

# A note on the movement of a humpback whale from Abrolhos Bank, Brazil to South Georgia

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## ABSTRACT

Most models of population structure for Southern Hemisphere humpback whales (*Megaptera novaeangliae*) assume that individuals feeding in the Scotia Sea migrate primarily to breeding and calving areas off Brazil. However data to support this are few and mostly indirect. Abrolhos Bank, Brazil, is the largest breeding and calving ground for humpback whales in the western South Atlantic Ocean. Historically, the waters near South Georgia held the largest concentrations of humpback whales in Antarctic Area II and were among the largest in the Southern Ocean. Photographs of individually distinctive natural markings on humpback whale flukes collected from the Scotia Sea ( $n=9$ ) were compared with two collections of photographs from Brazilian waters ( $n=829$  and  $n=735$ ) to identify re-sightings. A humpback whale photographed in August 2000 at Abrolhos Bank was subsequently photographed in December 2004 near Shag Rocks off South Georgia. The migratory distance between these sightings is 3,945km. This finding constitutes the first long-distance individual re-sighting to be documented from either of these areas.

KEYWORDS: MIGRATION; HUMPBACK WHALE; SOUTHERN HEMISPHERE; PHOTO-ID

## INTRODUCTION

Early modern industrial whaling operations severely reduced humpback whale (*Megaptera novaeangliae*) populations in the South Atlantic Ocean and corresponding areas of the Southern Ocean during the early decades of the 1900s (Mackintosh, 1942; Tonnessen and Johnsen, 1982; IWC, In press). Since this depletion occurred before biological data were routinely taken on killed whales and before the development of the Discovery tag (Brown, 1978), there are few data available with which to assess the movements and population structure of humpback whales in the region, although observed movement of individuals identified by natural markings (Katona and Beard, 1990) is an increasingly important tool in these waters.

Two principal low-latitude breeding and calving grounds for humpback whales occur in the South Atlantic Ocean; the coastal waters of eastern Brazil (Siciliano *et al.*, 1999; Zerbini *et al.*, 2006), and the west coast of Africa (Townsend, 1935; Walsh *et al.*, 2000). Abrolhos Bank, Brazil (16°40'–19°30'S, 38°35'–39°20'W), is the primary breeding and calving ground of humpback whales in the western South Atlantic Ocean. Mark-recapture abundance estimates for the period 1996–2000 range from 1,848 (95% CI; 725–2,971) to 3,871 (95% CI; 2,795–5,542) (Frietas *et al.*, 2004).

Humpback whale distribution within the high-latitude feeding grounds is less clearly delineated. While humpback whaling was widespread over the entire region (Mackintosh, 1942), most researchers suggest three primary concentrations, one to the west, associated with the Antarctic Peninsula and South Shetland Islands extending into the Bellingshausen Sea ('Chilean Group' – Mackintosh, 1942; 'Area I' – Donovan, 1991; 'Group G' – IWC, 1998), another in the Scotia Sea, principally near South Georgia and the South Sandwich Islands ('Atlantic Group' – Mackintosh, 1942; 'Area II' – Donovan, 1991; 'Group A' – IWC, 1998), with a third, and perhaps a fourth, south of

Africa ('African Group' – Mackintosh, 1942; 'Area III' – Donovan, 1991; 'Groups B and C' – IWC, 1998). The waters near South Georgia (54.5°S, 37°W) and the South Sandwich Islands were a principal centre of early humpback whaling operations and historically were one of the primary concentration areas for humpback whales in the Southern Ocean (Tomilin, 1957; Mackintosh, 1965).

The migratory movements of whales from these areas have not been well documented. Most current models of population structure for Southern Hemisphere humpback whales assume that individuals feeding near South Georgia migrate primarily to the waters off Brazil (e.g. IWC, 1998; Siciliano *et al.*, 1999; IWC, 2005). However the data to support this are scarce and mostly indirect. Alternative migratory destinations have been suggested for individuals from both Brazil and South Georgia. Notably South Georgia has been linked to western Africa (Mackintosh, 1942), while some degree of movement from Brazil to the Antarctic Peninsula has been widely suggested, though with varying levels of uncertainty (Mackintosh, 1942; Slijper, 1979; Evans, 1987).

## METHODS

Comparison of photographs of individually distinctive natural markings can provide direct evidence of whale movement. For this study, individual humpback whales were identified from photographs of natural markings and permanent scars on the ventral surface of the flukes (Katona *et al.*, 1979). A collection of identification photographs from throughout the Southern Hemisphere is maintained at College of the Atlantic (Bar Harbor, Maine, USA). This Antarctic Humpback Whale Catalogue (AHWC) is an international collaborative effort involving numerous individual or institutional contributors. Photographs from Brazil were systematically compared with identification photographs from the Scotia Sea to identify re-sightings.

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The AHCW sample of identified individuals from Brazil consists of 829 whales. These photographs were collected primarily by Projeto Baleia Jubarte (PBJ). PBJ conducts ongoing studies of humpback whales on the Abrolhos Bank using photographic identification. An additional 735 individual whales photographed by PBJ off Brazil were also used in these analyses. These photographs have not yet been fully compared with the AHCW so there is probable overlap.

Nine individuals were identified in the waters of the Scotia Sea, three from the bays of South Georgia Island, two from Shag Rocks to the west of South Georgia, two from offshore waters and two near the South Orkney Islands. For this analysis individuals identified west of  $\sim 55^{\circ}\text{W}$  at Elephant Island were included with individuals from the Antarctic Peninsula and South Shetland Islands.

## RESULTS AND DISCUSSION

An individual humpback whale (AHCW#2215, Fig. 1) was photographed on 4 August 2000 at  $18^{\circ}11.275'\text{S}$ ,  $038^{\circ}37.034'\text{W}$  on the Abrolhos Bank (Fig. 2). The whale was a member of a pair that was observed from 11:40 to 12:30. There was a record of singing in this group. The same individual was subsequently photographed on 4 December 2004 at  $53^{\circ}33.04'\text{S}$ ,  $041^{\circ}37.73'\text{W}$  off Shag Rocks near South Georgia. Approximately 10 humpback whales and 15 southern right whales were present and heavy traces of prey were reported on the echo-sounder at a depth of 30m. The migratory distance between these locations is 3,945km.

This observation constitutes the first long-distance re-sighting of an individual to be documented from either area. The small number of individuals identified on the Scotia Sea

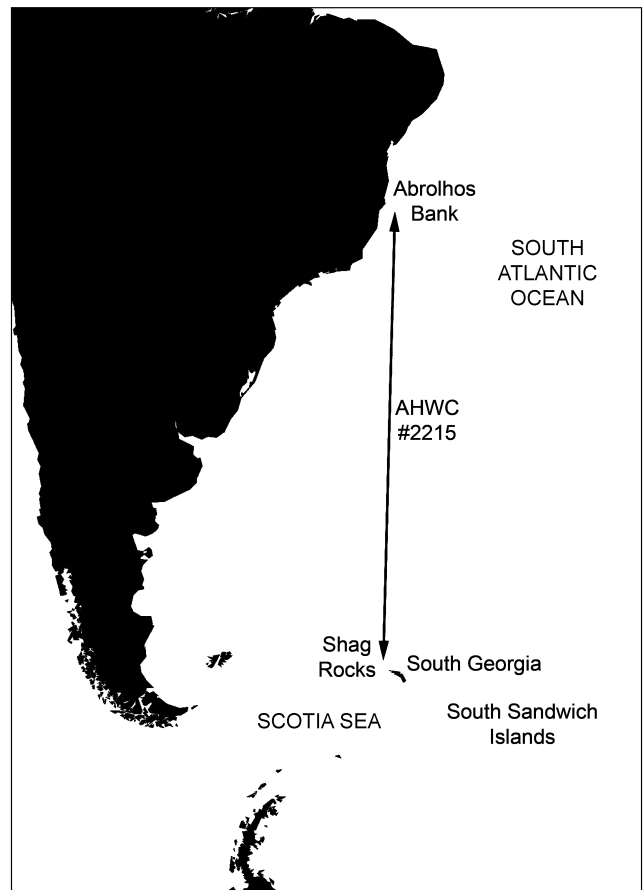


Fig. 2. The western South Atlantic Ocean and the Scotia Sea. The arrow marks the endpoints for the migratory transit of humpback whale AHCW#2215 that is documented here.

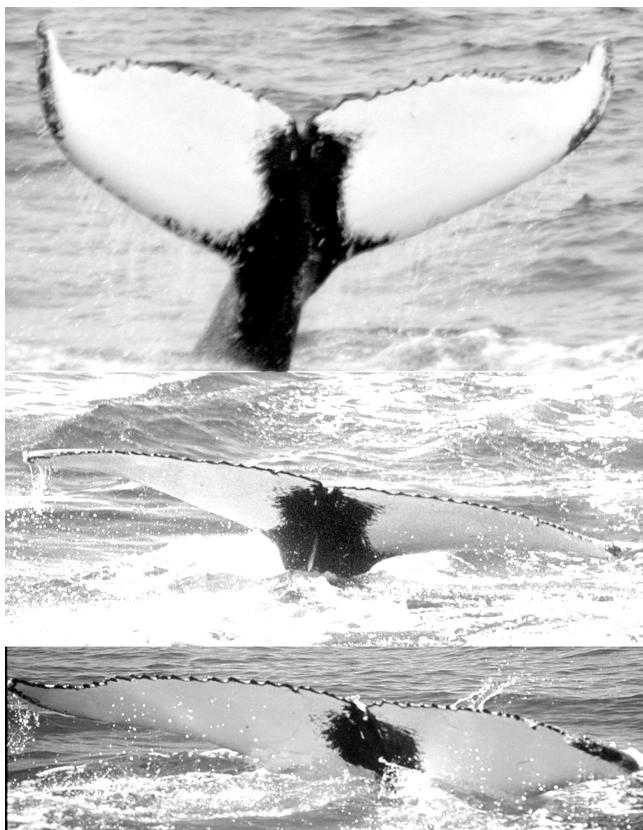


Fig. 1. Humpback whale AHCW#2215 photographed on 4 December 2004 off Shag Rocks near South Georgia (upper) and on 4 August 2000 on Abrolhos Bank, Brazil (centre and lower).

feeding grounds and the single observed re-sighting preclude statistical analyses. However, in contrast to this sighting, none of the catalogued individuals from Brazil were re-sighted in the Antarctic Peninsula ( $n=839$ ) or any other Antarctic region ( $n=105$ ).

Only a single Discovery tag recovery has been reported from the South Georgia vicinity, and that was recovered after an interval of only 5 days and a distance of  $\sim 220\text{km}$  (IWC, 1998). A tag fired into an animal in the feeding grounds at  $116^{\circ}\text{W}$  has been reported as having been recovered by the former USSR off Brazil at  $45^{\circ}\text{W}$  (IWC, 1998), however it was recovered from the cooker, so the actual capture location of the whale is not known with certainty and in the absence of additional information the reported recovery location must be considered unreliable (IWC, 1998).

The movement of an individual between Brazil and South Georgia is not surprising. The migration of most animals from the South Georgia/South Sandwich/Scotia Sea area to Brazil and the majority of animals from the Antarctic Peninsula to the west coast of South America is consistent with current thinking regarding humpback whale population structure in the region (IWC, 1998; Siciliano *et al.*, 1999; IWC, 2000; IWC, 2005). This finding supports the results of other studies that have used natural markings and genetic markers to identify links between the Antarctic Peninsula and South America and found no evidence of movement from these areas to Brazil despite increasingly large sample sizes (Stone *et al.*, 1990; Olavarría *et al.*, 2000; Caballero *et al.*, 2001; Garrigue *et al.*, 2002; Dalla Rosa *et al.*, 2004;

Stevick *et al.*, 2004). Recent evidence from satellite-linked transmitters has demonstrated the movement of two individuals from the Abrolhos Bank to waters east of South Georgia and near the South Sandwich Islands (Zerbini *et al.*, 2006). Additionally, modern sighting and stranding patterns off Brazil do not support a coastal migration, but are more consistent with an offshore migration to a feeding area to the south or southeast (Siciliano *et al.*, 1999).

While the observation presented here supports growing evidence that humpback whales from Brazil migrate to the Scotia Sea, low humpback whale population densities are generally reported in the vicinity of South Georgia today. The primacy of South Georgia stations in the historic killing of humpback whales, with more than 18,000 humpback whales reported to have been taken there between 1909-1915 (Mackintosh, 1942; IWC, 2005) and the exceptionally high krill densities in this region, suggest that it was a primary feeding concentration area a century ago. In contrast, recent reports indicate that few humpback whales are sighted in these waters today, while greater densities are reported near the Antarctic Peninsula and east of 20°E (Kasamatsu *et al.*, 1996; IWC, 1998; Moore *et al.*, 1999). Thus there is little evidence to suggest that the number of humpback whales in the immediate South Georgia area today is comparable to the number sighted off Brazil. While it is possible that larger numbers of whales occur in poorly sampled waters offshore, near the South Sandwich Islands or elsewhere in the Scotia Sea, there are few data to confirm or refute this and the question deserves more scrutiny.

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