# Killer whales of Antarctica; details gathered via eco-tourism.

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ABSTRACT

Research on Antarctic killer whales (*Orcinus orca*) is often difficult due to logistical constraints. By utilizing tourism shipping, platforms of opportunity are provided. To facilitate this, the Antarctic Killer Whale Identification Catalogue was established in 2001. Eighty-seven killer whales were photographed and catalogued and four individuals were resighted (within 30 N mi and over a time frame of nearly two years). Antarctic killer whales were photographed with wounds attributed to cookie cutter sharks (*Isistius sp.*). Sightings of Antarctic killer whales were made in New Zealand waters. One record provided photographs of a killer whale type not previously described from Antarctic waters, with exceptionally small eye-patches.

KEYWORDS: KILLER WHALE; *ORCINUS ORCA*; ANTARCTICA; TYPE; PHOTO-ID; TOURISM; COOKIE CUTTER SHARK

## INTRODUCTION

The geographical isolation and hostile environment of Antarctica present considerable logistical and financial constraints for conducting research. By using tourism ships as platforms of opportunity and by collecting anecdotal information from crew and passengers on these ships, the potential for gathering data is increased.

There are an ever-increasing number of tourist ships in Antarctica, with 35 companies (some operating multiple ships) currently members of the International Association of Antarctic Tour Operators, up from seven in 1991 (IAATO 2007). These ships provide a valuable source of information, as many of their clients are well equipped with cameras (and videos), resulting in proportionally high numbers of potential observers. It is estimated that approximately 20,000 people now visit Antarctica per season (Nov- Mar) (IAATO 2007).

Killer whales *(Orcinus orca)* can be identified as unique individuals from clear, high-quality photographs of distinguishing features, *i.e.*, primarily dorsal fin; with eye-patch and saddle-patch as secondary features (Baird 2000, Visser & Mäkeläinen 2000). Additionally, there are variations in pigmentation patterns on some, if not all, killer whales from the Antarctic region (Pitman & Ensor 2003, Visser 2002). For a full description of the field-distinguishable marks see Pitman & Ensor (2003) who describe three different forms; Type A, Type B and Type C. Basically, Type A looks similar in many ways to the 'typical' killer whale and both Type B and Type C have overall grey pigmentation, 'dorsal-capes' (a slightly darker grey area over the anterior dorsal-thorax) and either large (Type B) or small eye-patches (Type C) (see also (Pitman *et al.* 2007) for more details on Type C).

The Antarctic Killer Whale Identification Catalogue (AKWIC) was established in 2001 (Berghan & Visser 2001) to help to verify the distribution of these different Types and was the first collaborative effort to collate Antarctic killer whale data. It was formed along the lines of College of the Atlantic's Antarctic Humpback Whale Catalogue (http://199.33.141.23/antarctic/). Contributions to the AKWIC continue to be solicited from scientists, naturalists, Antarctic tour operators, Officers and deck-crews of ships, helicopter and fixed wing pilots, tourists and other visitors to the Antarctic region (as well as data from adjacent waters, including sub-Antarctic Islands).

## METHODS

Despite the high likelihood of correct identification of killer whales in general, data collected from external sources (*e.g.*, tourists) were graded for quality and poor-quality records were deleted. As many of the records of killer whales in Antarctic waters came via tourism ships, accuracy of the submitted records were enhanced, as they were facilitated by the onboard naturalist staff. Typically there is a marine mammal specialist aboard each trip and many of the staff are trained scientists and biologists. Assistance with locating killer whales was typically provided by these same staff, along with the ships Officers and deck-crews. However, by default,

anecdotal records from the general public (*e.g.,* tourists) are typically scant of data, particularly detailed observations. Regardless, they do provide general distribution data and some quality identification photographs/behaviour video.

The AKWIC collated photographs and video that clearly showed dorsal fin, saddle-patches and/or eye-patches for individual photoidentification (photo-ID). For each sighting record the following data was requested; date, location, time, group size and behaviours such as foraging.

Sightings without ID photographs were collected to identify distribution patterns. Where possible, records were sorted into five main categories; firstly, records with photographs where the Type of killer whale could be established were sorted into (1) Type A; (2) Type B; and (3) Type C killer whales, following Pitman & Ensor (2003). A fourth group of data were determined as 'Data Deficient' and this included data where no photographs or video were supplied to confirm that the record was a sighting of killer whales, or where date or location were undeclared. It also included sightings where there may have been photos to verify species, but they could not be classified into one of the Types. Lastly, a fifth category of data termed 'Other Killer Whales' was compiled. This consisted of images of killer whales which did not fit the field-marks as per Pitman & Ensor (2003). Again, each of these sightings was graded to ensure data quality.

## RESULTS

A total of 108 killer whale sightings were collated for the AKWIC from 1981-2007. Forty records were Data Deficient, including 15 where a sighting of killer whales was confirmed but they could not be classified to Type. Concentrations of sightings were clumped around the Antarctic Peninsula and the Ross Sea, as could be expected given the sources of data (these areas are the main locations where Antarctic ship-based tourism occurs). However, sightings were not uncommon around South Georgia Island and the nearby Shag Rocks. As found in the Pitman & Ensor study (2003), Type C killer whales were seen predominately in the Ross Sea area, and Type B were found in the Ross Sea and off the Antarctic Peninsula. Type A had a more erratic distribution, including more sightings further from the coastline (*e.g.,* in the Drake Passage).

Eighty-seven killer whales were catalogued into Type A ($n$ = 36), Type B ($n$ = 23), and Type C ($n$ = 28). Matches were made for four animals. One, a (presumed) female, (Type A, catalogue number ANT#15-A), was first photographed on 23 Nov 2003, then re-photographed on 7 Feb 2004 and subsequently on 16 Dec 2004. All sightings of this animal were within 30 N mi of each other. The second match was a sub-adult male (Type A, catalogue number ANT#10-A) who was travelling with ANT#15-A when first sighted and was again with her during the resighting event of 7 Feb 2004. The third resighting was a Type A killer whale (catalogue number ANT#18-A), again a presumed female, and again travelling with ANT#15-A. The fourth match was made between resightings of a Type B adult male (catalogue number ANT#7-B), who was first photographed on 14 Jan 2000 and then re-photographed on 21 Dec 2001, approximately 40 N mi to the north of where he was initially photographed.

There was some variation in the shape of the saddle-patches of Antarctic killer whales. At least one killer whale each from Type A, B and C was photographed with an 'open saddle-patch', as has been described for the killer whales of British Columbia, Washington State area (Baird & Stacey 1988). Type B and Type C killer whales were photographed with scars which were oval in shape and were presumed to be from cookie cutter shark bites (*Isistius sp.*).

Visser (1999) recorded a group of Type B killer whales in New Zealand waters in 1997 (Visser 1999) which had similar scars. Since then, three additional sightings of Antarctic killer whales have been made in New Zealand waters, however, these were Type C killer whales and they too had fresh wounds and healed scars, indicative of cookie cutter shark bites. No matches were made to other killer whales in the AKWIC, however, matches were made between the first and second of these Type C sightings (Visser 2007).

Only one record for the category 'Other Killer Whales' was collected; these animals were black and white killer whales (similar to Type A), however, they had extremely small eye-patches, smaller than those described for Type C killer whales (Pitman & Ensor 2003), and more reminiscent of the small eye-patches seen on a group of killer whales which stranded on New Zealand shores in 1955 (Visser 2007, Visser & Mäkeläinen 2000).

Foraging behaviour was recorded on a number of instances and for many records the killer whales could be classified to Type (*e.g.,* see Smith *et al.* 2007 (In Review)). Observations were also made of killer whales in apparent non-aggressive association with various other species, including Antarctic fur seals (*Arctocephalus gazella*), penguins and other species of cetaceans.

One killer whale was observed with a dorsal fin disfigurement that may be attributable to fisheries interactions. This animal was photographed at South Georgia, where such interactions are know to occur (Ashford 1996, Purves *et al.* 2004).

## DISCUSSION

By utilizing platforms of opportunity and gathering information from external sources it is possible to collate valuable information that, over time may help us to better understand the killer whales of Antarctica. Data collected via the AKWIC has been provided for publication in two manuscripts (Pitman & Ensor 2003, Smith *et al.* 2007 (In Review)), with a further two currently being prepared. The resightings of the four killer whales, although a small sample, is possibly an indication that these animals have a small home range, at least over the summer months when the data has been gathered. It is hoped to continue disseminating the findings from the AKWIC, collaborate with fellow researchers and collate further records of killer whales from these waters.

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