

Antarctic tourists: ambassadors or consumers?

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ABSTRACT. Two complementary studies were conducted to investigate both the immediate and longer-term influence of Antarctic cruise tourism experiences on participants' knowledge of Antarctica, attitudes toward management issues facing the Antarctic region, and environmental behaviours and future intentions. In addition, the study investigated tourists' attitudes toward visitor guidelines. The results suggest that Antarctica nature-based tourism operators have the potential to provide experiences that educate the public to the importance of Antarctica.

Contents

Introduction	233
Methods	235
Results	236
Discussion: summary of results	237
Conclusions	239
Acknowledgements	239
References	239

Introduction

Researchers and non governmental organisations question whether Antarctic tourism can be effectively managed through the use of interpretation and voluntary guidelines (for example ASOC 1999; Davis 1995, 1999; Enzenbacher 1995; Jabour and Mortimer 2005; Stonehouse and Crosbie 1995). On the other hand, proponents of sustainable Antarctic tourism believe the industry can, through tour design and interpretation, mitigate the potential negative environmental impacts of tourism and build an educated and motivated constituency that supports environmental conservation, both on site and at home (for example IAATO 2004a, 2004c; Jabour and Mortimer 2005; Maher and others 2003; Mason 2005; Spletstoesser 1996, 2000). Protected area managers have long used interpretation as a tool for increasing knowledge of, and managing specific tourist behaviours towards, important resources (for example Ham and Krumpel 1996; Hammitt and Cole 1998) and now nature-based tourism (NBT) operators in Antarctica and other locations play an increasingly important role in providing interpretation services and in mitigating negative environmental tourist impacts (Weiler and Ham 2001). However, despite widespread arguments that Antarctic tourism has the potential to enhance tourists' understanding of Antarctica and augment support of environmental conservation, industry-wide assumptions about these effects remain largely untested (Mason 2005;

Mason and Legg 1999; Stewart and others 2005). This present study attempts to evaluate the performance of NBT operators in Antarctica against the outcomes that it is claimed to produce. The operators chosen for the analysis included four Antarctica tour operators that provide ship-based cruises and one operator that provides expeditionary sea kayaking trips to the Antarctic Peninsula. Mandated to familiarise their clients with the visitor guidelines of the 1994 Kyoto recommendations on the Guidance for Visitors to the Antarctic (Antarctic Treaty Parties 1994b; Spletstoesser 1996), these operators, as members of the International Association of Antarctica Tour Operators (IAATO), are also expected to 'enhance public awareness and concern for the conservation of the Antarctic environment and its associated ecosystems' and to 'create a corps of ambassadors for the continued protection of Antarctica by offering the opportunity to experience the continent first hand' (IAATO 2004a). Accordingly, the research explored the immediate and long-term effects of Antarctica tour participation on tourists' knowledge of Antarctica, attitudes toward the management of Antarctica, environmental behaviours and future intentions.

Tourism in Antarctica

From its humble beginnings in 1958, Antarctic tourism grew slowly until the last decade, when the industry experienced rapid expansion (Bauer 2001; IAATO 2007). Visitation numbers doubled between 1985/1986 and 1988/1989, again between 1989/1990 and 1991/1992, and finally between 1992/1993 and 1999/2000 (Enzenbacher 1992; Headland 1994; IAATO 2004b). Based on figures produced by the National Science Foundation (NSF) and IAATO, between November 1996 and March 2000, 41,352 tourists sailed to Antarctica on commercial tours. In 2000 alone, 14,402 tourists traveled to Antarctica on 21 vessels from November 1999 to March 2000, a 46%

increase over the 1998/1999 season (IAATO 2004b). Although there was a slight retraction in visitation over the 2000/2001 season, visitation has continued to increase up to the 2007 season. Currently sea based tourism (cruises) accounts for roughly 99% of all tourism to Antarctica (IAATO 2004b). IAATO and industry experts project that expansion will continue into the foreseeable future with sea-based tourism visitation in 2006/2007 topping 34,000 (Bauer 2001; IAATO 2007).

Tourism management in Antarctica

In 1991, the Antarctic Treaty Parties (ATP) passed 'the Protocol on Environment Protection to the Antarctic Treaty' which strengthened the Antarctic Treaty by introducing safeguards through the requirement of environmental impact assessments and the monitoring of all activities occurring within the treaty area (ATCP 1991). This Protocol, also called the Madrid Protocol, recognised the intrinsic value of the Antarctic environment and its dependent ecosystems, 'including its wilderness and aesthetic values and its values as an area for the conduct of scientific research' (Antarctic Treaty 1991: 3). Some argue that the protocol was developed because of a growing concern for the potential negative impacts caused by the quickly growing Antarctic tourism industry although the measure focused on all activities.

Also in 1991, a group of Antarctic operators formed the International Association of Antarctica Tour Operators to represent the industry to Antarctic Treaty Consultative Parties, national science organisations and the worldwide public (Stonehouse 1992). Currently Antarctic tourism is largely self-managed through IAATO guidelines although the ATP, during the 1994 Kyoto Antarctic Treaty Consultative Meeting, adopted two recommendations to manage the tourism industry: the Guidance for Visitors to the Antarctic and the Guidance for those Organizing and Conducting Tourism and Non-governmental Activities in the Antarctic. These two guidelines promoted the protection of the Antarctic environment and the adherence of the Madrid Protocol and its annexes by outlining cursory procedures for visitors and tourism operators (ATCP 1994a, 1994b). While there are no measures to regulate or enforce the treaty or its agreements, IAATO has developed extensive industry guidelines that have evolved with the maturation of the industry (Spletstoeser 2000). These guidelines seek to meet the objectives of IAATO to 'advocate, promote, and practice safe and environmentally responsible private-sector travel in Antarctica (IAATO 2004a). More recently IAATO has focused on vessel scheduling (spatial and temporal management of visitation), emergency medical procedures, establishing and testing 'Site Specific Visitation Guidelines,' reinforcing environmental management and visitor procedures to prevent spread of invasive species and disease, enhancing operating procedures, monitoring of visitation, and promoting IAATO guidelines to non members (IAATO 2004c). IAATO and its members also seek to 'enhance public awareness and concern for the conservation of

the Antarctic environment and its associated ecosystems' and to 'create a corps of ambassadors for the continued protection of Antarctica by offering the opportunity to experience the continent first hand' (IAATO 2004a). To this end tour operators provide interpretation pertaining to the Antarctic environment although the level of emphasis varies depending on leaders and companies. However all Antarctic tour operators are required to familiarise their tourists with the visitor guidelines mandated under the 1994 Kyoto recommendations on the Guidance for Visitors to the Antarctic (ATCP 1994b; Spletstoeser 1996).

Educational and behavioural influence of the NBT experience

Positive and negative NBT impacts can be categorised into four broad categories: environmental, social, economic, and psychological (Powell 2005). To date, considerable research has focused on the potential negative biophysical impacts of Antarctic tourism (for example Acero and Aguirre 1994; Culik and Wilson 1995; Curry and others 2005; Curry and others 2002; Davis 1995; Giese and Riddle 1999; Naveen and others 2001; Naveen 1996, 2000; Nimon and others 1995; Regel and Putz 1997; Wilson and others 1991).

However, researchers have also noted the need for investigating the psychological effects of Antarctic tourism participation (Mason 2005; Mason and Legg 1999; Stewart and others 2005). As Mason (2005) and Stewart (2005) note, research focusing on Antarctic tourists and their experience has provided little insight into whether positive influences in knowledge, attitudes, or behaviours occur. Cessford and Dingwald (1994) and Bauer (2001) investigated demographic profiles, motivations, satisfaction, and perceptions of environmental impacts. Davis (1995) also investigated tourists self reported tour behaviours and ethical standards concluding that visitor education efforts, while an important part of Antarctic wilderness management, are inadequate.

However no studies have focused on whether Antarctic tourism participation influences specific cognitive (knowledge of Antarctica), attitudinal (attitudes toward Antarctica management), or behavioural (environmental behaviours) outcomes. NBT research focusing on the influence of participation and interpretation on knowledge, attitudes, and behaviours, has provided inconsistent results. Contrary to expectations, NBT experiences often produce little evidence of knowledge increase, despite tourists' high enjoyment of their experience (Ryan and others 2000). Some researchers argue that because the primary motives of tourists are entertainment, comfort, and consumption, it may be unrealistic to expect them to learn about the host environment or support sustainable practices through overt behaviour (Hollinshead 1999; Welford and others 1999). Instead, they suggest that nature-based tourism experiences should be thought of as extraordinary experiences and not as an environmental education tool that promulgates conservation. However

research focusing specifically on interpretive programmes occurring within NBT experiences and national parks and protected areas have sometimes found shifts in knowledge and occasionally attitudes (Hughes and Saunders 2005; Madin and Fenton 2004; Tubb 2003), although most previous studies suggest that even substantial knowledge gains from an interpretive experience have led to little or no attitude or behavioural impact (for example Beaumont 2001; Lee and Moscardo 2005; Morgan and others 2003; Wiles and Hall 2005). The exception to this trend pertains to research of well-planned, theoretically based interpretation that is designed not only to entertain but also influence knowledge, attitudes, and behaviours. This research suggests that by applying social psychological theories, such as the cognitive dissonance theory (for example Orams 1996; Aronson 1997), theory of planned behaviour (for example Ham and Krumpal 1996; Ham and others 2007; Armitage and Conner 2001; Powell and Ham in press) and the elaboration likelihood model of persuasion (for example Andrews and Shimp 1990; Petty and others 1995) to interpretation, practitioners can improve the likelihood of influencing not only knowledge and attitudes, but also behaviours (for example Ham 1992; Ham and others 2008; Moscardo 1999; Roggenbuck 1992). So while the results of some studies suggest that little impact on tourist cognition, attitudes, and conservation behaviours occurs as a result of a NBT experience, studies focused on evaluating well-planned and theoretically-based interpretation do suggest some potential for knowledge gain and impacts on other cognitive structures and behaviour (Ham 2007).

Methods

Sample and procedures

The objectives of this research were (1) to investigate the immediate influence of Antarctica cruise participation on tourists' knowledge, attitudes, and behaviours; and (2) to investigate the longer-term influence of Antarctica cruise participation on tourists' knowledge, attitudes, and behaviours. Four Antarctic operators who were members of the International Association of Antarctica Tour Operators (IAATO) in 2002 agreed to participate in the study. In addition one operator that conducted expeditionary sea kayak trips and which was not a member of IAATO also agreed to participate. From the five participating Antarctic operators, 10 commercial tours to the Antarctic Peninsula were investigated during the 2002/2003 and 2003/2004 seasons. To explore the immediate influence of participation, eight Antarctica tours were investigated. From these trips, 373 adult tourists that embarked from Ushuaia, Argentina, were asked to complete surveys on the first day of the tour with 288 completing the pre-visitation survey (response rate of 77%). During the eight tours, two people were evacuated due to medical emergency and were dropped from the post-visitation sample. 266 of the 371 potential post-visitation respondents completed a survey on the last

night of their tour (response rate of 72%). Two additional trips served as a control group to investigate the potential influence of testing and re-testing, of which 42 of 53 tourists completed only post-visitation questionnaire on the last night of their tour (response rate of 79%).

To investigate the more long-term influences of participation, 149 of the 266 post visitation respondents (56%) agreed to provide their name and address in order to participate in a questionnaire circulated three months after the trip. These people were emailed or mailed post-visitation questionnaires using a modified Dillman approach (Dillman 2000). Four surveys were returned due to inaccurate addresses, which reduced the retrospective sample total to 145, with 125 respondents completing the survey (response rate of 86%).

Questionnaire design

Prior to undertaking the study, the questionnaire was pilot tested on two Antarctic cruises during the 2001/2002 season. For this study, three six-page, primarily multiple choice questionnaires were used to investigate four outcome variables: knowledge of Antarctica (objective and subjective measures), environmental behaviours and future intentions, and attitudes toward Antarctica management. The objective measure of knowledge of Antarctica ($\alpha = .66$) comprised 10 multiple choice and five true-false questions and measured the tourist's knowledge of Antarctica's natural and human history. In an effort to corroborate the results from the knowledge (objective) of Antarctica index, a subjective measure of knowledge change ($\alpha = .87$) was also developed. Because interpretation often seeks to broaden understanding through the communication of themes rather than isolated facts (Ham 1992; Kohen and Sikoryak 2001), post visitation respondents were asked to report how much their knowledge increased in five thematic areas: natural history, marine biology, oceanography, environmental conservation, and general awareness of the natural environment. Response categories included: 'a great deal,' 'a moderate amount,' 'a little,' 'none,' and 'no opinion.' The five thematic areas were selected to reflect the general interpretational themes covered by Antarctic tour operators and the importance of these thematic areas for understanding the Antarctic environment. The environmental behaviours and future intentions index ($\alpha = .82$) measured tourists' activities in seven environmental actions that were selected for their social desirability and high locus of control. Response categories included: 'a great deal,' 'a moderate amount,' 'occasionally,' 'rarely,' and 'never.' Studies using similar indices that investigated general environmental behaviours included Beaumont's study of nature-based tourists, Cottrell's study of recreational boaters, and Kellert's study of wilderness education participants (Beaumont 2001; Cottrell 2003; Kellert 1998). The attitudes toward Antarctica resource management index ($\alpha = .87$) comprised 10 questions and investigated a participant's supportive or oppositional attitudes toward

potential strategies for managing or protecting the Antarctic environment. Response categories included: 'strongly support,' 'support,' 'oppose,' 'strongly oppose,' and 'no opinion.' The environmental and management issues under investigation reflected present or historical concerns and were deemed important by the researchers and the operators who reviewed the instrument. Because Antarctic tourists can directly impact the Antarctic environment, understanding their attitudes and reactions to current visitor management guidelines can provide insight into the effectiveness of current visitor education efforts. Finally, a series of five questions, based on the work of Davis (1995), was used to investigate tourists' attitudes toward the ATCP and IAATO visitor guidelines designed to protect the Antarctic environment. Response categories included: 'strongly agree,' 'agree,' 'disagree,' 'strongly disagree' and 'no opinion.' In all indices, missing data and responses of 'no opinion' were excluded from statistical analysis. This accounts for the variation in sample size for a particular variable in question.

Results

Tourist characteristics

Fifty-six percent of all respondents were male. The mean age of all study subjects was 51.04. Only 7.4% had previously participated in an Antarctic tour. For 92.6% of the participants, this was their first trip to Antarctica. However 51.3% of the tourists reported participating in 3 or more previous nature tours. 63.2% of participants were from a city or suburb. 59.7% of all respondents claimed the USA as their country of citizenship and 16.2% reported their nationality as Australian or New Zealand. 85.2% had a college or professional/graduate degree. Chi-square analysis revealed no significant differences between test groups. From a list of 13 possible motivations for participation, seeing a beautiful landscape had the highest mean score with 93% ranking the motivation as 'very important' (Table 1). Response categories were: 'very important,' 'important,' 'unimportant,' 'very unimportant,' and 'no opinion.'

Influence on knowledge, attitudes, and behaviours

A one-way analysis of variance revealed that significant changes in knowledge of Antarctica's natural history and general environmental behavioural intentions occurred immediately after participation (Table 2). In addition results suggest that a large percentage of this knowledge was retained three months after visitation.

The respondents answered 60% of the knowledge questions correctly prior to participating in the tour and, after participation, correctly answered 74%. Three months later, respondents correctly answered 73%. Although testing bias is a concern regarding these results, *post hoc* analysis found no significant testing effects, which supports results from similar investigations occurring in Grand Canyon National Park with similar instruments (Powell and others in press). In an effort to corroborate the results from the knowledge index, respondents reported their perceived increase in knowledge in five thematic areas: natural history of Antarctica, marine biology, oceanography, environmental conservation, and general awareness of the natural environment. Immediately following visitation, the tourists reported a high level of knowledge increase in all of the categories with 71% of respondents indicating that they learned a great deal or a moderate amount across the five categories. Approximately 83% of the retrospective group also reported learning a great deal or a moderate amount across the five thematic areas of interest. Results from the self-reported knowledge increase scale support the findings from the objective knowledge of Antarctica index that tourists increased their knowledge of the Antarctic environment. General environmental behavioural intentions also appeared to be significantly influenced. Immediately after participation, scores on the general environmental behaviour and associated intentions index increased 10% with respondents intending to increase significantly ($p < .05$) their participation in five of the measured behaviours (Table 3): joining environmental organisations, donating money to environmental organisations that protect Antarctica, avoiding the use of environmentally harmful products, voting for elected officials that support

Table 1. Motivations for participation in an Antarctic tour

Motivations for participation	Rank	N	Mean	% indicating very Important
Seeing a beautiful landscape	1	290	2.93	93.4
Seeing beautiful and interesting wildlife	2	288	2.92	93.1
Exploring new places	3	285	2.85	85.6
Experiencing a wilderness	4	290	2.84	86.2
Learning about the natural history of Antarctica	5	287	2.59	61.7
Adventure and challenging wilderness	6	287	2.32	47.7
Learning about environmental issues and conservation	7	285	2.25	40.7
Learning about the human history of Antarctica	8	288	2.09	27.8
Relaxing and escaping the stress of everyday life	9	287	2.04	35.2
Developing a spiritual connection with nature	10	273	2.01	33.3
Learning new skills	11	282	1.99	28.0
Follow in the footsteps of the great explorers	12	286	1.71	18.2
Socialising with family and friends	13	281	1.70	21.7

Table 2. ANOVA: Comparison of Antarctica test groups

Variable	Pre (1)		Post (2)		Control (3)		Retrospective (4)		ANOVA			Post Hoc
	M	SD	M	SD	M	SD	M	SD	F	(df)	p	
Knowledge (objective) of Antarctica	59.7	15.5	74.1	14.8	69.0	13.5	72.6	14.2	48.2	709	<.001	2,4***>1 3**>1 2=3
Environmental behaviours	60.5	20.1	70.8	17.1	64.5	15.6	63.7	18.7	14.8	707	<.001	2***>1 2**>4 2=3
Attitudes toward management of Antarctica	88.7	10.7	88.0	9.9	87.6	8.3	90.1	7.9	1.6	429	.181	1=2=3=4

* $p < .05$ ** $p < .01$ *** $p < .001$

environmental protection, and attending meetings pertaining to the environment. However, three months after their Antarctica tour, the retrospective respondents showed no significant increases in behaviours as compared with the pre visitation group. Scores on the attitudes toward management of Antarctica index indicated no change in supportive attitudes immediately after, and three months after, participation in an Antarctica cruise. Results suggest that participants in cruises were largely supportive of the Antarctica resource management policies and did not significantly change their opinions regarding management issues after participation (Table 4).

Attitudes toward visitor guidelines

Respondents were asked their opinion of five statements pertaining to visitor guidelines and their behaviours (Table 5). 84% of the post visitation respondents agreed or strongly agreed that they were satisfied with the behaviours of their fellow visitors toward wildlife. Conversely 16% of the post visitation respondents disagreed or strongly disagreed and were dissatisfied with the behaviours of their fellow tourists. 91% of the post visitation respondents disagreed or strongly disagreed that

they should ignore another photographer that repeatedly approached nesting penguins too closely indicating that a predominance of tourists would intervene. 88% of post visitation tourists disagreed or strongly disagreed with the acceptability of taking a small stone as a souvenir from an Antarctic beach. 96% of the post-visitiation respondents agreed or strongly agreed that the guidelines learned on their Antarctic trip were useful for future trips into the natural world. Finally, 62% of respondents agreed or strongly agreed that other Antarctic visitors often approach wildlife too closely. Results suggest that a majority of Antarctic visitors feel that other tourists often do not follow the guidelines regarding approaching and disturbing wildlife.

Discussion: summary of results

The two purposes of this study were to investigate the immediate and long-term influence of multi-day Antarctic cruises on tourists' knowledge of Antarctica's natural and human history, attitudes toward the management of the continent, and their general environmental behaviours and related intentions. Through participation in an Antarctic

Table 3. Environmental behaviours and intentions: independent samples means comparison by item

Statement items	Mean (SD)		df	t	P
	Pre	Post			
Joining organisations concerned with the environment	2.3 (1.4)	2.5 (1.1)	552	-2.080	.038
Donating money to organisations concerned with the protection and improvement of Antarctica	1.3 (1.2)	2.3 (.81)	555	-12.576	<.000
Avoiding the use or purchase of certain products because of their environmental impact	2.8 (1.0)	3.2 (.90)	553	-4.546	<.000
Recycling products at home	3.5 (.84)	3.5 (.82)	554	-.702	.438
Reading about the environment	3.0 (.92)	3.1 (.81)	554	-1.609	.108
Voting for elected officials that support environmental protection	2.6 (1.5)	3.2 (1.0)	554	-5.535	<.000
Attending meetings in the community about the environment	1.5 (1.2)	2.0 (1.1)	554	-4.957	<.000
Total	16.9 (5.6)	19.8 (4.7)	551	-6.543	<.000

Table 4. Post visit attitudes toward Antarctica resource management: independent samples means comparison by item

Statement items	Mean (sd)		df	t	p
	Pre	Post			
Regulating the commercial fishing of krill within Antarctic Treaty waters.	3.6 (.54)	3.7 (.50)	517	-1.307	.192
Regulating the use of long lines for fishing in the Southern Ocean, which accidentally kills sea birds.	3.5 (.62)	3.7 (.55)	517	-2.496	.013
Setting aside large sections of the Southern Ocean as marine protected areas where economic uses like fishing are excluded.	3.5 (.62)	3.6 (.59)	499	-.944	.345
Setting aside large pieces of land in Antarctica as protected areas that limit human uses.	3.5 (.64)	3.5 (.61)	533	-.814	.416
Regulating CO2 emissions in an effort to curb global warming despite the economic ramifications.	3.5 (.63)	3.5 (.60)	508	-.804	.422
Increasing scientific monitoring of the state of the Antarctic environment where tourism occurs	3.6 (.52)	3.5 (.57)	538	2.818	.005
Conserving wildlife in the Antarctic by limiting human access to important breeding areas.	3.6 (.54)	3.5 (.60)	533	1.669	.096
Developing stricter mandatory regulations for visitors in an effort to minimize negative impacts.	3.5 (.60)	3.4 (.64)	506	1.335	.183
Limiting the number of people that visit Antarctica	3.2 (.67)	3.2 (.59)	516	-.402	.688
Eradicating introduced species such as reindeer on South Georgia.	3.2 (.95)	3.0 (.77)	402	1.281	.201
Total	35.5	35.2	326	.602	.548

tour, environment knowledge of Antarctica increased significantly immediately after participation and the results imply that a large percentage of this knowledge was retained three months after participation. Environmental behavioural intentions increased significantly immediately after participation, however three months after participation, the results indicated that participants only incrementally changed their environmental behaviours. Although there may be many physical, temporal, and psychological reasons for the tourists' failure to act upon their behavioural intentions three months after their Antarctic cruise, the results suggest that Antarctica tour operators and IAATO have an opportunity to improve their on-site interpretation and outreach programmes so as to provide immediate and straightforward opportunities

for tourists to alter and further develop their Antarctic ambassadorship behaviors. For example, while all groups under investigation provided interpretation regarding Antarctic conservation issues, such as longline fishing bycatch, krill harvesting, and climate change during lectures and briefings, only four trips provided direct opportunities for trip participants to support conservation. The efforts included presenting a slide show prepared by the 'Save the albatross campaign' which provided information and interpretation pertaining to the long-line fishing industry and its negative impacts on albatross and other sea bird populations. After the presentation, flyers were distributed which urged people to donate money to the organisation after the trip. Only one of these operators then held an immediate fundraiser for

Table 5. Frequencies of responses (percentage): attitudes toward visitor guidelinesx

Item	N	Strongly Agree	Agree	Disagree	Strongly Disagree
I am satisfied with the behaviours of my fellow visitors with regard to the wildlife on shore.	260	14.6	69.2	14.6	1.5
Walking with a few friends, you notice another photographer repeatedly approaching nesting penguins too closely. You should ignore the incident as the penguins appear OK.	259	0.8	8.5	73.4	17.4
While walking along an Antarctic beach, you find a beautiful green rock. Although guidelines forbid the collection of biological or geological specimens, it would be OK to take one small stone as a souvenir.	257	2.3	9.3	51.0	37.4
The wilderness guidelines that I learned on this trip will provide useful guidance for future trips into the natural world.	248	21.8	74.2	3.6	0.4
Other Antarctic visitors often approach wildlife too closely.	184	5.4	57.6	36.4	0.5

the campaign with the hope of motivating people to action. These efforts raised \$3610.00. 'Post trip [the operator] also encourages membership in conservation groups focused on seabird conservation and maintains a list server with postings about Antarctic conservation issues, with contacts and resources for action.' Out of the ten trips under investigation, this was the only scheme that offered immediate opportunities for conservation support coupled with post trip follow up. Consequently, this trip, of the 10 under investigation, had the only documented contributions from tourists (IAATO 2004c). Antarctic tourists also appeared to have supportive opinions regarding measures designed to mitigate negative environmental impacts and to improve the conservation of Antarctica both before and after visitation. While no changes in attitudes were recorded, it appears that the high level of support for all measures before visitation may have produced a ceiling effect and precluded the development of more supportive attitudes. When investigating tourists' attitudes toward visitor guidelines, generally the results suggest a high level of agreement with the measures. A vast majority of visitors felt the guidelines were useful for future trips into the natural world. However while 84% of tourists felt satisfied with the behaviours of their fellow tourists toward wildlife, 62% of the respondents felt that fellow tourists often approached the wildlife too closely. This discrepancy in findings appears to indicate that opportunities exist to improve interpretation of the guidelines and the oversight of tourists while on shore interacting with Antarctic wildlife.

Conclusions

Protecting Antarctica and sustaining the dependent tourism industry relies on identifying the operational factors that promote the delivery of positive benefits while also mitigating the potential negative influences of tourist visits. The results of this study imply that Antarctica operators have the potential to be effective in providing tourist experiences that educate the public and raise awareness of issues facing Antarctica. The results suggest that through a combination of interpretation, operational guidelines, and voluntary efforts, IAATO and their member operators can educate tourists regarding issues important to the conservation of Antarctica as well as influence environmental behavioural intentions. However, influencing the actual behaviours of Antarctic tourists, even if they are motivated to adhere to guidelines and to support conservation, can be a difficult task. With Antarctica tourism expanding, improving the efforts of tour operators and their guides through the development of well-crafted and theoretically-based communication (for example Ham 1992; Powell and Ham in press; Roggenbuck 1992; Ham and others 2007) appears instrumental for providing tourist education that positively influences stewardship behaviours and mitigates the potential negative impacts of visitation. Additional outreach and research is needed that focuses on integrating theoretically based interpretation

and the operational factors that improve the adoption of stewardship behaviours. Ultimately, providing effective interpretation that not only educates but also inspires Antarctic tourists to follow visitor guidelines and developing complementary follow-up measures that present opportunities for them to protect Antarctica through philanthropy and other activities appears to be vital if IAATO and member operators will truly 'create a corps of ambassadors for the continued protection of Antarctica.'

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