

1 **The importance of proximity and animal welfare for wildlife tourist satisfaction in the**  
2 **context of interactions with habituated dolphins**

3 The long-term sustainability of wildlife tourism depends on integrating visitor demands  
4 with resource management, requiring an understanding of tourist motivation. Managing  
5 the conflict between access to the animals and welfare, however, may diminish the  
6 experience for tourists. This paper identifies trade-offs tourists are willing to make  
7 between access and animal welfare, associated with feeding habituated bottlenose  
8 dolphins (*Tursiops* sp.) in Monkey Mia, Western Australia. Using a choice modelling  
9 technique, we were able to determine monetary values of visitor experiences. Compared  
10 to the current guaranteed interaction with dolphins (and a daily resort entrance fee),  
11 respondents were willing to pay significantly higher hypothetical entrance fees to avoid a  
12 decrease in proximity to, or probability of, the dolphin interaction. However, negative  
13 impacts on dolphin welfare had a negative impact on visitor utility. Over 80% of visitors  
14 ( $n = 244$ ) accepted management regulations resulting in decreased time with and  
15 proximity to dolphins, if those addressed welfare concerns and were communicated  
16 clearly. Thus, while visitors placed the greatest value on the proximity and predictability,  
17 they were willing to trade off these aspects if they improved dolphin welfare. We provide  
18 management suggestions based on these results.

19 Keywords: iconic species; choice modelling, sustainable tourism, animal welfare,  
20 dolphins

21 **Introduction**

22 Anthropogenic impacts alter global biodiversity, thereby impacting ecosystem  
23 processes and function. Halting the loss of global biodiversity is crucial, as humanity  
24 depends on the services that biodiversity and ecosystems provide (Dirzo & Raven,  
25 2003; Nyaupane & Poudel, 2011; Van der Duim & Caalders, 2002). Ecotourism has  
26 been advocated as a solution to protect local biodiversity. Rather than primarily  
27 conserving biodiversity, ecotourism is based the sustainable use of biodiversity  
28 (Tremblay, Pearson, & Gorman, 2008; Van der Duim & Caalders, 2002) and can be an  
29 economically viable alternative to practices that damage the environment, whilst  
30 promoting environmental awareness and public conservation support (Van der Duim &  
31 Caalders, 2002).

32 Sustainability, the maintenance of ecological processes, is a core principle of  
33 ecotourism, because the exploitation of the product (wildlife experience) affects the  
34 persistence of the experience itself. The impact of tourism on wildlife is a major  
35 concern because of the conflict between visitor motives and sustainable habitat  
36 development (Hu & Wall, 2005; Tremblay et al., 2008). Therefore, tourism and wildlife  
37 resource planning require a complex framework of technical capabilities, including  
38 insights into ecology, wildlife science, welfare management, economics, tourism and  
39 marketing (Tremblay et al., 2008).

40 Marine ecotourism comprises a range of activities based on the marine  
41 environment including whale watching, scuba diving, beach walking and snorkelling  
42 (Garrod & Wilson, 2003). Due to its rapid growth, cetacean-based ecotourism has  
43 received a great deal of attention. For instance, whale-based tourism has increased in  
44 Australia by 15% in a five year period between 1996 and 2001, generating AU\$300  
45 million annually with 1.5 million people participating (Smith et al. 2006a).

46           In this study we focus on the iconic bottlenose dolphins (*Tursiops truncatus*), a  
47 small dolphin species common in coastal areas worldwide and likely to be exposed to  
48 tourism (Constantine, Brunton, & Dennis, 2004; Wilson, Thompson, & Hammond,  
49 1997). Like other mammal species such as chimpanzees (*Pan troglodytes*), bottlenose  
50 dolphins can become habituated to human presence, which is reported to have happened  
51 in Monkey Mia, Shark Bay (Western Australia) since the 1960's (Constantine et al.,  
52 2004; Orams, 1997).

53           Monkey Mia is one of a few places in the world where a long-term relationship  
54 between a group of dolphins and humans has been established though daily feeding  
55 (Connor & Smolker, 1985; Smith et al., 2006b). Following initial interaction with a  
56 single dolphin in the 1960's a group of seven dolphins was habituated (Orams, 1997)  
57 and by the 1980's Monkey Mia had become a tourist destination based around the  
58 dolphin feeding interaction. Increasing tourist numbers resulted in welfare concerns and  
59 as a response the Australian government stationed rangers in the area to implement  
60 formal regulations governing the feeding interaction ( Smith et al., 2008, Smith et al.,  
61 2006a) . As the five dolphins that are currently in the feeding programme reach age of  
62 mortality, feeding events may become more sporadic and could ultimate cease in the  
63 near future.

64           Around 100,000 tourists visit Monkey Mia in Shark Bay annually to see the  
65 habituated dolphins that come to the beach to be fed almost daily. Unsurprisingly, a  
66 multi-million dollar business has developed worth approximately AU\$30 million per  
67 year (Smith et al., 2006a). Shark Bay as a whole is characterised by relatively few and  
68 low impact recreational activities available to visitors, with only two boats operating  
69 wildlife-viewing tours near Monkey Mia (Burgin & Hardiman, 2015) and studies

70 estimate that Monkey Mia alone contributes 20–42% of the local Shark Bay economy  
71 (Stoeckl et al., 2005).

72         The prospect of interacting with dolphins often plays a major role in destination  
73 choice (Tremblay et al., 2008). However, the habituation of wild species is a welfare  
74 concern that requires assessment and management in order to minimize the negative  
75 impact on the species (Tyler & Dangerfield, 1999). Research suggests that food  
76 provision has a negative impact on social behaviour, foraging strategies and survival of  
77 wild bottlenose dolphin populations (Orams, 1995a; Orams & Hill, 1998). A number of  
78 studies have shown a link between food provision and aggression towards conspecifics  
79 (Constantine, 2001; Smith et al., 2006a) and even humans (Bryant, 1994; Orams,  
80 1995a). Moreover, increased disturbance associated with tourism can result in changes  
81 in feeding and resting (Steckenreuter, Harcourt, & Möller, 2011), increases in milling  
82 behaviour (Constantine et al., 2004), injury, vocalisation changes and avoidance  
83 (Orams, 1997). It is largely agreed that ecotourism should follow principles and  
84 practices associated with ecological, socio-cultural and economic sustainability (Weaver  
85 & Lawton, 2007). Therefore, welfare concerns associated with the dolphin interaction  
86 need to be minimised, whilst integrating socioeconomic constraints (Tyler &  
87 Dangerfield, 1999).

88         This paper reports the results of a survey investigating how aspects of the  
89 dolphin interaction influence visitors, specifically the degree to which they were  
90 prepared to trade off elements of that interaction with other aspects of their visit. Our  
91 objective was to gain insight into visitor satisfaction changes if management was  
92 altered, which is likely in the future. To do so, we conducted two choice experiments  
93 with visitors in Monkey Mia to study willingness to pay (WTP) for changed  
94 management regimes using choice modelling. We investigated WTP associated with

95 four levels of proximity to the dolphins and the importance educational activities in the  
96 Monkey Mia context (i.e. the education science centre). In a second set of choice  
97 models we evaluated the importance of animal welfare, the wildlife experience and  
98 possibility of other activities including terrestrial (hiking) and those not based on  
99 ecotourism (kite or wind surfing).

## 100 **Methods**

### 101 *Study site*

102 Shark Bay is an embayment approximately 13,000 km<sup>2</sup> in area and located on  
103 the east side of the Peron Peninsula on the West Coast of Australia, approximately 850  
104 km from Perth. In 1991 Shark Bay was assigned World Heritage status (Smith et al.,  
105 2006a). Monkey Mia is a small tourist resort consisting of a caravan park, camping  
106 ground, backpacker and hotel.

### 107 *Survey*

108 We conducted and analyzed a paper based visitor survey, which included  
109 questions about visitor expectations & experience, the socio-economic status of the  
110 subjects (including age, sex, educational status, group characteristics, occupation, etc.)  
111 and two choice sets drawn from a choice experiments. Choice set 1 focused on  
112 proximity to, and likelihood of, encountering dolphins (*Dolphin interaction as*  
113 *currently, 50% chance of observing dolphins, Occasional sightings offshore, No*  
114 *dolphins*) and the science center, indicating which education experience visitors valued.  
115 Choice set 2 focused on dolphin welfare (*Increased calf mortality*), expectations  
116 regarding feeding locations (e.g. visitor numbers and site) and alternative activities  
117 (hiking and kite surfing). This enabled us to evaluate the importance of welfare and  
118 dolphin interaction and other visit characteristics in order to understand the potential  
119 outcomes of changes in the feeding programme.

120 In order to understand destination choice, as well as the value respondents place  
121 on a number of activities including the dolphin interaction, respondents were asked to  
122 rank each activity on a scale ranging from, not important (1) to very important (4).

### 123 *Choice Experiment Methodology*

124 Choice experiments (CE) have recently become a tool for non-market  
125 evaluation in environmental policy (Bliemer & Rose, 2010; Hanley et al., 1998;  
126 Koundouri, 2009). This method has been developed to study consumer preferences for  
127 goods with multiple attributes (Louviere & Timmermans, 1990) and has been promoted  
128 as a useful methodology to understand tourist consumer behaviour (Crouch et al., 2001).  
129 CE have been used to evaluate factors associated with destination choice (Huybers,  
130 2003b), international tourist demand (Huybers, 2003a; Huybers & Bennett, 2000),  
131 accommodation (Morley, 1995) and single destination demands (Morimoto, 2005).  
132 Moreover, CE have given direct insight into visitor preferences regarding sustainable  
133 park and reserve management such as trail management (Lawson & Manning, 2002;  
134 Newman et al., 2005), hunting (Boxall & Macnab, 2000; Bullock, Elston et al., 1998),  
135 rock climbing (Hanley et al., 2002), mountain biking (Morey et al., 2002) and resource  
136 management (Cahill et al., 2008). Here we used a CE to quantify preferences of visitors  
137 towards potential changes in their experience.

138 In CE, respondents are asked to choose between two (or more) alternatives and  
139 a *status quo* option, which is associated with no change in management. Choice sets are  
140 formed by changing attributes of the alternatives systematically according to the  
141 experimental design (Bateman et al., 2002; Bliemer & Rose, 2010). A Random Utility  
142 Model (RUM) is grounded on the theory of choice, integrating behaviour into economic  
143 evaluation. The RUM presumes that the respondent will choose the alternative with the

144 highest utility. The utility gained by visitor i from tourism experience j can be  
145 represented by a utility function,:

$$146 \quad U_{ij} = \beta X_j + \varepsilon_{ij} \quad (E1)$$

147 Where X is a vector of attributes of the experience j,  $\beta$  a set of parameters, or  
148 weights, of how those attributes contribute to the experience and  $\varepsilon$  is a stochastic  
149 component that is unique to visitor I faced with experience j, but which is unobservable  
150 to the analyst. If given the choice between two or more alternative experiences, the  
151 RUM assumes that they will select the one that yields the highest utility.

152 If one assumes that the stochastic component is distributed independently and  
153 identically as an extreme value (Gumbel or Weibull) distribution then the probability of  
154 selecting the alternative j from a set of K alternatives available is given by the  
155 conditional logit model (Bateman et al., 2002).

$$156 \quad P(Y = j) = \frac{\exp(\beta X_j)}{\sum_k^K \exp(\beta X_k)} \quad (E2)$$

157 If a status quo option is included, the CE will be consistent with utility  
158 maximisation and demand. Then, by comparing attributes in terms of their implicit  
159 prices, rankings between attributes and their levels can be determined (Bateman et al.,  
160 2002).

### 161 *Choice Modelling: Survey Design and Data Collection*

162 A constraint to CE designs is the number of attributes that can be included  
163 before cognitive limits are reached. The relevant attributes for this case were chosen  
164 based on discussions during a pilot study in the region, and the six attributes of interest  
165 were split into two separate choice experiments. The attributes are reported in Table 1.  
166 Costs were the daily entrance fee into Monkey Mia resort charged by the DEC in 2012.  
167 The distribution of attribute levels with each CE was designed using the Ngene 1.1

168 software (ChoiceMetrics, 2012), which allows attributing levels to be combined into  
169 choice sets to achieve efficiency in the design based on statistical design theory. The  
170 experimental design was based on a fractional factorial design, with 16 choice  
171 questions, each comprising two alternatives. We chose 30% decrease in reproductive  
172 success as a realistic scenario as Orams and Hill (1998) showed that the survival rates of  
173 calves born to provisioned females in Monkey Mia were significantly lower (36%) than  
174 for those that were not provisioned (67%) between 1985-1993 (but refer to Mann &  
175 Kemps, 2003; Mann et al., 2000).

176

177 Table 1. a) Choice experiment 1. Attributes and levels associated with each attribute  
178 focussing on proximity and likelihood of dolphin interaction. b) Choice experiment 2.  
179 Attributes and levels associated with each attribute focussing on feeding logistics,  
180 welfare concerns and alternative activities. The bold values represent the levels of the  
181 status quo alternative.

182

### 183 *Survey administration*

184 Initially, the questionnaire was distributed to a test-group of 59 visitors in March  
185 2012. Comments and suggestions were taken into account when designing the main  
186 study. The main survey was distributed over a 10-day period in May 2012 between 8  
187 and 11am, during dolphin feeding times, when the greatest numbers of visitors were at  
188 the beach. The necessary approvals from the DEC and the human ethics committee at  
189 the University of Western Australia were obtained.

## 190 **Results**

### 191 *Overview*

192 The visitor demographics were similar to those obtained by Pinkus and Smith  
193 (2012) who investigated visitor characteristic in Monkey Mia between 2008 and 2012,  
194 which may allow for some generalization in this study. An average of 152.6 people  
195 (11.7SE, n=10 days) attended each feeding interaction during the study period and of  
196 the 320 surveys distributed of which 264 were completed.

197 The majority of tourists surveyed were visiting Monkey Mia for the first time  
198 with about half of the respondents coming from overseas (50.2%, n=263). The majority  
199 of overseas respondents (82.39% n=119) and about half of the Australian respondents

200 (47.29%, n=129) did not intend to return to Monkey Mia. Most respondents who had  
201 visited Monkey Mia before (13.7%, n=262) were from Australia (91.7%, n=36).

202 The survey indicated that 71% of the all respondents would have visited  
203 Monkey Mia even if dolphin feeding not available (n=261). Of those respondents, about  
204 two third (n=186) would have spent the same amount of time in Shark Bay, while over  
205 one third (38.7% n=72) would have spent less time in Monkey Mia. Of the respondents  
206 who would have not taken the trip, 60% (n=29) would have visited a different  
207 destination, while the other 30.2% (n=12) would have not taken a trip. 12.1% of all  
208 respondents were unsure (n=32).

209 Of the respondents, only 19.0% reported to have been able to hand-feed the  
210 dolphins (n=264), while the majority (81.0%) observed the feeding interaction. The  
211 large majority (85.4%, n=205 excluding 9 uncompleted questions) of those respondents  
212 answered that not feeding had not affected their experience negatively. Recently DEC  
213 established regulations under which visitors gather on the boardwalk rather than on the  
214 beach before feeding in order to avoid begging behavior of females, resulting in them  
215 neglecting their calves. According to our survey, the majority of respondents (80.3%,  
216 n=244) *Understand this practice and finds it necessary or Accept the measure taken.*

### 217 ***Importance rankings***

218 Prior to completing demographic information respondents were asked to score  
219 eight categories associated with their expectation of visiting Monkey Mia from 1 (not  
220 important) to 4 (very important). The categories associated with the dolphin interaction  
221 (*Seeing dolphins, Seeing dolphins in their natural environment and Closeness to*  
222 *dolphins*) were valued as most important. In contrast, overall *Feeding dolphins* and  
223 *Participation in a cruise* were of lesser importance to visitors (Figure 1).

224 Figure 1. Average importance score for different activities ( $\pm 1SE$ ) provided in  
225 Monkey Mia, with (1) not important (2) minor importance (3) important and (4)  
226 very important ordered according to declining value. Categories were *Seeing*  
227 *dolphins in their natural environment* (n=241), *Seeing dolphins* (n=242),  
228 *Closeness to dolphins* (n=242), *Observing marine based wildlife* (n=224),  
229 *Opportunity to learn about nature* (224), *Observing land based wildlife* (n=221),  
230 *Feeding dolphins* (n=231) and *Participation in a cruise* (n=218).

### 231 ***Choice experiment 1***

232 Although the importance scores give indication of rankings, these are essentially  
233 unconstrained: the respondent is not required to make any tradeoffs in making the  
234 scores. In contrast, the choice experiment set requires explicit tradeoffs to be made.  
235 The choice set data were analyzed using a conditional logit model, with the probability  
236 of choosing an alternative modeled as a function of its attributes (Hanley et al., 1998).  
237 The estimated coefficients represent (scaled) marginal utilities and imply the rate at  
238 which respondents were willing to trade-off one attribute for another.

239 The current level of interaction was used as the baseline, to which alternatives  
240 were compared. The p values indicate that all interaction levels are considered worse  
241 than the current level, that no science centre is viewed as reducing utility compared to  
242 the current position, but the positive improvements in the centre do not increase utility.  
243 Moreover, the results show a progressive reduction in utility as the form of interaction  
244 becomes more attenuated, as indicated by the large negative coefficients (Table 2).

245

246 Table 2. Results of Choice Experiment 1 parameter estimates (conditional fixed effects  
247 logistic regression). Significant values are highlighted bold.

248 ***Choice experiment 2***

249           Reductions in welfare, implied by reproductive success, were viewed highly  
250 negatively and were associated with the lowest coefficient (Table 5). While viewing  
251 feeding from the beach in groups of over 300 visitors decreased utility, viewing the  
252 dolphin interaction in lower numbers (<300) did not result in a reduction in experience  
253 compared to the current situation. The use of a viewing platform did not reduce utility  
254 relative to current practice (Table 3). Presence of new activities within the area had  
255 divergent effects: kite/ wind surfing was viewed negatively, while the more low key  
256 activity of providing guided hiking tours is seen positively.

257

258 Table 3. Results of Choice Experiment 1 parameter estimates (conditional fixed effects  
259 logistic regression). Significant values are highlighted bold.

260

261           Part-worth's are defined as the ratio of the coefficients of the desired attribute by  
262 the coefficient of the cost variable (*Price*), and give relative monetary values and  
263 implies a ranking of the changes in attributes in a common metric. As reported, the  
264 monetary values (AU\$) can be interpreted as the amount that respondents would be  
265 prepared to pay to avoid the loss in utility associated with the change in experience and  
266 can be compared across choice experiments. The results suggest that *Not seeing*  
267 *dolphins* would have the largest impact on utility, but *Negative impacts on dolphin*  
268 *welfare* was also perceived highly negative, ranking second. The nature of the  
269 interaction had a significant negative impact on utility, with changes in other activities  
270 relatively unimportant (Table 4).

271

272 Table 4. Willingness to pay to avoid change in experience from choice experiments 1  
273 and 2. Only significant values are reported.

274 **Discussion**

275           The current lack of understanding of tourist expectations regarding their wildlife  
276 experience makes sustainable resource management challenging (Fredline & Faulkner,  
277 2001; Higginbottom, 2004; Lee & Moscardo, 2005; Moscardo et al. 2001; Tremblay et  
278 al., 2008). Our survey highlights the importance of proximity to animals and their  
279 welfare, which may be in conflict with one another, but could be managed if  
280 communicated clearly.

281           The results of the choice modeling highlighted the importance of probability and  
282 proximity of the dolphin interaction. Respondents were willing to pay an additional  
283 AU\$11 to avoid *50% chance of dolphins at feeding*, and AU\$19 if *Dolphins would only*  
284 *be sighted offshore*. *No dolphins* around the area was perceived as the worst situation  
285 relative to status quo, with an inferred price of AU\$40. Supporting this, visitors ranked  
286 categories associated with the dolphin interaction (*Seeing dolphins*, *Seeing dolphins in*  
287 *their natural environment*, *Being close to dolphins*) highest.

288           The importance of certainty in interaction with dolphins in the expectations  
289 associated with visiting Monkey Mia highlighted by the ranking exercise is in line with  
290 results reported elsewhere (e.g. Fredline & Faulkner, 2001; Hammitt et al, 1993;  
291 Higginbottom, 2004). Supporting that, our results indicated that the large majority of  
292 visitors (85%, n= 205) did not feel that their experience was negatively affected if they  
293 were not able to feed the dolphins themselves. This suggests that possibly feeding is  
294 seen as a means to the desired end: certainty of viewing, rather than a desired activity of  
295 itself.

296           Feeding interactions have a negative impact on habituated dolphins (Bejder et al.  
297 2006a; Bejder et al., 2006b; Orams, 1995a; Orams & Hill, 1998), making it essential to  
298 understand the role animal welfare plays for tourists in order to find management  
299 approaches the can alleviate the tension between animal welfare and tourist expectation.

300 Dolphin welfare was highly important to respondents (here measured as *Change in*  
301 *reproductive success*, CE2), willing to pay AU\$33 in order to avoid a *Decrease in*  
302 *reproductive success*. This is almost equivalent to the amount they are prepared to pay  
303 to avoid there being no dolphins at all, suggesting visitors they would be prepared to  
304 forgo dolphins being present, if it that meant that there was no reduction in dolphin  
305 reproductive success.

306         Research has show that visitors are more likely to support management  
307 approaches and regulations within an environment if welfare impacts on species are  
308 clearly communicated to them (Ballantyne et al., 2009). Here, we found strong support  
309 for the management approach that restricted visitors from entering the beach before the  
310 feeding in order to ensure calf welfare. Although this impacted on their experience by  
311 limiting their time and proximity to the dolphins, visitors embraced this management  
312 approach. Thus, well communicated eco-tourism has the potential to increase  
313 understanding of ecosystems and to change the attitudes of visitors, resulting in  
314 environmentally responsible behavior, contributing to the long term viability of the  
315 ecosystems (Orams, 1995b).

316         Other attributes would have not met tourist expectations, with in little or no  
317 change in consumer utility compared to dolphin interaction and welfare attributes. For  
318 example, respondents did not support an *Enhancement of the science centre*, but *No*  
319 *science centre* had a negative impact on visitor utility. CE 2 showed that having high  
320 numbers of visitors ( >300) in the dolphin interaction area decreased utility (Table 3).  
321 Larger visitor numbers limit individual distance, exposure and naturalness, all of which  
322 are important aspects in visitor experience (Reynolds & Braithwaite, 2001). Activities  
323 such as kite/ wind surfing were associated with decreased utility, whereas respondents  
324 would be willing to pay AU\$7 for the introduction of hiking activities.

325 Wildlife tourism constitutes a significant contribution to the management of  
326 protected areas with funds associated with tourism ranging from 5-50% (Buckley, 2009)  
327 and with icon species playing an important role contribution to these funds and  
328 visitation rates (Skibins, 2012). However, icon species are also often challenging to  
329 manage in a setting where they are exploited (Lindsey, Alexander, Mills, Romanach, &  
330 Woodroffe, 2007). Restricting the interaction with an icon species can result in  
331 decreased public support and funding, which can have local and regional impacts. Thus,  
332 the demands of tourists have to be understood and managed against the needs of the  
333 resource, to make wildlife tourism biologically and economically sustainable  
334 (Semeniuk, Haider, Beardmore, & Rothley, 2009; R. G. Wright, 1998).

335 Our results stress the dependence of the regional economy in Shark Bay on the  
336 dolphins, which has been shown elsewhere (Stoeckl et al., 2005). Monkey Mia attracts  
337 approximately 100 000 visitors annually, with the expenditure on the icon species  
338 accounting for almost 19% of regional income (Stoeckl et al., 2005). It is essential to  
339 define visitors needs and expectations regarding their experience, understand this  
340 interdependency between wildlife icon and economy. According to our study, only  
341 43.5% of respondents claimed that they would spend the same amount of time in the  
342 region if the dolphin feeding was not available, which similar to the 46% reported by  
343 Stoeckl et al. (2005).

344 Here we show that the quality and certainty of the dolphin interaction, as well as  
345 welfare considerations, were of high importance to the visitors of Monkey Mia. By  
346 communicating the importance of regulations associated with welfare, the conflict  
347 between visitor demands and animal welfare could be alleviated. Thus, wildlife tourism  
348 can only be successful if the visitor demands are integrated into wildlife resource  
349 planning and management (Tremblay et al., 2008). Effective planning and management

350 can only occur if the motivations and needs of tourists are understood and integrated  
351 (Tremblay et al., 2008).

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511 **Tables & Figures**

512

513 Table 1. a) Choice experiment 1. Attributes and levels associated with each attribute

514 focussing on proximity and likelihood of dolphin interaction. b) Choice experiment 2.

515 Attributes and levels associated with each attribute focussing on feeding logistics,

516 welfare concerns and alternative activities. The bold values represent the levels of the

517 status quo alternative

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**a) CE1**

<b>Attribute</b>	<b>Level</b>
<u>Interaction</u>	<b>Continued as it is currently (daily feeding on beach)</b> 50% chance of dolphins attending feeding Occasional dolphin sightings from far off shore No dolphins around the area
<u>Science centre</u>	<b>Current science centre</b> Enhanced science centre (modernised, interactive) Current science centre + greater number of talks No science centre
<u>Cost</u>	<b>AU\$16</b> AU\$4 AU\$8 AU\$24

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**b) CE 2**

<b>Attribute</b>	<b>Level</b>
<u>Feeding location</u>	<b>No change (feeding on beach, variable numbers of visitors)</b> From viewing platform On the beach (over 300 visitors) On the beach (well under 300 visitors)
<u>New activities</u>	<b>No change (no new activities provided)</b> Kite/ wind surfing Guided walks/ talks about site
<u>Welfare impacts</u>	<b>No change in reproductive success</b> Decrease in reproductive success (30 % greater calf mortality)
<u>Cost</u>	<b>AU\$16</b> AU\$4 AU\$8 AU\$24

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518

519 Table 2. Results of Choice Experiment 1 parameter estimates (conditional fixed effects  
 520 logistic regression). Significant values are highlighted bold.

<b>Attribute</b>	<b>Level</b>	<b>Coefficient</b>	<b>SE</b>	<b>z</b>	<b>P&gt; z </b>
<b>Interaction</b>	50/50 chance	-1.252	0.20	-6.17	> <b>0.001</b>
	Sightings Offshore	-2.120	0.29	-7.23	> <b>0.001</b>
	No dolphins	-4.303	0.49	-8.71	> <b>0.001</b>
<b>Visitor centre</b>	Enhanced	0.188	0.24	0.79	0.427
	Talks given	0.004	0.23	0.02	0.987
	No science centre	-0.828	0.20	-4.06	> <b>0.001</b>
<b>Price</b>		-0.111	0.02	-6.1	> <b>0.001</b>

521 Observations: 968  
 522 Pseudo R<sup>2</sup>: 0.2717  
 523 LogL: -244.33  
 524

525 Table 3. Results of Choice Experiment 1 parameter estimates (conditional fixed effects  
 526 logistic regression). Significant values are highlighted bold.

<b>Attribute</b>	<b>Level</b>	<b>Coefficient</b>	<b>SE</b>	<b>z</b>	<b>P&gt; z </b>
<b>Feeding location</b>	Ob (+300)	-0.875	0.23	-3.89	> <b>0.001</b>
	Ob (-300)	0.279	0.19	1.49	0.135
	Platform	-0.155	0.19	-0.8	0.421
<b>New activities</b>	Kite/ wind surfing	-0.603	0.18	-3.32	<b>0.001</b>
	Hiking	0.478	0.18	2.59	> <b>0.01</b>
<b>Welfare</b>	Decreased reprod. success	-1.331	0.23	-5.67	> <b>0.001</b>
<b>Price</b>		-0.038	0.01	-2.58	<b>0.010</b>

527 Observations: 944  
 528 Pseudo R<sup>2</sup>: 0.1126  
 529 LogL: -290.31  
 530

531 Table 4. Willingness to pay to avoid change in experience from choice experiments 1  
 532 and 2. Only significant values are reported.

<b>Attribute</b>	<b>Level</b>	<b>\$/Visit</b>	<b>SE</b>	<b>z</b>	<b>P&gt; z </b>	<b>Rank</b>
<b>Interaction</b>	50/50 chance	11.28	2.05	5.51	<b>&lt;0.001</b>	6
	Sightings Offshore	19.10	2.66	7.17	<b>&lt;0.001</b>	4
	No dolphins	38.78	4.88	7.95	<b>&lt;0.001</b>	1
<b>Visitor centre</b>	No science centre	7.46	1.89	3.95	<b>&lt;0.001</b>	7
<b>Feeding location</b>	Of Beach (+300)	23.18	10.82	2.14	<b>0.032</b>	3
	Kite/ wind surfing	15.98	6.71	2.38	<b>0.017</b>	5
	Hiking	-12.67	5.66	2.24	<b>0.025</b>	8
	Welfare	35.27	11.33	3.11	<b>0.002</b>	2

533

534 Figure 1. Average importance score for different activities ( $\pm 1SE$ ) provided in  
535 Monkey Mia, with (1) not important (2) minor importance (3) important and (4)  
536 very important ordered according to declining value. Categories were *Seeing*  
537 *dolphins in their natural environment* (n=241), *Seeing dolphins* (n=242),  
538 *Closeness to dolphins* (n=242), *Observing marine based wildlife* (n=224),  
539 *Opportunity to learn about nature* (224), *Observing land based wildlife* (n=221),  
540 *Feeding dolphins* (n=231) and *Participation in a cruise* (n=218).