The two industries, although somewhat similar, differ in their attention to research. The ecotourism industry has benefited from extensive research into environmental impacts, beginning with work in wilderness areas in North America in the 1980s (Hendee *et al.*, 1990). Such an emphasis on scientific impact research is currently missing from wildlife tourism (Green & Higginbottom, 2001; Higginbottom *et al.*, 2001; Rodger & Moore, 2004; Roe *et al.*, 1997). There is an urgent need to focus wildlife research on impacts and develop guidelines for their management for a sustainable future (Reynolds & Braithwaite, 2001; Newsome *et al.*, 2005).

Close interactions (swimming, feeding and touching) between tourists and wildlife were identified by 7–8% of operators (Table 1) and for these activities interactions were identified as high. A significant number of tourists are demanding ever closer interactions with wildlife in their natural settings (Braithwaite & Reynolds, 2002; Gauthier, 1993; Moscardo *et al.*, 2001). Tour operators reported high levels of interaction when tourists are in close proximity with wildlife. Education and regulation may not be effective in reducing this high level of interaction as the close contact is often integral to the experience and operation of this sector of the industry. As such, strategic monitoring and

mechanisms for adaptive management are essential to identify and manage impacts on the wildlife of interest if and when they occur.

Understanding interactions between tourists and wildlife continues to be confounded by a lack of clarity regarding the definition of interaction and how it differs between sectors within the wildlife tourism industry. For example, how might interactions with birds differ from those with marine mammals versus those with reptile species? If interactions are to be maintained sustainably, there is an urgent need to fully describe and define the array of interaction possibilities and develop protocols for interaction with different types of animals and even individual species. Understanding what constitutes an interaction with wildlife and what is an observation and the overall influence this has on the human-wildlife relationship will also help determine where research effort and management sources need to focus (Bentrupperbäumer, 2005). Different knowledge and management action is needed for interaction with wildlife compared to observation of wildlife.

If science is central to ecologically sustainable tourism activities (Gilbert & Dodds, 1992) then the engagement of scientists in wildlife tourism must improve. Engagement from government, university and NGO scientists is equally low. Building relationships with individual scientists with known wildlife and/or tourism expertise offers one possibility. Furthermore, as seen in this study, often where scientists were involved the relationship had often been initiated by the operator. Using the opportunities provided by the Commonwealth of Australia's Cooperative Research Centre scheme provides another possibility. This last suggestion is problematic, however, for small operators, who may not be networked into their State Tourism Organisations, which are regarded by scientists and others as an industry point of contact for CRCs such as the Sustainable Tourism CRC. In Australia, a significant part of the problem is the remoteness of scientists from tour activities and destinations as many scientists are based in major cities while wildlife tourism activities take place in a variety of locations.

Although the role of science and scientists was limited, monitoring was undertaken by half of the tour operators. This raises concerns about objectivity of the results. Monitoring is essential for adaptive management, with an ability to adapt being central to sustainability (Newsome *et al.*, 2005); however a good monitoring design is essential. Currently there is little knowledge on the existing monitoring undertaken by tour operators. Given the clear commitment to monitoring, there is the opportunity to improve the rigour and reporting associated with such monitoring with little additional effort. Guidance could be provided by protected area managers and/or scientists. Given that many operators already feel they are involved in monitoring, the common hurdle of lack of interest does not need to be overcome before activities begin.

To conclude, this study has provided some insight into features of the wildlife tourism industry in Australia today. It is an industry characterised by diversity in destinations, activities and expectations. Currently, the levels of engagement by scientists with tour operators appear to be low, raising concerns about the industry's sustainability, as science is regarded as an essential tenet of sustainability. Future challenges include getting a better understanding of interactions and their management and increasing the involvement of scientists and scien-

tific research with industry. The current and projected growth of the wildlife tourism industry make it imperative that these challenges are met.

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