

Photo-identification analysis of humpback whales from three high latitude localities of the Eastern South Pacific Population (Stock G)

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ABSTRACT

The Eastern South Pacific humpback whale population (or stock G) winters primarily off Colombia and Ecuador and spend the summer in feeding areas in the Magellan Strait and around the Antarctic Peninsula. In recent years humpback whales have been observed in the northern part of the Chilean Patagonian channels (Corcovado Gulf) during the summer and fall seasons. To investigate whether the Corcovado Gulf represent a feeding area destination for part of the Eastern South Pacific population, or alternatively, a migratory corridor to the more southern Magellan Strait or Antarctic feeding areas, photo-id pictures from the three relevant localities (Corcovado Gulf, Magellan Strait and Antarctic Peninsula), were examined. The absence of matches between the Corcovado Gulf and the Magellan Strait and Antarctic Peninsula suggest that the Corcovado Gulf might be a summer migratory destination for at least part of the Eastern South Pacific population. This result should be considered as preliminary due to the small number of pictures examined for the Corcovado Gulf. More photo-id and genetic studies are recommended for humpback whales in this locality.

INTRODUCTION

The humpback whale (*Megaptera novaeangliae*) is a cosmopolitan species widely distributed in all oceans of the world. In the Southern Hemisphere, the International Whaling Commission Scientific Committee (IWC SC) has hypothesized the existence of seven breeding populations (IWC, 2005).

The Eastern South Pacific population or stock G, migrates along the west coast of South American from feeding areas in high latitude waters to breeding grounds located mainly in the coastal waters of Ecuador and Colombia (Kellogg, 1929; Mackintosh, 1965; Dawbin, 1966; Stone *et al.*, 1990; Flórez, 1991; Flórez *et al.*, 1998; Felix & Haase, 2001; Scheidat *et al.*, 2000; Stevick *et al.*, 2004). The northern boundaries for this population are the waters around Panama and Costa Rica (Acevedo & Smultea, 1995; Flórez *et al.*, 1998; Rasmussen *et al.*, 2007).

Traditionally this stock has been described as feeding in productive waters of the west coast of the Antarctic Peninsula during the summer season (Kellogg, 1929; Mackintosh, 1965; Dawbin, 1966). Recently, a different feeding area located in the west side of the Magellan Strait was suggested (Gibbons

et al., 1998; Gibbons *et al.*, 2003), and confirmed subsequently through systematic sighting surveys and photo-id analyses in the area (Acevedo, 2005; Acevedo *et al.*, 2006; Acevedo *et al.*, 2007).

In recent years, an increasing number of humpback whales have been observed during the summer/fall seasons in the Corcovado Gulf, which is located 1,080 km north of the Magellan Strait feeding area. Based on direct observations, Hucke-Gaete *et al.* (2006) suggested that the Corcovado Gulf could correspond to another feeding area for humpback whales of the Eastern South Pacific population. The alternative interpretation is that the Corcovado Gulf is a migratory corridor for the humpback whales feeding in the most southern feeding area of the Magellan Strait.

We investigated this by examining photo-id material of humpback whales available for the three relevant localities: Gulf of Corcovado, Magellan Strait and Antarctic Peninsula (Figure 1). As noted above the latter two localities are confirmed feeding areas for humpback whales of this population.

MATERIALS AND METHOD

Individual humpback whales were identified from photographs of natural markings and permanent scars on the ventral side of the flukes (Katona *et al.*, 1979). Photographs were taken during systematic surveys by different research groups as well on opportunistic basis, between 1982 and 2007.

The analyses used pictures contained in five photo-identification catalogues, covering the three relevant localities: Corcovado Gulf, Magellan Strait and Antarctic Peninsula (Figure 1). For the Antarctic Peninsula three catalogues were used (PROANTAR, INACH and COA), containing a total of 1,043 pictures taken from different research groups between 1982 and 2007. For the Magellan Strait a single catalogue was used (CEQUA), containing a total of 92 pictures taken between 2003 and 2007, and for the Corcovado Gulf, a single, small catalogue was used (CBA), containing a total of 17 pictures taken during the 2005/2006 austral summer season. Only medium and high quality pictures were used, and duplicate in each locality were discarded. The total number of individual whales analysed in the three localities was 1,152 (in a total of 1,379 pictures).

The pictures comparisons between Corcovado Gulf and the two feeding areas was undertaken with assistance of a computer software (Oyarzo, 2004) modified by the CEQUA researchers.

RESULTS AND DISCUSSIONS

No photo-id matches were found between whales identified in the Magellan Strait ($n= 92$) and Antarctic Peninsula ($n= 1,043$), which support the hypothesis of Acevedo (2005) and Acevedo *et al.* (2007) that the Magellan Strait and Antarctic Peninsula represent separated feeding migratory destinations for humpback whales of the Eastern South Pacific population.

No photo-id matches were found between the Corcovado Gulf ($n= 17$) and those in the Magellan Strait and Antarctic Peninsula. The absence of matches between the Corcovado Gulf and the other two localities suggest that whales in the former locality do not migrate south and probably remain in the northern Chilean Patagonia (around 42°S) throughout the summer and early autumn. Therefore, this finding suggests that the Corcovado Gulf might be a different summer migratory destination for at least part of the Eastern South Pacific population. However, this result should be considered as preliminary due to the small number of photo-id pictures examined in the Corcovado Gulf.

Differences in mitochondrial DNA (mtDNA) have been found between humpback whales in the Magellan Strait and Antarctic Peninsula (Olavarría *et al.*, 2003; Olavarría *et al.*, 2005; Olavarría *et al.*, 2006), suggesting genetic sub-structure within the Eastern South Pacific population. To conduct further studies on site fidelity, residence and movement of humpback whales in the Corcovado Gulf additional collection of photo-id pictures and the collection of biopsy samples for genetic analysis, will be necessary. These analyses will be necessary to corroborate the hypothesis proposed in this study that the Gulf of Corcovado is a different migratory destination for some humpback whales of the Eastern South Pacific Population.

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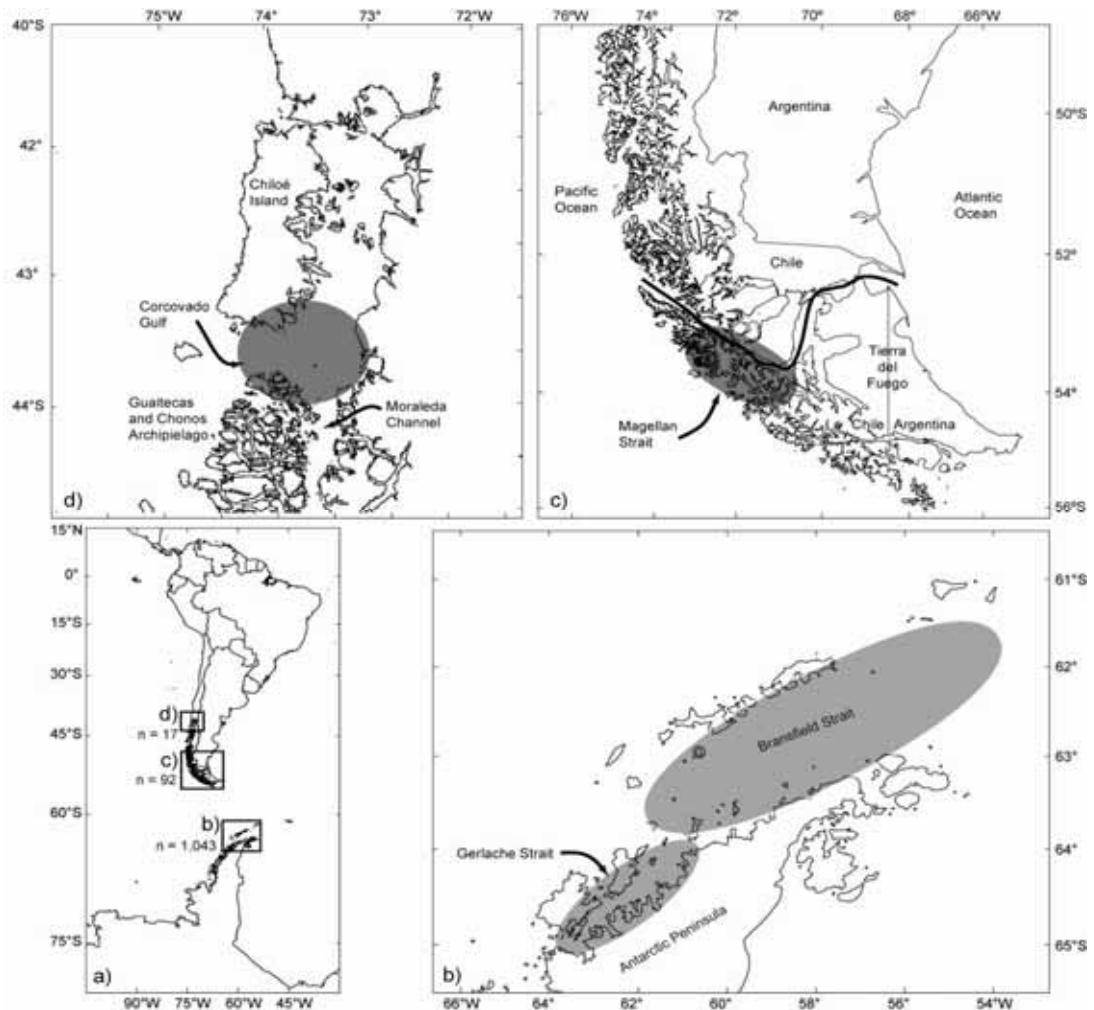


Figure 1: (a) Research areas and sample sizes used in the present study; (b) details of the Antarctic Peninsula research area; (c) details of the Magellan Strait research area; (d) details of the Corcovado Gulf research area. Shaded ellipses show the geographical extension where photo-id pictures were taken. The black line in (c) shows the course of the Magellan Strait.