Being there: examining the behaviour of Antarctic tourists through their blogs

Ricardo M. Roura

Arctic Centre, University of Groningen, PO Box 716, NL-9700 AS, Groningen, The Netherlands

Abstract

Most visitors to Antarctica today are commercial tourists. Over 150 000 tourists visited Antarctica between 2007 and 2010, making up more than 700 000 person/landings. Despite the scale of tourism in Antarctica, knowledge about its environmental impacts is generally inconclusive, and monitoring is limited. This article examines tourist behaviour regarding the environment using information available on travel weblogs (blogs) posted by tourists on the Internet. Fifty blogs describing Antarctic travel were analysed, mostly as part of organized tourism cruises, during the four Antarctic summer seasons between 2007 and 2010, both qualitatively and quantitatively. The blogs described the activities of 90 people who had visited Deception Island as part of their itinerary and who, overall, had undertaken at least 190 person/landings in Antarctica. Blog analysis highlighted the importance of wildlife as a tourist attraction. In the blogs it was apparent that tourist–wildlife interactions result in a range of behaviours from both individual tourists and animals. Tourism results in cultural traces and other environmental consequences, although some of these would not be judged as "impacts" under the current practice of implementing the Protocol on Environmental Protection to the Antarctic Treaty. Blogs showed many more instances of compliance than of noncompliance with environmental regulations. Tourist blogs illustrate the behavioural processes by which environmental impacts from tourism could occur, which are repeated through thousands of person-landings and other activities in Antarctica every season. Precautionary action may be a practical alternative to manage tourism at some sites until it is clearer how this activity affects the environment.

Visiting the Antarctic was once restricted to those engaged in exploration, resource exploitation and research, but is now increasingly accessible to the broader public. Most visitors to Antarctica today are commercial tourists, whose activities are facilitated by a robust tourism industry. In the past few decades, tourism has consolidated into a dominant activity in Antarctica, measured by the number of ships, people and sites involved (ASOC 2001, 2006, 2008; Naveen et al. 2001; ASOC & UNEP 2005; Lamers et al. 2008; Lynch et al. 2009; Hall & Saarinen 2010; Roura 2010a). In addition, the tourism industry has become an influential player in the Antarctic Treaty System (ASOC 2003, 2004; Haase et al. 2009).

The dynamic characteristics of tourism in Antarctica—typified by growth, expansion and diversification (Roura 2010a)—and a consequential increase in environmental pressures, have long raised concerns about the potential impacts of this activity on the values and uses of the region (Enzenbacher 1992; Hall & Johnson 1995; Stewart et al. 2005; Tin et al. 2009; Hall & Saarinen 2010; Roura 2010a). Cumulative environmental effects are a cause of particular concern (de Poorter & Dalziell 1996; Hofman & Jatko 2000; Bastmeijer & Roura 2004). However, identifying actual tourism impacts has mostly remained elusive (de Villiers 2008; New Zealand 2012a, 2012b).

Tourism developments have led Antarctic Treaty states to discuss regulation of this activity and practical initiatives to manage it. At its core, the debate is about tour operators maintaining access to the sites used as destinations for their clients, weighted against concerns about tourism having an impact on the values and uses for which the Antarctic is protected. Concerns include not only impacts on environmental, scientific and other intrinsic values of the Antarctic but also implications for search and rescue, and broader effects on the Antarctic Treaty regime vis-à-vis jurisdictional questions (Bastmeijer & Roura 2004).

In this context, two common narratives about Antarctic tourism have emerged. Some think tourism is sustainable, whilst opposing views regard it as a resource activity and as an intrusive force in wilderness areas (Nuttall 2010). For instance, at the 32nd Antarctic Treaty Consultative Meeting (ATCM) several Parties stated that, "when properly managed, tourism in Antarctica should be welcomed", while also noting the need to minimize environmental impact, maximize the safety of operations and avoid interfering with science (SAT 2009, paragraph 182). To that statement other Parties retorted that "... the absolute priority of the Treaty is Antarctic scientific research and environmental protection and that tourism should not be encouraged but rather strictly regulated" (SAT 2009, paragraph 183).

The case for the sustainability of Antarctic tourism—at least at the local and regional scales—is made on the basis of the self-organization and modus operandi of the tourism industry. The bylaws of the International Association of Antarctica Tour Operators (IAATO) paraphrase the Madrid Protocol (Article 8) and commit members not to have "more than a minimum or transitory impact" (IAATO 2010a). Furthermore, IAATO focuses on educating their visitors to become ambassadors for the protection of the Antarctic. The objective, and also the argument underlying these various statements, is that responsible tourism has no discernible or at least no significant effects on its destinations (e.g., Splettstoesser et al. 2004). However, the ecological footprint of Antarctic tourism (as defined by Hunter 2002) remains unknown. The concentration of tourism at some sites, coupled with a focus on wildlife as tourist attractions, continue to raise concerns among decision makers about current and future cumulative impacts (United States et al. 2011). Many questions about the sustainability of Antarctic tourism remain unanswered and hinge, inter alia, on the lack of a comprehensive understanding of onshore tourist activities and a lack of knowledge about the actual extent of environmental impacts. The picture is further complicated as the traditional shipborne tourism model is being replaced by a raft of new tourism modalities, including the penetration of the interior of Antarctica through a range of tourism facilities and products (e.g., Bastmeijer & Roura 2004; Lamers et al. 2008).

Tourism is regulated by generic instruments applicable to most activities in Antarctica, coupled with some specific regulations. Non-binding industry guidelines supplement this basic regime that is in place (Bastmeijer & Roura 2004; Lamers et al. 2008; Haase et al. 2009). Antarctic tourism must meet certain conditions, but it is generally not subject to restrictions (Bastmeijer & Roura 2004). However, this may be changing in the wake of developments such as the sinking of the tourism cruiser MV *Explorer* off the South Shetland Islands on 23 November 2007. Adopted at the ATCM in 2009, Resolution 7—"General principles of Antarctic tourism"—provides a roadmap for further tourism regulation. A 2011 ban on the use and carriage of heavy fuel oils in Antarctic waters imposed by the International Maritime Organization, which addressed concerns by Antarctic Treaty states, lowered the number of cruise ships visiting Antarctica (IAATO 2012a).

Tourism has been discussed by Antarctic Treaty states since the 1960s and has been an agenda item at the ATCMs for over a decade, but to a certain extent decision-makers and tourists operate in parallel universes. Most information about tourism available to decisions makers is mediated by the tourism industry, for instance, through reports submitted by IAATO to the ATCMs. This is complemented by limited information provided by Antarctic Treaty states themselves through official inspections of cruise ships (ASOC & UNEP 2012) or by researchers investigating various aspects of tourism (Stewart et al. 2005 and references therein) and in particular tourism impacts (New Zealand 2012a, 2012b and references therein). As decision-makers discuss tourism, Antarctic tourists (the paying customers of the tourism industry) carry on with their travels, subject to applicable regulation, and may not be aware that their activities generate a heated debate.

Many questions remain unanswered about tourist behaviour, the environmental consequences of tourism, how they interact with the environment and how, in practice, tourism regulation influences tourist behaviour. This article aims to answer the following questions on the basis of an analysis of Antarctic tourist blogs. What do tourists do and how do they interact with the Antarctic environment? How do tourists interact with Antarctic wildlife? What are the obvious environmental consequences of tourist behaviour? What events that happen to tourists can be described as incidents or accidents? Are

tourists aware of environmental regulations, and do they comply with them?

In order to answer these questions, this article examines the tourists' experience of the environment as described by the tourists themselves in travel weblogs (blogs) posted on the Internet. A blog is "an online journal or diary where the author can post a range of thoughts, ideas and philosophies for public consumption" (McKercher et al. 2008: 375). In broad terms, two sorts of information can be extracted from tourist blogs: the explicit information that is available in written and visual texts (i.e., words and images); and the implicit information that is contained in these texts but not made explicit by the bloggers (see also Pyykkönen 2007 regarding the analysis of tourist photographs). Furthermore, tourist blogs describe the Antarctic experience as perceived by the tourists themselves—the emic meaning—and contain visual and written texts that can be examined and interpreted by external observers—the etic meaning. For a discussion of emic and etic as they apply to tourism, see Pearce (2005) and references therein.

A detailed review of the concept of tourist experiences is beyond the scope of this article. Overall, the tourist experience should not be considered as one-dimensional, but as a multi-phase continuum that involves the actual experience on-site at the travel destination, with events before and after the actual travel that include anticipation, travel to and from the destination, and recollection of events (Stewart 1998; Maher 2010 and references therein). This article is concerned with aspects of the tourism experience that concern on-site tourist behaviour and specifically how tourists interact with the Antarctic environment as reflected in their blogs.

Methods

Conceptual framework

As a strategy of enquiry for this research, tourism has been examined from the perspective of behavioural archaeology (Schiffer 1987, 1995, 2010) as applied to polar tourism by Roura (2011). "Archaeology" may suggest excavating the remains of past social systems. However, behavioural archaeology was conceived as an approach to study people–material interactions in all times and places (Reid et al. 1974, 1975), including how human behaviour modifies the natural and cultural landscapes (Heilen et al. 2008; Hollenback 2010). An essential component of behavioural archaeology is the study of the cultural and environmental processes that form and modify the archaeological record (Schiffer 2010 and references therein). Tourism can examined as one of

such cultural processes, and the physical remains of tourist activity and behaviour can be considered both as an environmental impact and as a form of archaeological record. One of the advantages of the behavioural archaeology approach over other tourism research approaches is that it serves to describe and interpret tourist behaviour and its consequences for the environment independently from a priori value judgements about impact significance (Roura 2011).

Data collection methods and study area

Research on polar tourism can follow two basic approaches, in situ and mobile (Roura 2011). In the in situ approach the researcher is based at a particular site and observes different groups of tourists as they visit that site. Alternatively, in the mobile approach the researcher travels with a tourist group (as a tourist or in another capacity) and conducts observations along the way. Interviews and questionnaires provide additional sources of information about tourism. Taking a different approach, this research is based on a sample of entries from travel blogs posted by Antarctic tourists on the Internet, which provides unobtrusive access to the tourism activity as experienced by individual tourists as insiders in particular tourist groups. Tourist blogs are readily accessible, and enable focusing on particular places or time segments.

Blogs cover the activities of individuals, couples or groups, and a single blog can be written by one person or several. Blogs posted by Antarctic tourists may include travelling in one or more countries or regions in addition to the Antarctic component of a trip. The building components of a tourist weblog are individual entries that reflect a period of time—a fraction of a day to one or more days—and describe visits to one or more locations. In this study, samples were collected from blogs in which bloggers had travelled in an organized tourism cruise in the four seasons between 2006–07 and 2009–10 and visited Deception Island as part of the itinerary. Deception Island is a regular tourism destination that is well known to the author (Roura & Pérez Muñoz 2002; Roura et al. 2008; Roura 2010a, b), which facilitated the sampling and analysis of blogs. All the blog entries examined here described landing or non-landing visits to Deception Island; some of them discussed visits to other locations as well.

Deception Island (62°57′S, 60°38′W) is an active flooded volcano in the South Shetland Islands (Fig. 1). It has a distinct horseshoe shape and is a long-established tourism destination, described as "the only place in the world where vessels can sail directly into the centre of a restless volcanic caldera" (ATCPs 2005a: 2).
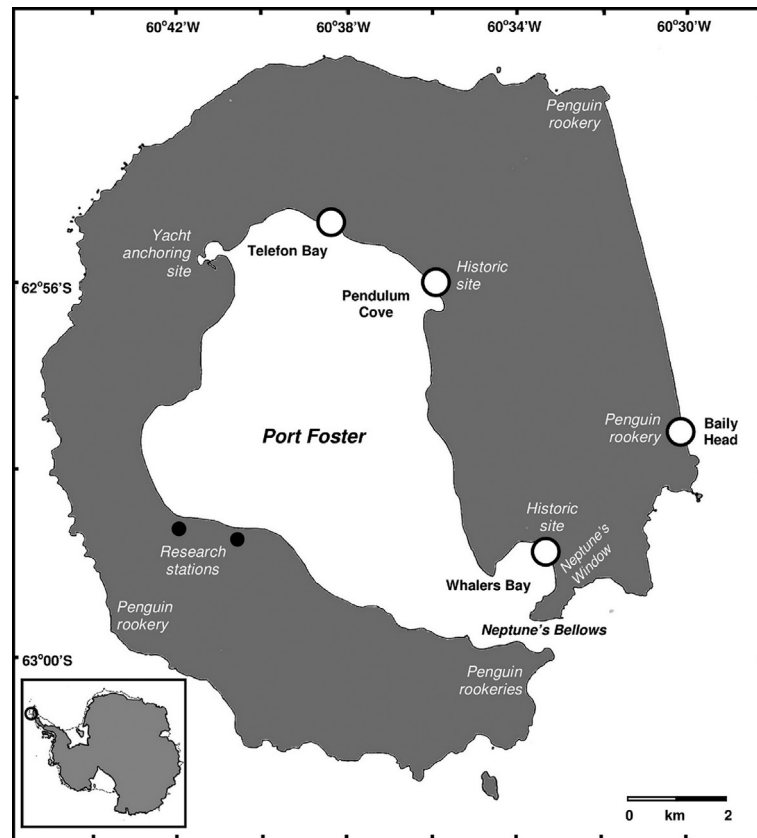
Fig. 1 Deception Island, one of the South Shetland Islands in the north-west of the Antarctic Peninsula (inset). The white circles show sites where tourist landings occur.

Aside from Port Foster, the island's inner harbour, most tourism takes place at four sites that are visited primarily for their historic features (Whalers Bay, Pendulum Cove), volcanic landscapes (Telefon Bay) and wildlife (Baily Head). These sites have repeatedly been among the 20 most visited locations in the Antarctic in recent years (New Zealand 2012c). Key tourist attractions include the remains of an early 20th century whaling factory (Fig. 2) and swimming at beaches with geothermal activity (Fig. 3). In addition to cruise ships, private and commercial yachts regularly visit the island, as well as ships resupplying summer-only research stations from Argentina and Spain. Successive human activities on the island have left a legacy of cultural remains as well as environmental impacts (Hacquebord 1992; Roura et al. 2008). Since 2005, Deception Island has been managed as an Antarctic Specially Managed Area (ASMA) in order to protect the environment, manage a variety of competing demands on the island (including science, tourism and conservation) and ensure human safety (ATCPs 2005a).

Tourism at Deception Island is subject to a range of binding and non-binding rules, both generic to the

Antarctic and site-specific. Chief among them is the Protocol of Environmental Protection to the Antarctic Treaty, also known as the Madrid Protocol, which went into force in 1998 and which applies to most Antarctic activities; tourism regulations adopted by Antarctic

Fig. 2 Tourists landing at Whalers Bay, Deception Island, 2002. (Photo by R. Roura.)

Fig. 3 The ''polar plunge'' at Pendulum Cove, Deception Island, 2002. Note plastic chairs, placed on top of tarpaulins, to help bathers to undress and dress. (Photo by R. Roura.)

Treaty states; and the management plan for ASMA No. 4. The management package for Deception Island (Deception Island Management Group 2005) includes a "Code of conduct for visitors to Deception Island", which is the basis of non-binding site-specific guidelines for Whalers Bay (2008), Baily Head and Telefon Bay (2009) and Pendulum Cove (2012). Tourism industry guidelines complement these instruments.

More than 150 000 tourists are reported to have travelled to Antarctica between the 2006–07 and 2009–10 Antarctic summers—the period considered for this research—of which more than 80 000 visited Deception Island (IAATO 2012b; Fig. 4). During that period more than 700 000 person/landings took place in Antarctica,

that is, instances of people setting foot ashore, including more than 90 000 person/landings at Deception Island (IAATO 2012b; Fig. 5). Deception Island has been classified as a "high visitation, low traffic" site based on 2007–08 data, where "high" is defined as being within the top fifth percentile of all of the sites for either visitation or marine traffic (Lynch et al. 2010: 5).

A sample of 50 blog entries reflecting the activities of 90 people at Deception Island was collected for this research. It should be noted that blog sampling required some research in itself, and consequently samples were obtained in two phases. In a first—exploratory—phase, a set of samples (series A) was obtained entering the terms "Antarctic blog" or "Deception Island blog" in the search engine Google (www.google.com), from September 2009 to June 2010. This phase aimed to assess the suitability of blogs for research on Antarctic tourism. Some 200 000–300 000 entries resulted from each search in this phase, of which only some tens of entries in the first few pages (as ranked by the search engine) were relevant for this research. Of these, 25 relevant blogs were sampled. An examination of this initial sample confirmed the viability of using travel blogs to study Antarctic tourism as it was possible to locate a sufficient number of blogs meeting the sampling criteria and these were rich in content.

In a second phase, additional samples (series B) were collected from TravelPod (www.travelpod.com), a free travel blogging website (November 2010), using the search term "Deception Island, Antarctica". This website was chosen because a number of the entries that had met the search criteria during the first phase had been found there. In addition, the website displayed information in a

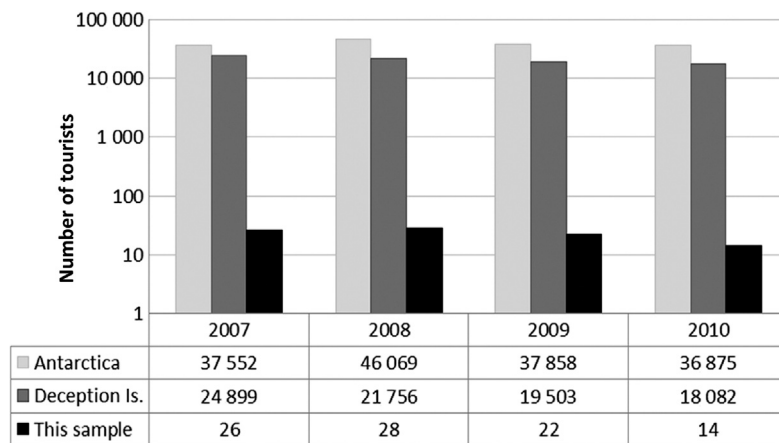|	2007	2008	2009	2010
Antarctica	37 552	46 069	37 858	36 875
Deception Is.	24 899	21 756	19 503	18 082
This sample	26	28	22	14

Fig. 4 Number of tourists in Antarctica, Deception Island, 2007–10, and the number of blogs examined in this study. Data for Antarctica and Deception Island from the International Association of Antarctica Tour Operators (IAATO 2012: files ''Summary of seaborne, airborne, and land-based Antarctic tourism'' for 2006–07 to 2009–10).
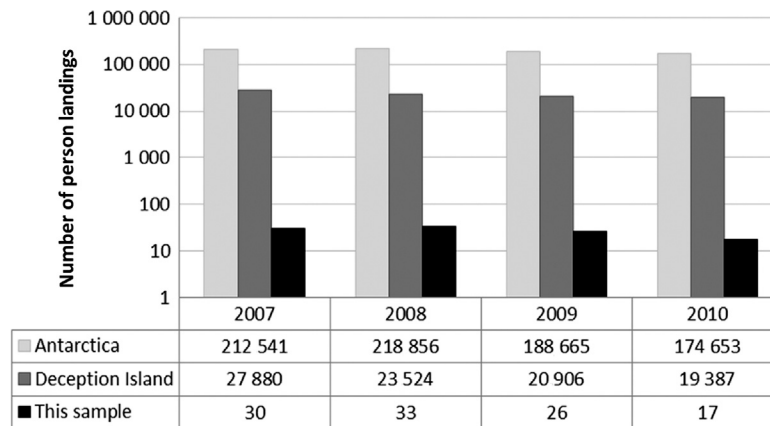
Fig. 5 Number of person-landings in Antarctica, Deception Island, 2007–10, and the number of person-landings in the blogs examined in this study. Data from the International Association of Antarctica Tour Operators (IAATO 2012: files ''Number of tourists per site/per vessel [continental sites only] sites [landed and non-landed visits sorted alphabetically]'' and ''Number of tourists per site/per vessel [peninsula sites only] sites [landed and non-landed visits sorted alphabetically]'' for 2006–07 to 2009–10).

standard format, which simplified sampling and analysis. The search here yielded 80 entries containing over 700 photographs, from which 25 entries were sampled in order of relevance using the website's sorting function (the other sorting criteria offered by this website was "date").

Table 1 shows the basic characteristics of the blogs, the bloggers and their trips. Most trips started and ended in Ushuaia, Argentina, and followed well-trodden cruising routes around the north-west part of the Antarctic Peninsula, making periodic stops. Most tourists travelled in vessels carrying fewer than 500 passengers (Fig. 6).

Individual blog entries described activities over periods of 1–15 travel days, and a total of 158 travel days in Antarctica when taken together. The blog samples for both series reflected visits to Deception Island at regular intervals through the season (approximately 12 days on average), with periods of some 7.5 months between the end of a season in March and the beginning of the next season, in October/November (Fig. 7). Bloggers landed at all established tourist landing sites in Deception Island (Figs. 8, 9).

Blogs in series B had a standard format that provided additional insight into the bloggers and their trips. For most, the Antarctic cruise was part of a longer trip that also included countries in the Americas, Australasia, and/or South-east Asia.

Representing a broad range of ages, tourist bloggers travelled alone, in couples, as a family or in youth groups. Some bloggers fit the profile of elderly retired couples associated with traditional Antarctic tourism (reviewed in Basberg 2010), while others were younger people. The younger age of tourists might reflect a growing

accessibility of Antarctic tourism and the targeting by the tourism industry of a broader range of potential customers. Plainly, the sample used in this research reflects a segment of the Antarctic tourist population with the inclination and expertise to produce a blog about their journey, regardless of differences in age, interests and socio-economic status.

Data analysis

Data analysis was based on theme identification techniques listed by Ryan & Bernard (2003), primarily, frequency of words and photographs, and "cutting and sorting" material into categories. Blog content was scrutinized from the perspective of behavioural themes selected *a priori* (concerning people–environment interactions) to answer the research questions outlined above. Videos and readers' commentary on the blogs were excluded from the analysis. Data analysis included a modicum of quantification to allow a better grasp of the data set, but overall the analysis was inherently qualitative.

Word content in individual blog entries ranged from two words to over 5000 words; photograph content ranged from none to over 200 photographs (Fig. 10). Word lists were generated using TagCrowd (www.tagcrowd.com), an Internet-based computer program that enabled creating word "clouds" with the most frequent words from which names, surnames and common English words were filtered out. The word count for all blog entries in the sample was 55 731. The 25 most common words for each blog entry were identified, amounting to 508 different words. Among these 508 words, the most common words were identified and

Table 1 Overview of the 50 blog entries that comprised the sample examined in this study. They were produced by 90 individual travellers describing 49 Antarctic trips (2006–07 to 2009–10), all of which included landing or non-landing visits to Deception Island. The blogs covered 158 travel days in Antarctica, including 51 travel days at Deception Island. Age estimates are very approximate and are derived from blog content, primarily photographs of the blog's author or companions as well as references to the bloggers' ages in the blog entries.

Coverage of individual blog entries	Deception Island only (1–2 travel days)	52%
	Part of Antarctic cruise (1–7 travel days)	32%
	Whole Antarctic cruise (9–12 travel days)	16%
Blog language	English	94%
	Dutch, German, bilingual	6%
Group composition	Singles	52%
	Couples	38%
	Family groups	4%
	Youth groups	4%
Age range estimate	20s–30s	58%
	40s–50s	14%
	Over 60s	8%
	Mixed age groups	8%
	Unknown	12%
Country of origin	English-speaking countries (seven countries)	92%
	Other countries (three countries)	2%
Blogger role	Tourists: mainstream cruises and activities	70%
	Tourists: specialized cruises and/or activities	18%
	Professionals travelling as tourists, e.g., journalists	8%
	Staff of cruise ships: personal blogs	4%
Vessels	At least 26 vessels of different kinds (1–4 cruises each)	
Landings	At least 95 landings (61 of which at Deception Island)	
	At least 190 person/landings (105 of which at Deception Island)	
Key activities	Landings at penguin rookeries, historic sites; or non-landing cruises with/without Zodiac cruises	
	Amateur/professional photography	
	Extended walks	
	''Polar plunge''	
	Diving	
	Kayaking	
	Overnight camping (not at Deception Island)	

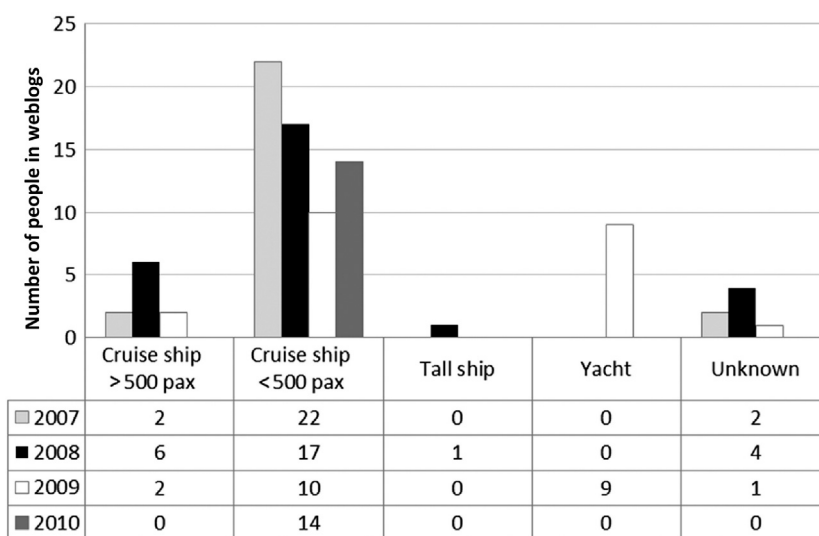|	Cruise ship >500 pax	Cruise ship <500 pax	Tall ship	Yacht	Unknown
2007	2	22	0	0	2
2008	6	17	1	0	4
2009	2	10	0	9	1
2010	0	14	0	0	0

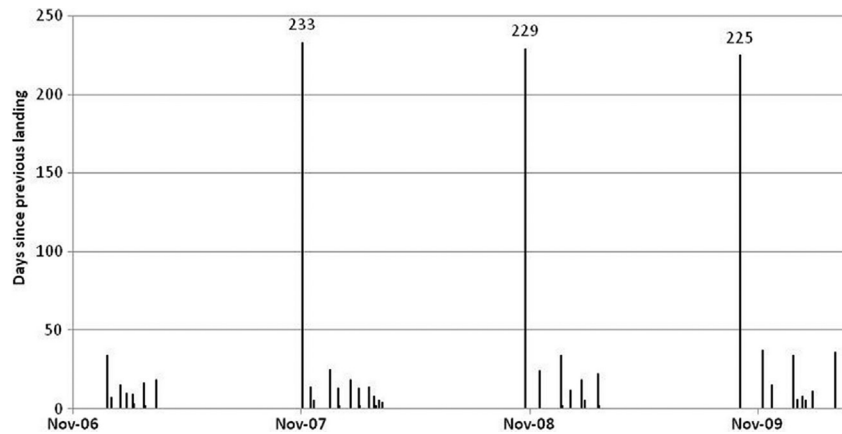**Fig. 6** Vessel type used by bloggers and their travelling companions.

Fig. 7 Days since the previous landing, starting in the 2006–07 season, based on the blogs examined in this study.

sorted by frequency. Their immediate context was determined using the "key words in context" technique outlined by Ryan & Bernard (2003).

Photographs were classified according to format and content. Photograph format (independent from its *orientation*) was classified as landscape, general and close-up. Photograph content was broadly classified as landscapes, wildlife, historic and contemporary cultural features, activities and people, with some subcategories in each. Photographs of people engaging in various activities were classified as "people" if individuals were engaging with the photographer (e.g., looking at the camera), or otherwise as "activities". It should be noted that there are no entirely objective ways of classifying photographs, so whenever possible, the bloggers' captions were used to categorize photographs' content. Alternatively, the content was categorized according to

the element located in the foreground and centre of the photograph.

Results

Content analysis

Bloggers aimed to make the most of their Antarctic journey as they went through a series of anticipated stages: crossing the Drake Passage, encountering icebergs and penguins for the first time, landing on Antarctic soil, visiting "must-see" attractions, experiencing the extremes of Antarctica and departing the region. Bloggers wrote about their journey in diverse styles. A detailed analysis of blog styles merits a separate examination and will not be discussed here. These included: dry "skipper's logs" with dates, places and facts; "naturalist" blogs

	Whalers Bay	Pendulum Cove	Telefon Bay	Baily Head	Unknown
☐ 2007	4	2	2	2	2
■ 2008	9	4	4	1	4
☐ 2009	10	0	4	1	0
■ 2010	8	0	0	2	2
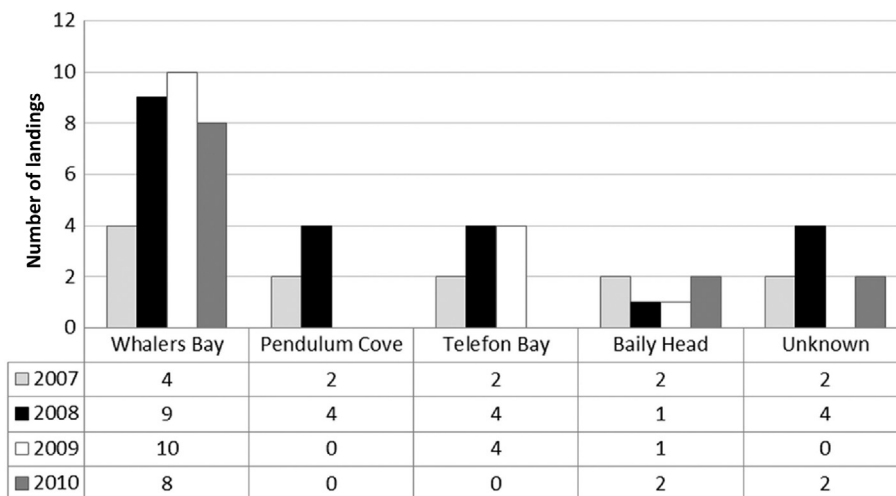
Fig. 8 Number of landings at Deception Island indicated in the blogs examined in this study.

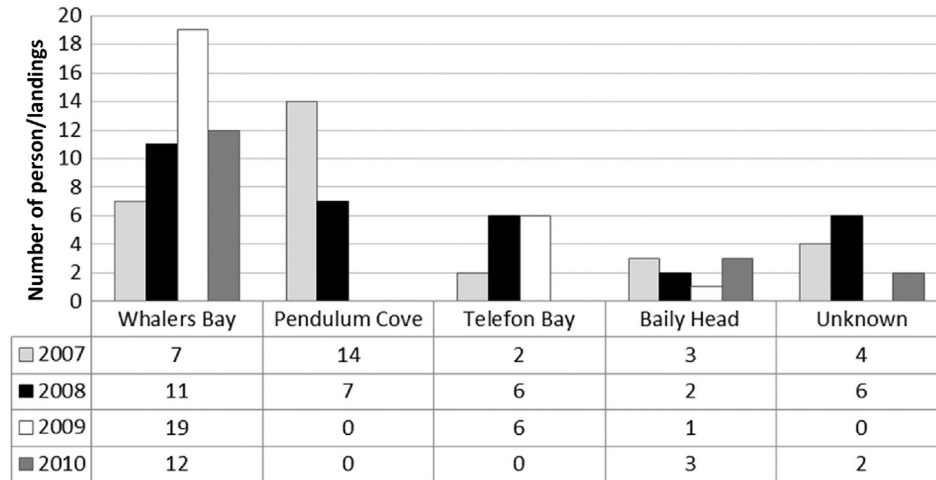|	Whalers Bay	Pendulum Cove	Telefon Bay	Baily Head	Unknown
☐ 2007	7	14	2	3	4
■ 2008	11	7	6	2	6
☐ 2009	19	0	6	1	0
■ 2010	12	0	0	3	2

Fig. 9 Person/landings, including bloggers and their travelling companions (partners, family members or other members of their youth groups) at Deception Island indicated in the blogs examined in this study.

with observations about wildlife and the environment; "humorous" blogs with witty comments about people and events; and "philosophical" blogs. Table 2 shows the 15 most frequently used words in the blogs and the context in which they were used.

Antarctic tourists are prolific photographers. Based on a few mentions of the number of photographs taken, bloggers took an estimated 30 photographs per person per day (tourists travelling on a yacht) to an estimated 600–700 photographs per person per day (skilled amateur photographers). The photographs analysed for this article totalled 1309. Landscape-format photographs of landscapes and close-up photographs of wildlife were most frequent (Fig. 11). Historic sites are some of the main sights at Deception Island, but were less frequently photographed than other features; faunal remains,

invertebrates and flora were the least photographed features (Fig. 11). Penguins were the most photographed features and most photographed from a close range, followed by seals (Fig. 12). A substantial number of photographs portray penguins in the earlier stages of breeding (Fig. 13).

Tourist–environment interactions. From the perspective of behavioural archaeology, tourist behaviour in Antarctica involves interactions between people and their artefacts (e.g., parkas, boots and cameras) with external environmental phenomena such as wind, penguins and the landscape (Roura 2011). In their blogs, tourists used words and images to describe overlapping interactions with the Antarctic environment, including visual, mechanical, acoustical, chemical and thermal interactions. Watching the landscape go by in the late evening, a blogger notes:

> (1) I now understand what people truly mean by "ice blue"—it's the clearest, coldest blue imaginable in the sky with the mountains of snow and ice beneath. (a3)

Mechanical (physical) interactions such as setting foot in the Antarctic provide a sense of finally "being there":

> (2) Our next landing was at Brown Bluff, our first stop on the Antarctica mainland. We are here! It was exciting to step off the zodiac and say that we were finally standing on Antarctica! (b19)
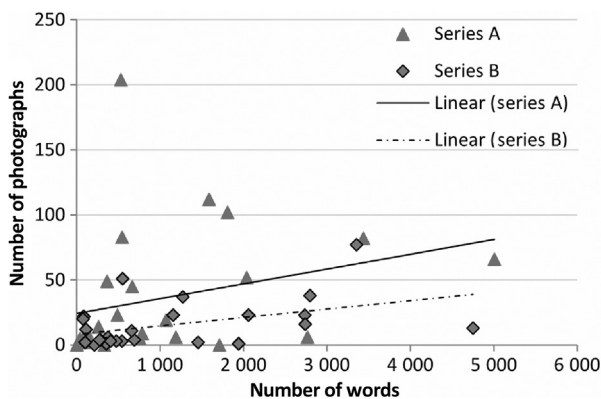

Fig. 10 Quantities of words and photographs in the blogs examined in this study.

Table 2 Most frequently used words in the sample of blogs, sorted by decreasing order frequency (1–15), and the context of those words, determined using the ''key words in context'' technique outlined by Ryan & Bernard (2003).

Order of frequency	Word	Context
1	Island	Visits to Deception Island or to other islands (indicates that many landing sites are located on islands).
2	Deception	Visits to Deception Island; origin of the name; additional interpretations of the name.
3	Penguin(s)	Word used in descriptions of penguins; reference to places visited (penguin rookeries).
4	Antarctic(a)	The continent being visited; descriptions of the region, travel tips, etc.; adjective added to many elements of the visit.
5	Water	Descriptions of the ocean and of marine fauna and seabirds; associated with cold water and the ''polar plunge.''
6	Bay	A geographic location, including place names specific to Deception Island (landing sites often located in bays).
7	Whale(r)	Observations of whales at sea from the ship or inflatable boats; reference to the history of Whalers Bay, historic whale hunting and to whalers' living conditions.
8	Ship	The vehicle for the trip; a point of reference for other activities.
9	Landing	The main activity for most of the trips in this sample.
10	Beach	A landing place; part of a habitat; a historic site; locus of the ''polar plunge.''
11	Seal(s)	Reference to various species found at Deception Island or elsewhere visited by bloggers.
12	Head	References to Baily Head on Deception Island, where tourists are taken to land or attempt to land, or to view it from the sea; hiking.
13	Ice	Seeing ice for the first time; description of conditions; sailing through ice; landing on sea ice.
14	Caldera	Description of Deception Island and its geological history.
14	Chinstrap	*Pygoscelis antarctica*, a penguin species found at Baily Head.
14	Sea	References to sea conditions; being at sea; sea sickness.
14	Zodiac	Inflatable boats used in landings; activities; spatial reference (e.g., return to Zodiacs).
15	Morning	Temporal reference for activities or events.
15	Station	Reference to sites seen or visited in various locations of Antarctica.
15	Weather	Reference to actual or possible weather conditions; changes in weather; effect on activities.

A tourist on a non-landing cruise describes seeing the Antarctic Peninsula:

(3) . . . so close that you felt as if you could touch it. Figuratively, I did reach out so my finger seemed to reach it, and while we never made a technical landing, I feel I was truly in Antarctica. (a3)

Acoustic interactions include the sounds of sailing through ice, the noise of a penguin colony and shouting into empty oil tanks:

(4) If an adult and a chick get separated they both start squawking, and even with hundreds of thousands of adults and chicks running around and squawking, they still find each other. The noise is deafening. (b23, Paulet Island)

Smell (a chemical interaction) is mentioned primarily with reference to penguins and elephant seals (*Mirounga leonina*):

(5) When you get that many penguins together, the smell is quite strong. For such cute little creatures, they certainly smell rank. (b4, Baily Head approached from the sea)

Thermal interactions—experiencing the cold of the Antarctic, or protecting oneself from it—are also frequently described. The so-called "polar plunge" is mostly specific to Deception Island and consists of swimming in thermally heated seawater, either in shallow waters or in shallow pools dug on the beach. Because the precise location of hot spots fluctuates, some tourists manage to have a warm bath, but many do not:

(6) The certificate we each got for this crazy escapade said the water temperature was measured to be 2 C (about 36 F). Most people . . . dealt with this as you'd expect: get in, get out, get dry, get dressed in quick succession. (a18)

While one form of interaction may dominate, there may be overlapping interactions that combine to produce an overall sense of the environment (e.g., Urry 2002). Observing penguins from the beach at Baily Head, Deception Island, a blogger notes:

(7) The beach was one giant mix of energy. The sound of the waves, penguins, and the movement of both, with mixed patterns of black and white was amazing. (a17)

Most tourists experience the Antarctic environment from the ship's decks, inflatable boats or ashore. Some tourists
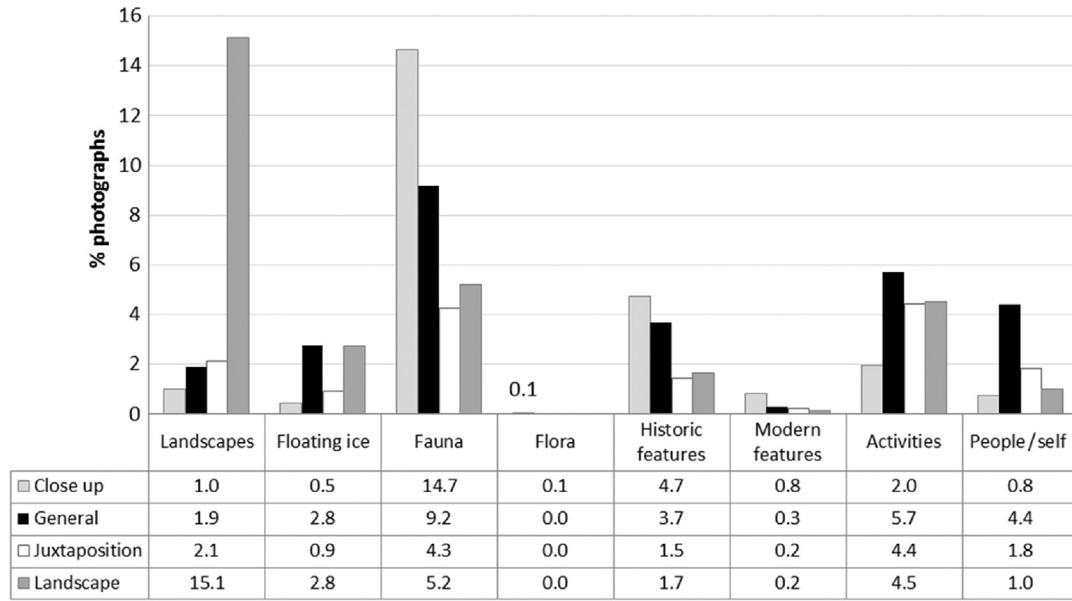
	Landscapes	Floating ice	Fauna	Flora	Historic features	Modern features	Activities	People/self
□ Close up	1.0	0.5	14.7	0.1	4.7	0.8	2.0	0.8
■ General	1.9	2.8	9.2	0.0	3.7	0.3	5.7	4.4
□ Juxtaposition	2.1	0.9	4.3	0.0	1.5	0.2	4.4	1.8
▨ Landscape	15.1	2.8	5.2	0.0	1.7	0.2	4.5	1.0

Fig. 11 The format and subjects of photographs in the blogs examined. Percentages are relative to the total number of photographs in the sample (*n* =1309).

may also enjoy a different perspective, as described below by kayakers and divers:

(8) In more sheltered waters we were able to have many kayak excursions of 2 to 3 hours to see close up the huge icebergs, ice cliffs, glaciers and wildlife … We saw many humpback whales from the ship but the highlight was seeing one close to the kayak. It was

always cold, sometimes with an icy wind blowing and snow falling. (a7)

(9) Whalebones including a massive jawbone were scattered about [the sea bed] creating a habitat for immense anemones, limpets and a wide assortment of sponges. The water was 32 degrees [F] but neither of us felt cold we were mesmerized by the beauty. (a9; diving at Whalers Bay)

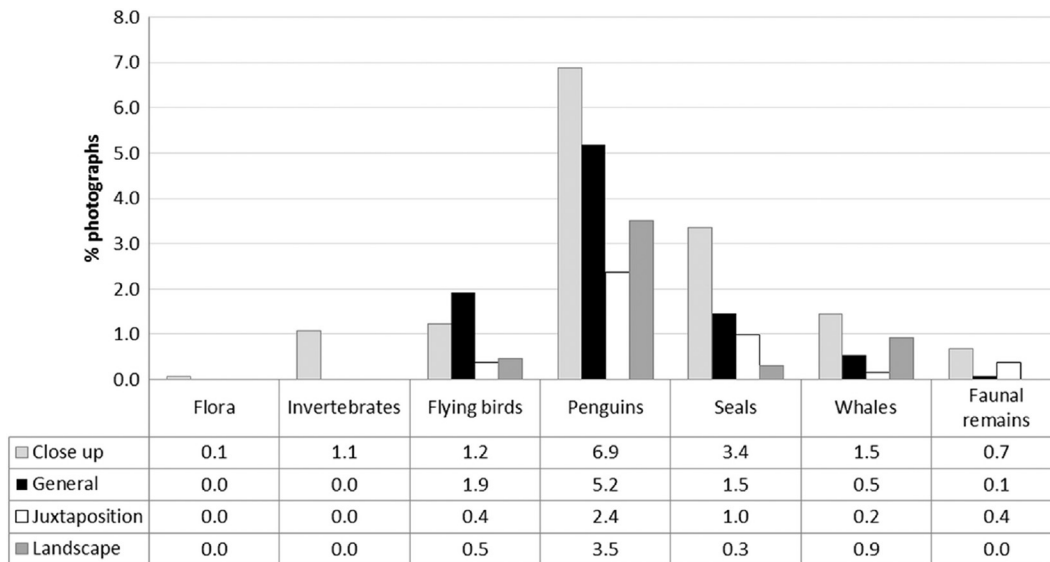|	Flora	Invertebrates	Flying birds	Penguins	Seals	Whales	Faunal remains
□ Close up	0.1	1.1	1.2	6.9	3.4	1.5	0.7
■ General	0.0	0.0	1.9	5.2	1.5	0.5	0.1
□ Juxtaposition	0.0	0.0	0.4	2.4	1.0	0.2	0.4
▨ Landscape	0.0	0.0	0.5	3.5	0.3	0.9	0.0

Fig. 12 Flora and fauna photograph content and format in the blogs examined in this study. Percentages are relative to the total number of photographs in the blog sample (*n* =1309).
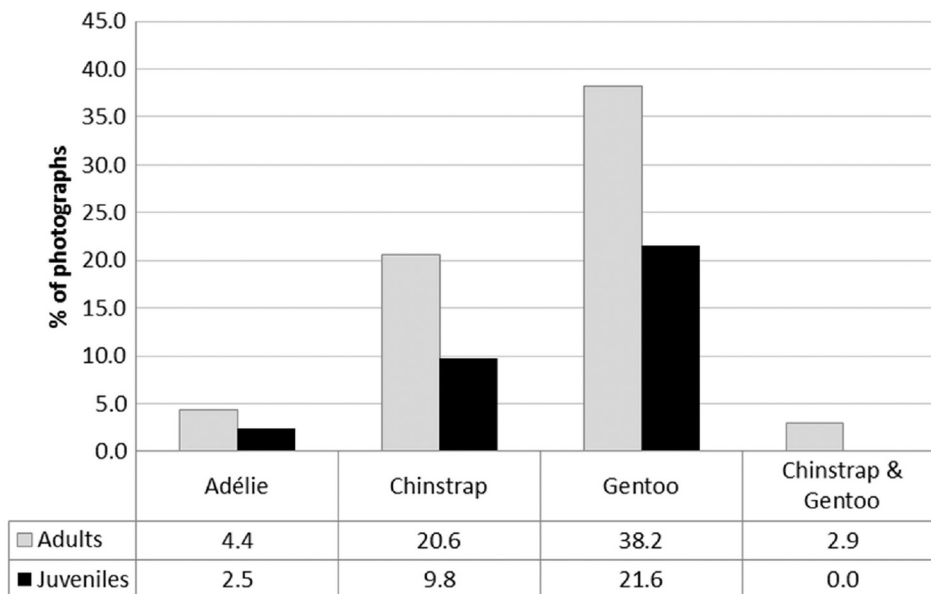
Fig. 13 Percentage of juveniles in photographs of penguins (series B only, which contains 908 photos) in the blogs examined in this study. In this analysis, ''juveniles'' include eggs, chicks that have not moulted into their juvenile plumage, and juveniles.

Plainly there are pockets of the civilized world in the Antarctic wilderness:

> (10) The old Fort had a couple of huts left and one, as well as being a museum, had a surprising range of touristy goods, including stamps and postcards at their Royal Mail Post Office! (b21; Port Lockroy)

Tourist–wildlife interactions. Encounters with wildlife represent a key component of the Antarctic tourism experience, and many cruises are geared around enabling these encounters. A main tourism attraction, penguins are the species most written about and most photographed:

> (11) My Absolute Favorite Thing to Do in Antarctica: Watch the Antarctica Penguins! (a15)
> (12) I fell straight in love with this little birds … my god were they cute and I was standing in the cold and watched them how they were making their way down the beach to collect rocks for their nests. (b20)

Some bloggers make observations on basic wildlife behaviour:

> (13) It was a chance to get up close with the penguins who are really funny clumsy birds to watch on land but then they are the exact opposite in water. (b23)

Anthropomorphism—"the use of human motives, values, and emotional responses to describe and explain animal behaviour" (Moscardo et al. 2004: 240)—is apparent in many blogs, particularly with respect to penguins: photograph captions describe expressions that are perceived to be funny; pet names may be given; they look "miserable" or "unhappy" when moulting; or they are simply "bored".

> (14) One pair were dancing and preening each other, a somewhat touching sight for us romantics. (b21)

The common *modus operandi* of tourism enables tourists to see from a close range penguin colonies and other wildlife sites. Since tourism extends from October/November to March/April, tourists have the possibility (depending on where and when they land) to see wildlife at different stages of their life cycle. Some blogs document penguins or other species in the early stages of breeding:

> (15) We made two landings today … one at Heroine Island and one at Paulina Island! Thousands and thousands Adélie penguins greeted us at both islands! Many of the eggs were hatching so we were able to see baby Adélies. Some eggs were hatched, while others were incubating. (a19)
> (16) We were able to walk past some nesting Chinstraps to reach the colony. (b16; Baily Head)

When interacting with wildlife, some people back off or wait passively to see how animals react to their presence, and respond accordingly; others are more proactive:

(17) I waited to get back across the penguin highway, which was fairly impossible to cross because the penguins had formed a solid stream of themselves … (a19; Heroine Island)

(18) I also spotted a bit of bone that made me curious. As I approached, a snowy petrel began to dive-bomb me, so I backed off. (b3; Hannah Point)

(19) Usually, the fur seals are easy to scare off if you raise your arms at them and make some noise. (a22)

Visitors to Antarctica are required to keep a certain distance from wildlife, and this is usually told to tourists from the beginning of their cruise. Numerous photographs in the blogs that were examined portrayed people in close proximity to penguins and other wildlife, while some photographs of wildlife suggest that the photographers are close to and/or towering over their subject. However:

(20) As I have mentioned before, there are rules as to how close you can get to the wildlife. There are no rules as to how close they can come to you. (b16)

As in blog excerpt no. 18, quoted above, the direction of movement—who approached whom—is apparent in some texts:

(21) The elephant seals generally ignored us—and the fur seals seemed to tell us to back down—but the Gentoos were infinitely curious. One only needed to pause briefly while giving them a wide berth—and they would narrow the gap, coming within a few feet of one, clearly trying to figure out why one was in their territory. Not aggressive at all: just curious. (b3; Hannah Point)

Distance guidelines, however, do not always reflect the reality of particular sites:

(22) We are required to maintain a 15 foot distance between ourselves and the wildlife but there are so many penguins it is just not possible. (b19; Paulet Island)

In many photographs portraying people and penguins, it is apparent that people have sat down and let penguins approach them. In some instances, however, the direction of movement appears to have been the opposite. For instance, people appear standing next to penguin chicks, which could not have approached them.

Some individual bloggers tended to take substantially more close-up wildlife photographs than others (Fig. 14). This may reflect factors such as particular photographic opportunities, personal interests and photographic equipment, but may also reflect a person's "pushy" behaviour:

Fig. 14 Percentage of close-up wildlife photographs by individual bloggers in blogs examined in this study.

(23) Totally forgot to mention that half of our passengers were a group from [country X] ... in our briefing we received the day before they told us we need to keep a distance to the wildlife of about 5 m but these guys didn't care at all and some of the expedition staff got really angry with them and their behaviour. They were pretty aggressive, especially a guy with a big filming camera which always went way too close to the animals. (b20)

Tourist artefacts and visitation traces. In line with Schiffer (1995, 2010), tourist artefacts (equipment) such as zoom lenses, boots and gear influence tourist behaviour and their overall activities (Roura 2011). For instance, some bloggers noted the difficulties of hiking with rubber boots, or complained about forgetting their walking sticks or about the poor quality of their outer gear. Zoom lenses make it unnecessary to approach wildlife to take a close-up photograph, although tourists with such lenses may still come near wildlife (see no. 23).

Traces of behaviour can be regarded as "artefacts" made by (or for) tourists. These can include footprints, lost, discarded or intentionally deposited objects, objects removed from the site and assemblages of objects put on display for tourists. The sample examined here documented comparatively few obvious traces of behaviour on the environment. These included footprints or trampled ground, recent, ephemeral paths on sloping ground and snow, holes dug to facilitate the "polar plunge" and underwater turbulence caused by divers. Well-defined paths were apparent in photographs of Neptune's Window at Deception Island and also at a landing site in Aitcho (Barrientos) Island. Additional traces of visitation included rock cairns, fossil displays, reconstructed whale skeletons and old graffiti. Referring to a rock cairn under a memorial cross at Whalers Bay, a blogger notes:

(24) I have a tough time believing this pile of rocks has sat undisturbed all these years so perhaps the tourists have assembled this informal cairn. (a18)

Another blogger reflects on seeing a whale skeleton:

(25) I thought it was cool how together the skeleton remained. We were later told that the whale was put back together from parts found all over the beach. (a25, photograph caption)

Behavioural traces can also include, potentially, features related to the disturbance of animal behaviour and breeding activities, such as abandoned nests or

(conversely) the apparent habituation of wildlife to visitors. These and other animal reactions to visitors can also be regarded as artefacts of tourism. However, evidence of animal behaviour is difficult to assess accurately solely from words and photographs. Wildlife may appear indifferent to the presence of visitors, may approach them or may withdraw from them (see also blog excerpt no. 21). Each of these reactions may result from a particular response from individual animals to the visitors:

(26) Granted, we clubbed their babies for centuries, but way to hold a grudge, guys. Anyone closer than fifteen feet to these ornery guys would typically find himself immediately honked at ... and given chase. (a25, describing fur seals)
(27) [X] was taking photographs when a Chinstrap came right up and looked at him, then proceeded to regurgitate and shoot its green stomach contents at him. This is a normal protective behaviour response. (b16)

One blog recommended to readers to leave no traces of their visit to Antarctica, but overall few bloggers recorded in their blogs the effects of their own presence on the environment or Antarctic tourism in general:

(28) It was almost like the penguins didn't mind us being there, which made me more comfortable to walk around and photograph the colony. (a19; Heroine Island)
(29) ... we landed at Walker Bay/Point Hannah (it's a secret; shhh) ... This point is one of [guide's name]'s secrets: they don't land here often, to keep it pristine, and few other companies land here at all. The wildlife is so undisturbed by human presence, that it must be the right decision, as much as one would like to share the magic of this place with others. (b3)

Two bloggers had visited Antarctic before and were able to compare impressions about changes from their previous visit. Reflecting on her first day back in Antarctica, one of them notes:

(30) First impressions of my return to the Antarctic: although there were two sailboats in Deception Bay [sic]—and another cruise ship that arrived later, as we left—my initial impression ... is that this is still a pristine wilderness, perhaps even more pristine than it was 70 years ago, when the whaling factories functioned. The landing at [Hannah Point in] Livingstone [Island] confirmed this impression. Wonder if [this impression] will last past Port Lockroy? (b3)

Incidents and accidents. Incidents and accidents introduce an element of uncertainty in what is an otherwise reasonably predictable trip. Incidents and accidents can be regarded as unplanned interactions with the Antarctic environment. As noted by a blogger:

(31) This is not a cruise. Everything is subject to weather and conditions and the schedule can change at a moment's notice. (b19)

None of the 26 ships used by bloggers experienced serious incidents while the bloggers were on board. However, seven different bloggers travelled on ships during the study period of 2007–10 that had incidents requiring external assistance: grounding with no hull damage (MV *Orlova*); grounding with hull damage (MV *Ushuaia*); and sinking (MV *Explorer*). These events did not affect the bloggers directly, but in some cases resulted in rerouting or a change of ship. For instance, some bloggers were rerouted to assist the MV *Nordkapp*, which ran aground at Whalers Bay in January 2007, and to assist the MV *Explorer*. In March 2007 a couple travelled on what was probably the last Antarctic cruise of the MV *Explorer* before she sank in November of that year. The bloggers' photographs showing the MV *Explorer* approaching ice give the reader—after the event—an ominous impression. The captions read, for instance, "Right that's close enough" and "Watch out below!" (b17).

Other incidents experienced by bloggers included the following: Swimmers were approached by what they described as potentially aggressive seals. A diver lost all her diving gear overboard during a boating manoeuvre. A group of kayakers was caught in strong winds, and as a result one of the kayaks was tipped over, and the rest was forced to raft together until they were assisted. A yacht ended up "sitting high and dry" on its keel (a21) when it grounded at low tide while at anchor. Two bloggers reported waves caused by calving glaciers hitting landing sites. One of these was a substantial wave:

(32) … which rushed ashore for some five metres above the tide line, so much so that a few people, who stood next to the shoreline were swept off their feet and large blocks of mini car sized ice were rolled over and over towards the shore. (b21)

These incidents did not result in any substantive personal or environmental damage, but illustrate the range and frequency of incidents and accidents affecting tourists.

Compliance with environmental guidelines. Most environmental guidelines in Antarctica restrict access to particular places, or require a particular behaviour with regards to fauna, flora or historic features. These include, for instance, minimum distance to keep from wildlife, or requirements not to touch, handle or walk on certain features. This information is available to tourists in written form (for instance, on the website of the Secretariat of the Antarctic Treaty) and also through verbal briefings and visual supervision provided by tour operators (Naveen et al. 2001; Roura 2010a). Blogs may contain explicit or implicit information describing the bloggers' awareness of regulations (Table 3) or, conversely, engaging (unintentionally or otherwise) in behaviour that is discouraged or not allowed (Table 4). Most blogs were not explicit about compliance with guidelines, but did not provide conclusive evidence (in words or photographs) suggesting lack of compliance.

Some bloggers mentioned attending briefings, although the content of briefings was not always specified:

(33) Once we got to the island, we were given a brief summary of the rules. (a19)

(34) In illustrating their point about keeping a safe distance and not feeding the wildlife, they showed a slide of a researcher who'd tangled with a penguin, and the big nasty bruise that it left on his arm. They described it as being grabbed with needle-nosed pliers and then flogged with a pair of flip-flops. (a12)

On the compliance side, some blog entries referred to the blogger awareness or implementation of guidelines:

(35) Funny how we all rushed at the first penguins we saw last night. Today they were everywhere, even coming so close from us we could have touched them. As we need to be extra careful about germs transmission, it is not allowed to touch them and we need to make sure our boots are very tidy from one location to the next. (b9)

The tourism industry has implemented procedures to ensure that all tourists clean their boots before any landing in Antarctica, to prevent the introduction of non-native species to the Antarctic or the transfer of species between different Antarctic sites. Only one photograph among the 1309 images examined showed boot cleaning procedures. A blogger describes the procedure like this:

(36) On each return to the ship we had to carefully scrub the penguin poo off our boots before we were allowed back inside. (a7)

Table 3 Instances of compliance with guidelines reported in blogs (n =15 blogs or 30% of the blogs).

	Attending briefing	Following guidelines[a]	Referring to knowledge of guidelines[b]	Noting others not implementing guidelines	Total
By data source					
Photo		1			1
Text	8	5	2	2	17
Both photo and text				1	1
By vessel type					
Cruise ship (>500 passengers)	1				1
Cruise ship (<500 passengers)	6	5	2	2	15
Tall ship					
Yacht					
Unknown	1	1		1	
By age[c]					
20s–30s	4	4	2	2	12
40s–50s	1				1
Over 60s	2	2			4
Mixed age groups	1			1	2
Total (by data source, vessel type or age)	8	6	2	3	19

[a]Guidelines regarding wildlife or boot cleaning. Excludes photographs of people maintaining a distance of at least 5 m from wildlife.
[b]Guidelines regarding wildlife, boot cleaning, graffiti writing or digging holes for the "polar plunge".
[c]Age ranges estimated: see Table 1.

It is possible that some tourists are aware of some guidelines but not of others. For instance, a blogger notes that the derelict buildings at Whalers Bay should not be entered, but subsequently enters a fuel tank:

(37) And you think *you* have some landscaping issues at home! Clearly there's a good reason the expedition staff said we need to stay out of the buildings. (a18; photograph caption)

Table 4 Instances of lack of compliance with guidelines reported in blogs (n =13 blogs or 26% of the blogs).

	Accessing off limit zones or buildings	Approaching wildlife too closely	Digging holes[a]	Discouraged walk[b]	Handling historic artefacts	Touching wildlife	Total
By data source							
Photo	4	1		2	1	1	9
Text	1			1			2
Both photo and text	3	1	2				6
By vessel type							
Cruise ship (>500 passengers)							0
Cruise ship (<500 passengers)	5	2	1	3	1		12
Tall ship							0
Yacht	3		1			1	5
Unknown							0
By age[c]							
20s–30s	2		1	2	1		6
40s–50s	2			1			3
Over 60s		1					1
Mixed age groups	3	1	1			1	6
Total (by data source, vessel type or age)	8	2	2	3	1	1	17

[a]Since entry into force of guidelines in 2009.
[b]Since entry into force of guidelines in 2005.
[c]Age ranges estimated: see Table 1.

(38) One structure we could enter were the large holding tanks, now empty ... The echo in here was pretty cool, and if you think you sing well in the shower you'll be a superstar in here! (a18; caption to photograph of the inside of a tank)

Most of the entries describing the digging of holes for the "polar plunge" predate the adoption of guidelines discouraging this procedure (applicable from the 2008–09 season); however, others post-date this date, and one blogger noted that this was no longer allowed.

The "Code of conduct for visitors to Deception Island" permits tourism at four locations (Fig. 1). There is also a yacht anchoring site, and two stations that may be visited by previous agreement. In doing so, the management plan discourages (but does not explicitly prohibit) tourism elsewhere on the island. Some bloggers refer to them or others hiking between Whalers Bay and Baily Head, which is discouraged by the code of conduct for the island because of environmental and safety concerns. In addition, an extended walk from Whalers Bay seems to have become an established activity in recent years, expanding considerably the area used for tourism:

(39) [The guide] took us on a three hour hike to the 1800m [sic] summit of the volcanic crater which was tough going. There were huge winds to contend with but it was worth it for the views of the bay and the South Shetland Islands in the distance. (b23, 2008)

A small number of photographs in the sample illustrated discrete forms of behaviour that are discouraged or not allowed by guidelines. These included: a person climbing one of the ladders attached to the outside of a fuel tank at Whalers Bay, with the caption: "Curiosity. [X] just wanted to see what was inside" (a1); a young woman crouching and extending a hand to touch a penguin, with the caption "[X] approaches penguins" (a21); and a tourist posing for a photograph while holding an artefact at the Wordie House historic site.

Further, some photographs had been taken from inside no-go areas, such as: a view taken from the shores of Kroner Lake inside Antarctic Specially Protected Area 140, which can only entered under permit; views of the inside of fuel tanks and other buildings at Whalers Bay; and close-up views of Southern Giant petrel chicks at Hannah Point, taken from within an off-limits area, described thus:

(40) [X] enjoyed her close encounters with penguins, while I went off to explore the terns and petrels nesting on the cliffs ... We also enjoyed the very downy petrel and albatross chicks. And the "white"

petrels ... Apparently, they are unique to these islands. (b3)

Another blogger recalled an overnight camping experience in which tourists were not allowed to bring food or drink; however,

(41) ... [it] was still a real party. Almost all participants cunningly bypassed the prohibition ... it was like a school trip in which alcohol was secretly smuggled. (b24; author's translation)

Discussion

Tourist behaviour may result in cultural traces of various kinds, some of which might be regarded, in management terms, as environmental impacts. Antarctic tourism can be a factor in the transformation of both natural environmental features and pre-existing cultural remains (Roura 2011 and references therein). However, the environment may be affected by a range of cultural processes other than tourism, so that the behavioural traces from different cultural process may overlap and combine. Different cultural processes may result in similar outcomes and, conversely, the same process may result in different outcomes at different sites. For instance, recreational visits by non-tourists can cause some effects similar to those caused by tourists. Likewise, similar forms of tourism may have different consequences at different sites, depending on their characteristics and sensitivity to visitation (see also New Zealand 2012b). Off-site processes such as fishing, marine pollution and climate change can also have site-specific effects, for instance, on seabirds (de Villiers 2008). In addition, natural environmental processes may cause site-specific changes independently from the level of tourism at a site. Different kinds of processes may act in synergy with each other.

What do tourists do and how do they interact with the Antarctic environment?

According to MacCannell (1976), a tourist attraction is defined by the empirical relationship between a tourist, a sight (the subject of sightseeing), and information about a sight. This results in interactions of various kinds between people (tourists), their artefacts and particular environmental or cultural features (Roura 2009, 2011). Blogs constitute a record of some of these interactions.

During landings, polar tourists display a basic behavioural repertoire that includes walking around the sites they visit, gathering and receiving information about

local sights and documenting their presence at particular places, either by taking something with them, e.g., photographs, or leaving something behind, e.g., a stone on a cairn (Roura 2010a, 2011). Obviously, common behaviour is complemented by a vast range of less common—and even eccentric—behaviour, including potentially non-compliant behaviour. For instance, in 2011–12 some tourists cast barley seeds on the ground at Telefon Bay in Deception Island, apparently for religious reasons (IAATO 2012a; Committee for Environmental Protection 2012, paragraph 121).

The blogs examined here documented both common behaviour (e.g., photography) and less common forms of behaviour (e.g., the "polar plunge"). Behaviour was primarily focused on archetypical sights of the Antarctic—notably penguins—and also those particular to Deception Island, such as geothermal features and the remains of whaling. Some bloggers also enjoyed carrying out in an Antarctic setting in activities that are not specific to this region, such as kayaking or camping. The tourists' immersion in the Antarctic environment was complemented with visiting souvenir shops, enjoying on-board entertainment and blogging about their journey.

Tourist–environment interactions may be influenced by the artefacts (equipment) used by tourists and this was apparent in some of the blogs examined. For instance, equipment such as kayaks, diving gear and tents enabled experiencing the environment, and potentially modifying it, in ways that were not available to those without such equipment. In their study of a scuba diving expedition in Antarctica, Lamers & Gelter (2012) conclude that diversified activities generate a broader variance in attitudes and behaviours, which may have environmental implications.

How do tourists interact with Antarctic wildlife?

Blog analysis highlighted the importance of wildlife as a tourist attraction. It is clear that Antarctic tourists want to see wildlife, and access to wildlife sites is one of the main "products" offered by the tourism industry. The blogs showed that tourist–wildlife interactions result in a range of behaviours from both individual tourists and animals—from mutual curiosity, to a cautious retreat, to instances of more assertive behaviour. The *modus operandi* of tourism enables tourists to see many forms of Antarctic wildlife from close proximity and at virtually any stage of their life cycle, and this was also apparent in the blogs examined. An extreme known example of impacts resulting from this proximity is serious injury to a penguin chick that was hit by a falling tripod and which had to be euthanized (IAATO 2012a).

Regular pedestrian approach may affect wildlife in a number of ways, including stress reactions, reduced recruitment and population abundance, (apparent) habituation and relocation to other sites (Tin et al. 2009 and references therein). Beale & Monaghan (2004) noted that visitors to wildlife colonies may be regarded as "predation-free predators", that is, wildlife may react to visitors as if they were approaching predators, resulting in stress and potentially in a range of impacts. Both the number of visitors and approach distance matter, which underscores the importance of the tourism *modus operandi* and of tourist behaviour. An extreme known example of impacts from wildlife disturbance is the presumed death of an elephant seal that fell from a cliff at Hannah Point after apparently panicking during a tourism landing (IAATO 2010b). A review of research on wildlife disturbance research (de Villiers 2008) suggested that there is substantive variation in the way disturbance associated with human activities in Antarctica affects wildlife. Wildlife responses to disturbance are affected by numerous factors, many of which are not fully understood. Overall, "there is no 'one size fits all solution to managing human disturbance in the region" (de Villiers 2008: 8).

What are the obvious environmental consequences of tourist behaviour?

Tourist–environment interactions may result in tourism "artefacts" that are cultural transformations of the environment by or for tourism. Mechanical forms of people–environment interactions may result in features such as footprints, tracks, lost or discarded objects and the introduction of non-native species. Non-mechanical forms of people–environment interaction (e.g., visual, acoustic) may lead to (or prevent) mechanical interactions. For instance, a salient feature of the landscape may attract visitors and cause them to approach or walk on vulnerable historical or environmental features. Conversely, the visual recognition of sensitive features may keep people away from them.

Relatively few consequences of tourist behaviour could be identified unambiguously in the blogs examined in this study. These included features such as footprints and recent ephemeral paths on sediments or snow, well-established paths on sediments or through moss, rock cairns and a whale skeleton reconstructed for tourism. Some photographs portrayed animals apparently displaying agonistic behaviour as a reaction to visitors (see, e.g., Tarlow & Blumstein 2007), although it should be noted that the relationship between the intensity of behavioural responses and the effects on animal fitness or

populations is unclear (de Villiers 2008 and references therein).

Overall, blog analysis suggest that tourism results in cultural traces and other environmental consequences, although some of these would not be judged as "impacts" under the current practice of implementing the Madrid Protocol. Tourism is one of multiple possible causes of change to the natural and cultural (historic) environment (e.g., Hofman & Jatko 2000; Naveen et al. 2001; Roura 2011).

More than 250 sites have been used for tourism purposes between 1989–90 and 2007–08 (Lynch et al. 2010), and at least 32 of these sites are regularly used to land tourists and for that reason are subject to site-specific guidelines. However, tourism impacts on the Antarctic environment remain poorly understood. Despite environmental impact assessment requirements under the Madrid Protocol, there is no established procedure to assess the environmental impact that results when a site becomes a tourist destination (Hemmings & Roura 2003). A recent review of tourism impacts undertaken by the Committee for Environmental Protection noted that the published literature on Antarctic tourism environmental impacts was very limited and suggested that, with the exception of obvious tracking at some locations, "tourism impacts are either absent … or any impacts are subtle and cumulative and undetectable at the current (low) levels of monitoring" (New Zealand 2012a: 5). However, the lack of data cannot be used as a basis for concluding that tourism has not had any impact (Committee for Environmental Protection 2012, paragraph 49).

What events occur to tourists that can be described as incidents or accidents?

Antarctic tourism follows predictable patterns but may be subject to diachronic change and synchronic variation as a result of weather and general environmental conditions. Tourists may experience major or minor incidents and accidents involving unexpected forms of interaction with the environment, and this was underscored in the blogs examined here. Incidents and accidents involved sudden changes in weather conditions, waves from calving glaciers, and shipping-related incidents of various sorts. Some incidents may be hazardous to humans, or may result in the deposition of artefacts (e.g., from lost objects to shipwrecks) and in environmental effects of various kinds (e.g., hydrocarbon pollution).

The most common type of (major) incident affecting tourism appears to be the grounding of vessels (New Zealand 2012b). At least 20 vessel incidents,

ranging from losing propulsion to sinking, have been reported to the ATCM and the Commission for the Conservation of Antarctic Marine Living Resources since 2007. Of these, 10 were cruise ships and two were yachts in semi-commercial expeditions (ASOC 2012), including vessels used by bloggers in this sample. The increasing range of activities—such as kayaking or diving—offered to mainstream tourists further expands the range of possible incidents and accidents.

Are tourists aware of environmental regulations, and do they comply with them?

One of the main tourism management instruments are those that regulate (or inform) the behaviour of individual tourists, such as site guidelines. This is implemented under the supervision of tour guides, usually on a staff–tourist ratio of 1:20. It has been suggested that visitor compliance with guidelines is imperfect (de Villiers 2008 and references therein) and also that members of IAATO have demonstrated an apparently high level of compliance to industry and Madrid Protocol environmental requirements (Tin et al. 2009). Some recent official inspections by Antarctic Treaty states have inspected a small number of tourism cruise ships and have generally been complimentary of their operations (e.g., United States Antarctic Inspection Team 2006). However, official inspections have focused primarily on shipping aspects of cruise ships rather than on tourism activities ashore. In this context, tourist blogs provide a unique insight into tourist compliance with environmental guidelines.

Generally, tourists in this sample were not explicitly concerned about issues of compliance—their attention was focused on enjoying the journey. However, some blogs reflected explicitly or implicitly either specific compliance or lack of compliance with tourism regulations. Examples of compliance included keeping a recommended distance from wildlife, avoiding contact with wildlife and boot cleaning. Examples of lack of compliance included people accessing off-limit areas or buildings, approaching wildlife too closely, handling historic artefacts and touching wildlife. It should be noted that events of non-compliant behaviour may be very brief. At the same time, behaviour lasting a short time may result in lasting effects on the environment.

It is possible that for some tourists, noncompliant behaviour may have been a one-off or an infrequent event through a cruise. For instance, a blogger who walked into southern giant petrels nesting areas, which are closed to visitors, otherwise displayed a high degree of environmental awareness as judged by the overall content of her blog; she may not have been adequately

informed or supervised in that particular instance. In contrast, other tourists may have regularly and knowingly engaged in inappropriate behaviour. Several instances of noncompliance, and possibly the most serious, occurred in a single yacht-based semi-commercial expedition, but there were also instances of noncompliance on mainstream tourism cruises (Table 4).

It is possible that tourists may ignore some rules intentionally (Roura 2011). The example of tourists taking food and drink to an overnight camp, against instructions, suggests a certain disregard for *some* rules that tourists may not regard as sensible or that interfere with their enjoyment of the Antarctic. Furthermore, some guidelines fall into a grey zone. For instance, about 1500 tourists undertook the hike between Whalers Bay and Baily Head in the study period (IAATO 2012b); this walk is discouraged—though not prohibited—by the "Code of conduct for visitors to Deception Island", so some tour operators continue to offer this walk.

Conclusions

This research is the first examination of Antarctic tourist behaviour using blogs posted by tourists. For the purposes of tourism, Antarctica is not only a *destination* visited for its archetypical attractions but is also a *playground* for a range of more or less adventurous activities, and a *background* for on-board activities and entertainment. Tourist blogs reflect these various forms of tourist engagement with the Antarctica, although this analysis has focused on the first two.

Many of the blogs examined here reflected the intellectual curiosity and *joie de vivre* of the bloggers, some of whom were particularly perceptive about what they saw and experienced. Each blog entry provides a snapshot of the events during a particular cruise: events that are significant to understand tourist behaviour may have been excluded from the blog. It is not suggested that the majority of Antarctic tourists behave in the same way as those examined here. Nonetheless, blogs provide tourists' representations of "being there" in the Antarctic as well as information about tourist behaviour, from which environmental impacts may result. Furthermore, some blogs both illustrate and explain behaviour and as such they serve as a bridge between the emic and the etic.

Blog content underscores that contemporary tourism in the Antarctic focuses on the environment, and is simultaneously quite forcefully tourism-centric. The tourism industry and the tourists themselves are driven to engage with just about any aspect of the Antarctic environment that may become an attraction (in the sense of MacCannell 1976), either through sightseeing or through more active forms of interaction. This impetus is somewhat constrained by regulations of various kinds, such as site-specific guidelines, and is amplified by the growing diversity and scale of the tourism activity.

For the most part, blog entries suggested that bloggers carried on with their journeys unconcerned about the issues that preoccupy decision-makers, but nonetheless appeared to broadly comply with regulations. Some blog entries demonstrated instances of explicit compliance with regulations or, conversely, instances of noncompliance. As a whole, blogs showed many more instances of compliance than of noncompliance, although it is interesting that both types of behaviour were picked up in a small sample. It should be noted that a high level of compliance does not necessarily mean an absence of environmental impacts—guidelines do not satisfactorily cover, for instance, issues of cumulative impacts.

Overall, tourist blogs document, implicitly or explicitly, the behavioural processes by which tourism impacts could occur. Many of the actual and potential impacts of tourism depend on discrete tourist–environment interactions (e.g., approaching, walking on, touching), and on the circumstances in which these forms of behaviour unfold—individually, collectively and cumulatively—through landings at certain sites and, more generically, through the establishment and consolidation of tourism destinations in Antarctica.

The observations made here—based on a small sample of blogs—should be placed in the context that over 150 000 tourists visited the Antarctic between 2006–07 and 2009–10, and that they conducted more than 700 000 person/landings in Antarctica, displaying a myriad of patterns of behaviour comparable to those described here. From this perspective, the scale of the tourism activity that takes place on a regular basis at many sites in Antarctica becomes apparent, as is the potential for conflict between humans and wildlife and other features, values and uses of this region.

Tourism has been debated periodically since the earlier Antarctic Treaty Consultative Meetings and on annual bases since the early 2000s, following a major expansion of this activity in the 1990s. Many governments are concerned about the lack of a comprehensive understanding of onshore tourist activities, and about the possibility that current or future cumulative impacts may cause unsustainable levels of stress on ecosystems (United States et al. 2011). Environmental monitoring of tourism impacts in Antarctica, however, is very limited, and a greater effort would be required to detect ecosystem or landscape changes (e.g., Lee & Hughes 2010). In addition, further research on human behaviour would be

needed to better understand tourism and its consequences to the natural and cultural (historic) environment of Antarctica, including in relation to other processes. Despite lengthy and repetitive discussions by Antarctic Treaty states, tourism has developed faster than the regulatory regime imposed on this activity, which has been reactive to developments on the ground. Unless the pace and substance of tourism discussions change, tourism will continue its dynamic trajectory. Precautionary action may be a practical alternative to manage tourism at some sites until it becomes more clear as to how this activity affects the environment.

Acknowledgements

References

ASOC (Antarctic and Southern Ocean Coalition) 2001. Antarctic tourism. Information Paper 40. XXIV Antarctic Treaty Consultative Meeting. 9–20 July 200, St. Petersburg.

ASOC (Antarctic and Southern Ocean Coalition) 2003. Regulating commercial tourism in Antarctica: the policy issues. Information Paper 67. XXVI Antarctic Treaty Consultative Meeting. 9–20 June 2004, Madrid.

ASOC (Antarctic and Southern Ocean Coalition) 2004. *The case for concern about Antarctic tourism.* Paper 20 Rev. 1. Antarctic Treaty Meeting of Experts on Tourism. 22–25 June 2004, Tromsø.

ASOC (Antarctic and Southern Ocean Coalition) 2006. Strategic issues posed by commercial tourism in the Antarctic Treaty Area. Information Paper 120. XXIX Antarctic Treaty Consultative Meeting. 12–23 June, Edinburgh.

ASOC (Antarctic and Southern Ocean Coalition) 2008. A decade of Antarctic tourism: status, change, and actions needed. Information Paper 41. XXXI Antarctic Treaty Consultative Meeting. 2–13 June 2008, Kiev.

ASOC (Antarctic and Southern Ocean Coalition) 2012. Follow-up to vessel incidents in Antarctic waters. Information Paper 53. XXXV Antarctic Treaty Consultative Meeting. 11–20 June, Hobart.

ASOC (Antarctic and Southern Ocean Coalition) & UNEP (United Nations Environment Programme) 2005. Antarctic tourism graphics: an overview of tourism activities in the Antarctic Treaty Area. Information Paper 119. XXVIII Antarctic Treaty Consultative Meeting. 6–17 June 2005, Stockholm.

ASOC (Antarctic and Southern Ocean Coalition) & UNEP (United Nations Environment Programme) 2012. Review of the implementation of the Madrid Protocol: inspection by Parties (Article 14). Information Paper 59. XXXV Antarctic Treaty Consultative Meeting. 11–20 June, Hobart.

Basberg B.L. 2010. Antarctic tourism and maritime heritage. *International Journal of Maritime History 22*, 2–26.

Bastmeijer K. & Roura R.M. 2004. Regulating Antarctic tourism and the precautionary principle. *The American Journal of International Law 98*, 763–781.

Beale C.M. & Monaghan P. 2004. Human disturbance: people as predation-free predators? *Journal of Applied Ecology 41*, 335–343.

Committee for Environmental Protection 2012. *Final report of the fifteenth CEP meeting.* Buenos Aires: Secretariat of the Antarctic Treaty.

Deception Island Management Group 2005. Deception Island management package. Accessed on the internet at http://www.deceptionisland.aq/package.php on 19 November 2012.

de Poorter M. & J.C Dalziell (eds.) 1996. *Cumulative environmental impacts in Antarctica: minimisation and management. Proceedings of the IUCN workshop on cumulative impacts in Antarctica.* Gland, Switzerland: World Conservation Union.

de Villiers M. 2008. Review of recent research into the effects of human disturbance on wildlife in the Antarctic and sub-Antarctic region. In: Human disturbance to wildlife in the broader Antarctic region: a review of findings. Appendix 1 to Working Paper 12. XXXI Antarctic Treaty Consultative Meeting. 2–13 June 2008, Kiev.

Enzenbacher D.J. 1992. Antarctic tourism and environmental concerns. *Marine Pollution Bulletin 25*, 258–265.

Haase D., Lamers M. & Amelung B. 2009. Self-regulation of tourism in Antarctica: exploring the conditions for success and failure. *Journal of Sustainable Tourism 17*, 411–430.

Hacquebord L. 1992. Hector station on Deception Island (South Shetland Islands, Antarctica), an environmental assessment study of a whaling station. *Circumpolar Journal 1–2*, 72–97.

Hall C.M. & Johnston M.E. (eds.) 1995. *Polar tourism: tourism in the Arctic and Antarctic regions.* Chichester, UK: John Wiley and Sons.

Hall C.M. & Saarinen J. 2010. Tourism in the Arctic and Antarctic regions. Introduction—definitions, locations, places and dimensions. In C.M. Hall & J. Saarinen (eds.): *Tourism and change in polar regions: climate, environment and experiences.* Pp. 1–43. London: Routledge.

Heilen M.P., Schiffer M.B. & Reid J.J. 2008. Landscape formation processes. In B. David & J. Thomas (eds.): *Handbook of landscape archaeology.* Pp. 601–608. Walnut Creek, CA: Left Coast Press.

Hemmings A.D. & Roura R.M. 2003. A square peg in a round hole: fitting impact assessment under the Antarctic envir-

onmental protocol to Antarctic tourism. *Impact Assessment and Project Appraisal 21*, 13–24.

Hofman R. & Jatko J. (eds.) 2000. Assessment of the possible cumulative environmental impacts of commercial ship-based tourism in the Antarctic Peninsula area. *Proceedings of a Workshop held in La Jolla, California, 7–9 June 2000*. Washington DC: National Science Foundation.

Hollenback K. 2010. Landscapes. In M.B. Schiffer (ed.): *Behavioural archaeology: principles and practice*. Pp. 186–193. London: Equinox.

Hunter C. 2002. Sustainable tourism and the touristic ecological footprint. *Environment, Development and Sustainability 4*, 7–20.

IAATO (International Association of Antarctica Tour Operators) 2010a. About IAATO: bylaws. June 24, 2010. Downloaded from the Internet at http://www.iaato.org/bylaws.html on 15 November 2010.

IAATO (International Association of Antarctica Tour Operators) 2010b. Proposed amendment to Antarctic Treaty site guidelines for Hannah Point. Information Paper 104. XXXIII Antarctic Treaty Consultative Meeting. 3–14 May 2010, Punta del Este.

IAATO (International Association of Antarctica Tour Operators) 2012a. Report of the International Association of Antarctica Tour Operators 2011–12. Information Paper 36. XXXV Antarctic Treaty Consultative Meeting. 11–20 June, Hobart.

IAATO (International Association of Antarctica Tour Operators) 2012b. Tourism statistics. Accessed on the internet at http://iaato.org/tourism-statistics on 10 December 2012.

Lamers M. & Gelter H. 2012. Diversification of Antarctic tourism: the case of a scuba diving expedition. *Polar Record 48*, 280–290.

Lamers M., Haase D. & Amelung B. 2008. Facing the elements: analysing trends in Antarctic tourism. *Tourism Review 63*, 15–27.

Lee J.E., & Hughes K.A. 2010. Focused tourism needs focused monitoring. *Antarctic Science*. doi: 10.1017/S0954102009990782

Lynch H.J., Crosbie K., Fagan W.F. & Naveen R. 2009. Spatial patterns of tour ship traffic in the Antarctic Peninsula region. *Antarctic Science*. doi: 10.1017/S0954102009990654.

Lynch H.J., Crosbie K., Fagan W.F. & Naveen R. 2010. Spatial patterns of tour ship traffic in the Antarctic Peninsula region. *Antarctic Science 22*, 123–130.

MacCannell D. 1976. *The tourist. A new theory of the leisure class*. New York: Schocken Books.

Maher P. 2010. Awesome size ... magnitude of the place ... the incredible beauty. Visitors' onsite experiences in the Ross Sea region of Antarctica. In C.M. Hall & J. Saarinen (eds.): *Tourism and change in the polar regions: climate, environment and experiences*. Pp. 215–235. London: Routledge.

McKercher B., Weber K. & du Cros H. 2008. Rationalising inappropriate behaviour at contested sites. *Journal of Sustainable Tourism 16*, 369–385.

Moscardo G., Woods B. & Saltzer R. 2004. The role of interpretation in wildlife tourism. In K. Higginbottom (ed.): *Wildlife tourism: impacts, management and planning*. Pp. 232–251. Altona, Victoria: Common Ground Publishing and Cooperative Research Centre for Sustainable Tourism.

Naveen R., Forrest S.C., Dagit R.G., Blight L.K., Trivelpiece W.Z. & Trivelpiece S.G. 2001. Zodiac landings by tourist ships in the Antarctic Peninsula region, 1989–99. *Polar Record 37*, 121–132.

New Zealand. 2012a. Environmental aspects and impacts of tourism and non-governmental activities in Antarctica. Working Paper 22. XXXV Antarctic Treaty Consultative Meeting. 11–20 June, Hobart.

New Zealand. 2012b. CEP tourism study. Draft report 2012. Appended to: Environmental aspects and impacts of tourism and non-governmental activities in Antarctica. Information Paper 33. XXXV Antarctic Treaty Consultative Meeting. 11–20 June, Hobart.

New Zealand 2012c. CEP tourism study. Supporting tables and data sets. Appended to: Environmental aspects and impacts of tourism and non-governmental activities in Antarctica. Information Paper 33. XXXV Antarctic Treaty Consultative Meeting. 11–20 June, Hobart.

Nuttall M. 2010. Narratives of history, environment and global change. Expeditioner–tourists in Antarctica. In C.M. Hall & J. Saarinen (eds.): *Tourism and change in the polar regions: climate, environment and experiences*. Pp. 204–214. London: Routledge.

Pearce P.L. 2005. *Tourist behaviour: themes and conceptual schemes*. Toronto: Channel View Publications.

Pyykkönen M. 2007. Visual construction of cultural identities of "others": Lapland travellers' photographs of the Saami people and culture. *Arctic and Antarctic 1*, 169–209.

Reid J.J., Schiffer M.B. & Neff J.M. 1974. Expanding archaeology. *American Antiquity 39*, 125–126.

Reid J.J., Schiffer M.B. & Neff J.M. 1975. Behavioural archaeology: four strategies. *American Anthropologist 77*, 836–48.

Roura R.M. 2009. The polar cultural heritage as a tourism attraction: a case study of the airship mooring mast at Ny-Ålesund. *Svalbard. Téoros 28*, 29–38.

Roura R.M. 2010a. Cultural heritage tourism in Antarctica and Svalbard: Patterns, impacts & policies. In C.M. Hall & J. Saarinen (eds.): *Tourism and change in the polar regions: climate, environment and experiences*. Pp. 180–203. London: Routledge.

Roura R.M. 2010b. Monitoring the transformation of historic features in Antarctica and Svalbard: local processes and regional contexts. *Polar Record 46*, 289–311.

Roura R.M. 2011. *The footprint of polar tourism. Tourist behaviour at cultural heritage sites in Antarctica and Svalbard. Circumpolar Studies Volume 7*. Groningen: Arctic Centre, University of Groningen.

Roura R.M., dos Santos Afonso M., Pérez Muñoz C. & Tin T. 2008. Tourism and the human footprint at Deception Island, South Shetland Islands, Antarctica. Paper presented at the SCAR/IASC IPY Open Science Conference. 8–11 July, St. Petersburg, Russia.

Roura R.M. & Pérez-Muñoz C. 2002. *Evaluation of sites with human activities at Deception Island. Recommendations for a management plan.* Washington, DC: The Antarctica Project.

Ryan G.W. & Bernard H.R. 2003. Techniques to identify themes. *Field Methods 15*, 85–109.

SAT (Secretariat of the Antarctic Treaty) 2009. *Final report of the thirty-second Antarctic Treaty Consultative Meeting.* Buenos Aires: Secretariat of the Antarctic Treaty.

Schiffer M.B. 1987. *Formation processes of the archaeological record.* Salt Lake City: University of Utah Press.

Schiffer M.B. 1995. *Behavioural archaeology. First principles.* Salt Lake City: University of Utah Press.

Schiffer M.B. 2010. *Behavioural archaeology. Principles and practice.* London: Equinox.

Splettstoesser J., Landau D. & Headland R.K. 2004. Tourism in the forbidden lands: the Antarctica experience. In T.V. Singh (ed.): *New horizons in tourism. Strange experiences and stranger practices.* Pp. 27–36. Wallingford, UK: CABI Publishing.

Stewart E., Draper D. & Johnston M. 2005. A review of tourism research in the polar regions. *Arctic 58*, 383–394.

Stewart W.P. 1998. Leisure as multiphase experiences: challenging traditions. *Journal of Leisure Research 30*, 391–400.

Tarlow E.M. & Blumstein D.T. 2007. Evaluating methods to quantify anthropogenic stressors on wild animals. *Applied Animal Behaviour Science 102*, 429–451.

Tin T., Fleming Z., Hughes K.A., Ainley D., Convey P., Moreno C., Pfeiffer S., Scott J. & Snape I. 2009. Impacts of local human activities on the Antarctic environment: a review. *Antarctic Science 21*, 3–33.

United States Antarctic Inspection Team 2006. *Report of Inspections under Article VII of the Antarctic Treaty and Article 14 of the Protocol on environmental protection. November 12 – December 1, 2006.* Washington, DC: United States Department of State.

United States, France, Germany, Netherlands & New Zealand 2011. ATCM review of tourism rules and regulations. Working Paper 26. XXXIV Antarctic Treaty Consultative Meeting. 20 June - 1 July, Buenos Aires.

Urry J. 2002. *The tourist gaze.* London: Sage Publications.