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Using photo-identification to investigate the identity of blue whales at South Georgia: a comparison of photographs with Chile

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ABSTRACT

It has long been assumed that all of the blue whales caught at South Georgia were Antarctic blue whales (*Balaenoptera musculus intermedia*). Recently re-evaluated catch data, genetic and acoustic studies have suggested that Chilean blue whales (*Balaenoptera musculus subsp.*) may occasionally, if infrequently, occur at South Georgia, but this has yet to be substantiated. This study utilized the Southern Hemisphere Blue Whale Catalogue to compare the identification photographs of 23 individual blue whales from the South Georgia region to those of 478 blue whales from Chile. If a match was found it would confirm the presence of Chilean whales at South Georgia. No matches were found between the South Georgia region and Chile. This is not a surprising result given the small sample size from South Georgia. Genetic analyses of Antarctic blue whale samples from the Southern Ocean identified only 1-2% as pygmy whales. The results here are inconclusive regarding the potential presence of Chilean whales at South Georgia and future comparisons with more identification photographs may yield different results.

KEYWORDS: ANTARCTIC, TAXONOMY, PHOTO-ID, MOVEMENT

INTRODUCTION

In the Southern Hemisphere, three subspecies of blue whales are currently recognized: the Antarctic blue whale (*Balaenoptera musculus intermedia*), the pygmy blue whale (*B. m. breviceauda*) occurring in the Indian Ocean and southwest Pacific Ocean, and an unnamed Chilean blue whale (*B.m. subsp.*) from the southeast Pacific that has recently been accepted by the Taxonomy Committee of the Society for Marine Mammalogy¹. These subspecies are differentiated morphologically (Branch *et al.* 2007; Pastene *et al.*, 2020), genetically (LeDuc *et al.* 2007; LeDuc *et al.* 2017), and acoustically (McDonald *et al.* 2006; Širović *et al.*, 2018).

Blue whale catch records from South Georgia are dominated by Antarctic blue whales and generally it has been assumed that all blue whales at South Georgia are of this form (Branch *et al.* 2007). Recently acoustic, genetic, and re-evaluated catch data have given evidence that Chilean blue whales may occasionally, if infrequently, be present at South Georgia (Branch *et al.* 2007b; Pangerc 2010; Sremba *et al.* 2018), but this is yet to be confirmed.

Using photo-ID to confirm the presence of Chilean blue whales at South Georgia would provide information on the identity of blue whales at South Georgia and provide new data on the movement patterns of Chilean blue whales. The Antarctic Blue Whale Catalogue contains 14 individually identified blue whales that have been photographed at South Georgia (2011-2019). In addition to these, there are 9 whales in the Catalogue photographed within 400km from South Georgia (2009-2017). Three of these whales are consistent in appearance with non-Antarctic blue whales, with prevalent skin lesions and scarring and a proportionally shorter tailstock. They appear similar to Chilean blue whales that also display these characteristics (Brownell *et al.*, 2007; Pastene *et al.*, 2020). Typical Antarctic blue whales exhibit "clean" skin and a proportionally longer tail stock. All three whales were photographed at South Georgia on 28 February 2015.

In this study we compare the identification photographs of 23 blue whales from South Georgia and adjacent waters to those of 478 Chilean blue whales, utilizing the Southern Hemisphere Blue Whale Catalogue.

¹<https://www.marinemammalscience.org/species-information/list-marine-mammal-species-subspecies/>

METHODS

The identification photographs of 23 blue whales from South Georgia and adjacent waters (14 whales from South Georgia; 9 whales from within 400km of South Georgia; Table 1) were extracted as a subset from the Antarctic Blue Whale Catalogue (Olson *et al.*, 2020). The photographs were compared to three collections of photographs from Chile: from Centro de Conservación Cetacea (n=397, 2004-2009); from Fundación MERI (n=60, 2014-2017); and from the IWC Chile cruises (n=21, 1997-1998). The matching was undertaken using the Southern Hemisphere Blue Whale Catalogue (SHBWC), which contains copies of all four photo collections (from the Antarctic and from Chile). For more information about the SHBWC see Galletti Vernazzani *et al.*, 2020. Methods for visual comparison followed those outlined in Sears *et al.*, 1990.

Table 1. Dates and numbers of photo-identified blue whales at South Georgia or in adjacent waters compared to three Chilean photo collections.

Date	No. left side ID's	No. right side ID's	Total no. identified blue whales	Location
18 Nov 2011	1	0	1	South Georgia
06 Feb 2015	3	3	4	South Georgia
28 Feb 2015	4	0	4	South Georgia
06 Feb 2018	2	1	2	South Georgia
24 Jan 2019	1	0	1	South Georgia
26 Feb 2019	0	2	2	South Georgia
04 Dec 2009	1	1	2	300km ESE Cape Disappointment, South Georgia
24 Feb 2016	0	1	1	South Sandwich Islands
19 Nov 2016	0	1	1	Between Falkland Islands and Shag Rocks
03 Apr 2017	3	3	5	400km NE of South Georgia
TOTAL	15	12	23	

RESULTS AND DISCUSSION

The comparison of photographs of 23 blue whales from the South Georgia region to 478 blue whales from Chile did not yield any matches. This is not too surprising given the small sample set of South Georgia identifications used in this analysis. Genetic studies reported only small percentages (1-2%) of southeast Pacific blue whales in the Antarctic, whether using contemporary samples (LeDuc *et al.*, 2007) or historic samples (bone extractions; Sremba *et al.*, 2018). Therefore the results here are considered inconclusive without further investigation.

Recently photographs of 30 blue whales were collected at South Georgia in January-March 2020, and these will be available for comparison to Chilean catalogues in the future. It is important to note that during January-March 2020, there was an unusual low (perhaps the lowest) number of sightings of blue whales from waters off Chile either in southern (Isla de Chiloe) or northern Chile (Isla de Chañaral) (pers. obs. BGV).

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