

A note on the northernmost record of the Antarctic minke whale (*Balaenoptera bonaerensis*) in the Eastern Pacific

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ABSTRACT

In this study the first record of the Antarctic minke whale (*Balaenoptera bonaerensis*) in Ecuador (2°7.35'S, 80°45.7'W) is presented. It was a single stranding of a calf of 3.43m in length. The species was identified based on morphological characteristics such as the number and colour of baleen plates, the number and extension of ventral grooves, lack of white flipper patch and the waved greyish light colouration pattern on the flanks, among others. Although only a handful of records exist of this species in the Eastern Pacific, it confirms that the breeding area of this species at least reaches the equator in this region.

KEYWORDS: MINKE WHALE; DISTRIBUTION; SOUTH AMERICA; BREEDING GROUNDS; PACIFIC OCEAN; SOUTHERN HEMISPHERE

INTRODUCTION

Until around twenty years ago the taxonomic status of minke whales was insufficiently defined. Minke whales from both hemispheres were considered conspecifics and generally referred to as *Balaenoptera acutorostrata* Lacépède, 1804 (e.g. Leatherwood *et al.*, 1983). In 2000, the Scientific Committee of the International Whaling Commission (IWC) recognised the Antarctic minke whale, *B. bonaerensis* Burmeister, 1867 as a different species (IWC, 2001). In the Southern Hemisphere, *B. bonaerensis* coexists partially sympatric with a southern dwarf form that is genetically more related to the northern minke whale *B. acutorostrata* (Arnold *et al.*, 2005; Reilly *et al.*, 2008). There is still uncertainty, however, about the stock structure of the Antarctic minke whale (e.g. Pastene, 2006).

The three minke whale sub-types can be identified based on morphologic and skeletal differences and body colouration. The most evident external differences between the Antarctic and the two forms of *B. acutorostrata* are the lack of a white patch on the flippers and a dark throat patch, which are present only in the dwarf and northern minke sub-types (Arnold *et al.*, 1987; Best, 1985). Differences also include the position of the dorsal fin, the colour and number of baleen plates, an asymmetrical body colouration and several subtle colouration designs in different parts of the body (Arnold *et al.*, 1987; Arnold *et al.*, 2005; Best, 1985; Best, 2007; Bushuev and Ivashin, 1986).

Based on surveys of whaling ships, Kasamatsu *et al.* (1995) suggested that there are two breeding areas for the southern minke whale in the Pacific Ocean; in the eastern and the western Pacific, mainly distributed between 10°S and 20°S. However, the minke whale is considered an uncommon species in the Eastern Pacific (Jefferson *et al.*, 2008). The species does not appear in records of whaling activities along the South American coast during the 20th Century even when catches of more commercially valuable whales such as sperm (*Physeter macrocephalus*), Bryde's (*B. brydei/edeni*) or blue (*B. musculus*) decreased considerably

(see Clarke, 1980). Previous records of the species in the Southeast Pacific are from young bycatch specimens in artisanal fishing gillnets in Peru at 8°25'S and 12°29'S (García-Godos *et al.*, 2013; Van Waerebeek and Reyes, 1994). There are few records from the Galapagos Islands, Ecuador (0°30'S, 90°30'W), referred to as *B. acutorostrata* (Merlen, 1995; Palacios, 2003) and a westward record (8°03'S, 109°54'W) made on 14 November 1985 (Robert Pittman, pers. comm.). Our specimen from the continental coast would be the first confirmed record of *B. bonaerensis* in Ecuadorian waters and the northernmost one of the species in the Eastern Pacific.

The specimen

A calf female rorqual of 3.43m in length with a unique central ridge on the head stranded at San Pablo, Ecuador (02°7.35'S, 80°45.7'W) on 31 October 2004 (Fig. 1). The specimen was initially misidentified as a sei whale (*B. borealis*) (Félix *et al.*, 2011), however, a more detailed analysis of the available morphological information showed that the specimen was in fact an Antarctic minke whale (*B. bonaerensis*).

The specimen was relatively fresh when examined. The epidermis was present on around 90% of the back and 30% of the belly. Some bloating was noted, especially of the tongue (Fig. 2). The skin on its right side was in better condition as the animal was lying on its left side and the sun had started to dry it. Thus, colour descriptions below refer to this right side of the animal. On the left side a brownish contusion wound of around 40cm without epidermis extended from behind the eye to the base of the pectoral fin. The absence of bruising suggests the wound could have occurred after death, possibly due to sunburn and abrasion from the beach. The external examination did not help to determine the cause of death. 12 standard body measurements were taken from this specimen to the nearest centimetre (Table 1).

The specimen was dark grey on the back changing to light grey toward the flanks and white on the ventral side. Along

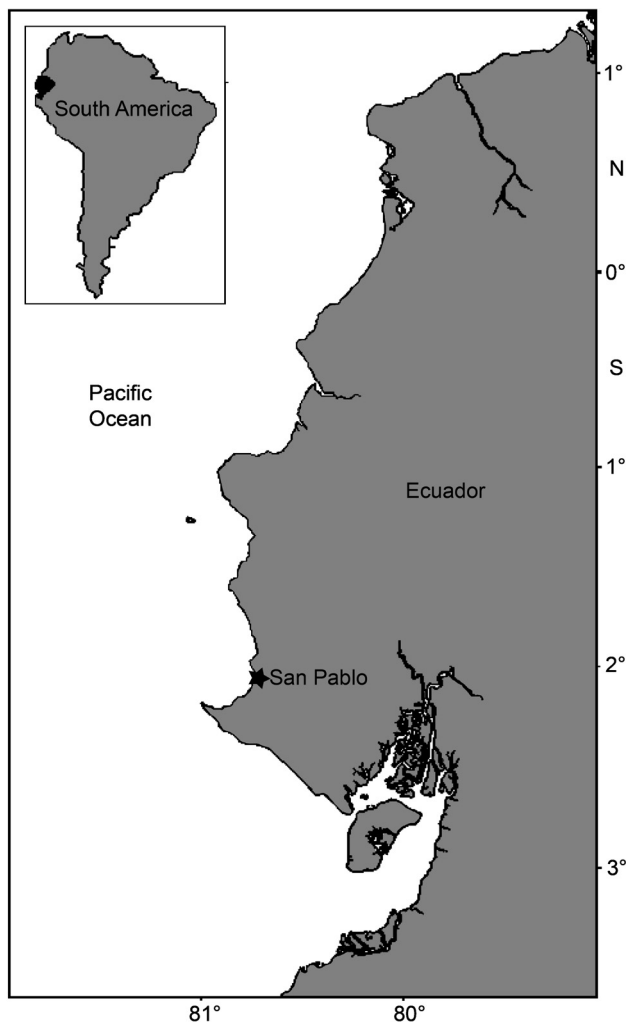


Fig. 1. The site of the stranding at San Pablo, Ecuador.

the flanks three major light greyish streaks in a waved pattern were observed extending from the lower part up to the mid flank; one located in front of the dorsal fin, another one in thoracic area and a smaller one over the flipper. Another light grey streak was also visible in the caudal area. Two irregular and light grey streaks extended from the blowholes rearward and to left side of the body (Fig. 3). Ventrally, most of the epidermis was lost and the specimen looked whitish and slightly pink in the ventral and genital area. The skin at the



Fig. 2. Different views of the specimen of *B. bonaerensis* stranded at San Pablo, Ecuador.

throat was in better condition and was white. The flipper's surface was uniformly grey with darker tips, the most common pattern found in Antarctic minke whales flippers (Best, 1985; Bushuev and Ivashin, 1986). Flippers had a white anterior border and dark grey rear border, and were white ventrally. The dorsal fin was tall and falcate, but was still flexible. There were 62 ventral grooves that ended before the navel, which was in the process of healing.

The complete left row of baleen was collected. It was 742mm in length and contained 265 individual baleen plates (Fig. 4). The first 3/4 of the gum, measured from the base, was grey and the remainder was whitish. The gum has a sinuous and asymmetrical form; its external height was 28mm and internally 13.6mm. The gum maximum width was 65.1mm at 320mm from the tip. The row is maintained in formalin (5%) in the Museo de Ballenas at Salinas (Cat N° 115 MBABO 01).

The colour of the plates' surface was not assessed when collected. However, their outer colouration was clearly visible in photographs taken when the specimen was found

Table 1

Body measurements of the Ecuadorian specimen expressed in centimetres and as percentage of total length. The rightmost column contains data from Best (1985) for reference.

Measure	Length (cm)	% total length	Mean % body length (Best, 1985)
Total length (tip of the upper jaw to deepest part of flukes notch)	343	100	100
Tip of upper jaw to centre of the eye	76	22.2	20
Tip of the upper jaw to angle of gape	74	21.6	18.7
Tip of upper jaw to blowhole along midline	54	15.7	14.3
Tip of upper jaw to tip of dorsal fin	231	67.3	71.5
Tip of upper jaw to midpoint of umbilicus	193	56.3	53.7
Tip of upper jaw to midpoint of genital aperture	249	72.6	66.5
Length flipper (anterior insertion to tip)	54	15.7	15.8
Length flipper (axilla to tip)	39	11.4	11.9
Height dorsal fin (fin tip to base)	15	4.4	3.7
Width, flukes (tip to tip)	83	24.2	29
Distance from nearest point on anterior border of flukes to notch	27	7.9	7.2



Fig. 3. Rostrum and upper part of the head showing the central keel and the two blowhole streaks.

(Fig. 3). Most plates had a dark grey external border in the upper part and white tips, particularly along the posterior and central parts of the row. Border plates became lighter towards the tip, changing from dark grey to a red colour, to cream-white. Due to the colour transition on the external border of the row, plates were separated into three colour categories: (1) all white, cream-white plates located in the tip of the row ($n = 45$, 17%); (2) mostly reddish, behind the white part ($n = 33$, 12.4%); and mostly dark grey (the remaining from the original count, $n = 172$, 64.9%). These numbers should be dealt with cautiously as they were qualitatively estimated from photographs. Over time the plates have lost their original colouration, becoming lighter due to the preservation media. This colouration pattern is no longer visible. The largest individual baleen plate was 81mm, measured on the external side from the gum to the beginning of the bristles, and its width was 59mm, measured along the base of the gum, which gives a proportion width/length of 0.73.

DISCUSSION

Most morphological characteristics that could be evaluated in the Ecuadorian specimen coincided with detailed descriptions of Antarctic minke whales, including the number of ventral grooves, lack of the white flipper patch,



Fig. 4. Left baleen plates row curated at the Museo de Ballenas in Salinas, Ecuador. Colour photos available online (www.iwc.int/publications) shows the original colour when the piece was collected.

blowhole streaks, lack of dark throat patch and the distinctive greyish waved coloured pattern in the flanks (e.g. Arnold *et al.*, 1987; Best, 1985; Best, 2007). Notwithstanding this, other features such as caudal and head chevrons were not seen in our specimen and this could be related to the age of the animal, sunburnt skin and/or post-mortem changes.

The number and colour of baleen plates is another essential identification feature. According to Best (1985; 2007), Antarctic minke whales show asymmetrically-coloured baleen, with 20–25% white baleen on the left side and 35–40% white baleen on the right side, with the remaining plates having a black outer border. For the specimen examined in this study, most plates were bicoloured and some had three colours. The specimen had 17% of plates with a white outer border located at the tip and around 33 baleen plates (12.4%) with different proportions of red with white or dark grey after the white section. Reference to the reddish colouration of the plates cannot be found in the literature, which leads to the hypothesis that this is a temporal condition of young specimens and with time this colouration would disappear. The proportion width/length of the largest plate (0.73) is within the wide range given by Best (1985).

Most of the external measurements of the Ecuadorian specimen are outside of the range of Antarctic specimens reported by Best (1985) and Ohsumi *et al.* (1970) (see the data shown in table 5 in Best, 1985). This is not surprising as those data are from larger animals killed during whaling operations and body proportions may change with age. One example of this is the position of the dorsal fin which is known to be located more posterior in the Antarctic form than the dwarf form (Best, 1985; Arnold *et al.*, 1987). For the Ecuadorian specimen it was located in a more anterior position than for the dwarf form.

The size at birth of the Antarctic minke whale is between 2.7 and 2.9m (Ivashin and Mikhalev, 1978; Best, 1982), which indicates that the Ecuadorian specimen would be a calf of a few months old. The presence of this calf in Ecuador during the breeding season of the Southern Hemisphere Mysticeti, as well as other calves from Peru (Van Waerebeek and Reyes, 1994; García-Godos *et al.*, 2013), confirms that this species breeds in the Eastern Pacific at least as far north as the equator, just as it occurs in the western and eastern Atlantic Ocean (e.g. Siciliano *et al.*, 2011; Segniagbeto *et al.*, 2012). The distribution of Antarctic minke whale in wintering areas is poorly known and no areas of concentration have been reported; their distribution is probably offshore and disperse (Best, 1982; Kasamatsu *et al.*, 1995; Jefferson *et al.*, 2008). The few reports of the species from the Eastern Pacific appear to be consistent with this hypothesis. Since they have been reported just occasionally, strandings and bycatch victims seem to be a unique source of information in the Eastern Pacific. It is not possible to establish the affinity of this and other specimens from the Southeast Pacific with a particular Antarctic minke whale stock, as genetic studies have not been conducted. Emphasis should be put on obtaining tissue samples for genetic studies to assess stock identity and population structure.

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