A preliminary comparison of humpback whale tail fluke images from west South Africa and Namibia

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ABSTRACT

Humpback whales that occur off west South Africa and Namibia are postulated to belong to Breeding Stock B2, although there is no direct evidence that whales travel between these two regions during migration. Identification images of the tail flukes of humpback whales sighted off west South Africa and Namibia were compared. A systematic comparison was carried out between 61 images representing 35 individuals collected at Walvis Bay, Namibia, and 510 images of 149 individual whales from west South Africa. No matches were detected between the two regions.

KEYWORDS: HUMPBACK WHALE; PHOTO-ID; NAMBIA; WEST SOUTH AFRICA; BREEDING STOCK B

INTRODUCTION

Humpback whales *Megaptera novaeangliae* that migrate and breed off the African west coast belong to Breeding Stock B (BSB) as designated by the International Whaling Commission (IWC 2010). Based on genetic evidence of population sub-structuring (Rosenbaum *et al.* 2009) BSB has been divided into two breeding sub-stocks, B1 and B2. However, the majority of sampling to date has been limited to only two disparate localities: on the breeding ground off Gabon (Collins *et al.* 2008) which is though to represent BSB1, and off the west coast of South Africa (Figure 1), hitherto viewed as a migratory corridor, but more recently shown to also function as a spring/summer feeding ground for small numbers of humpbacks that presumable belong to BSB2 (Barendse *et al.* 2010a). Since no breeding behaviour has been observed (or is expected to take place) on the west coast of South Africa, the actual geographical location of the breeding ground for BSB2 remains unknown; the detection of movements of 11 whales between Gabon and west South Africa through microsatellite (Carvalho *et al.* 2009) and photographic matches (Collins *et al.* 2010) has brought the sub-division of BSB into question. Given that the whole coastal region between about 7 – 30 ^{O}S, comprising the territorial waters of Angola and Namibia (Figure 1) is more or less unsampled it remains difficult to construct a more conclusive population structure model for the region. Based on trends in historical catches the coastal waters of Namibia and Angola are expected to function as migratory corridors, suggested by the occurrence of two distinct seasonal peaks in catches at these localities, presumably representing whales on their northward and southward migrations (Best and Allison 2010). This region is located in one of the world's major eastern boundary upwelling systems, the Benguela ecosystem (Hutchings *et al.* 2009) with its northern boundary located near the Congo River mouth. The Benguela may be further sub-divided into four distinct regions: the Angolan sub-tropical zone, the northern Benguela, the Lüderitz upwelling area, and the southern Benguela/Agulhas Bank (Hutchings *et al.* 2009). The detection of any movements of individual humpback whales between any of these regions would be invaluable towards improving the current breeding stock structure hypothesis. This paper reports on results of the first-ever comparison of humpback whale tail fluke pictures from Namibia and west South Africa.

MATERIAL AND METHODS

The photographic database for west South Africa (WSA) is described in Barendse *et al.* (2010b), and contains 510 images of tail flukes representing 149 individual humpback whales, collected between the years 1983 – 2008 in the area west of Cape Agulhas between about 29 – 34 ^{O}S, the majority at Saldanha and St Helena Bays. In Namibia, identification images for humpback whales were collected at Walvis Bay, (23^{O}00'S, 14^{O}30'E) during boat based surveys of Heaviside's (*Cephalorhynchus heavisidii*) and bottlenose dolphins (*Tursiops truncatus*) during the austral winter (June – August) and summer (January – March) months of the years 2008, 2009 and 2010. Humpback whales were rarely encountered but sightings were increased due to communication with multiple whale watching boats operating within the bay; these operators also contributed some of the images. The raw images have thus far not been incorporated into a functional catalogue, but preliminary sorting and

matching of duplicate pictures yielded 35 individual humpback whales identified by tail flukes (61 images). The images of each of these whales were systematically compared to the tail fluke images of each of the WSA humpback whales. Images of all quality, including those showing partial flukes and trailing edges only were viewed.

RESULTS

No matches were detected between the images from Namibia and WSA.

DISCUSSION

Humpback whales in the Southern Hemisphere that are known to follow the coast during migration often move from headland to headland (Dawbin 1966; Bryden 1985). During a typical coastal migration, it would therefore not be unexpected for whales to pass from west South Africa, through Namibia, to a more northerly destination, and vice versa on the southern migration. The notion that all humpback whales from WSA migrate via Namibia is not supported by the respective catch histories in that at the latter locality, catches showed a sign of 'recovery' in 1925-30 after initial depletion while off WSA they remained very low (Best and Allison 2010). Catch rates in West South Africa (expressed as catch per catcher per season) were also much lower than those off Namibia between 1912 and 1914, when both stations were operating primarily on humpback whales, and early observers in South Africa stated that humpback whales converged on and diverged from the coast, north of Saldanha Bay (Best and Allison 2010). It therefore seems likely that a proportion of the proposed B2 sub-stock takes an offshore migratory path past the west coast of South Africa, as has been shown for some whales from the Gabon region (Rosenbaum and Mate, submitted manuscript).

It is also interesting to compare the more recently observed patterns in seasonal availability of humpback whales off WSA and Namibia with historical seasonality based on catches (see Best and Allison 2010). At Saldanha Bay there was a slight peak in availability during winter, but the highest relative abundance was observed during October and December/January, often associated with feeding behaviour (Barendse *et al.* 2010a). At Walvis Bay there were some sightings during late summer, but most humpback whale encounters took place in winter (June, July, August) (S. Elwen, unpublished data); however, there was no research effort after August to confirm the historic catch peak recorded during Spring, although whale and dolphin watching operators did encounter some humpback whales during September and October. The oceanographic conditions (i.e. wind-driven upwelling) off some Namibian localities such as Lüderitz (Hutchings *et al*. 2009) may offer similar feeding opportunities to those that occur of WSA, thus explaining the sightings made during summer, and historic accounts of over-summering animals at Walvis Bay (Best and Shaugnessey 1979), although the sampling effort off Namibia has been thus far inadequate to confirm this.

The next steps for research on humpback whales in Namibian waters should include: (1) the compilation of all available tail fluke and dorsal fin images into a user-friendly regional catalogue, including the application of photographic quality ratings, and classification of tail flukes according to pigmentation; (2) comparisons with other regional catalogues, such as Gabon and the Antarctic Humpback Whale Catalogue; (3) where possible, the expansion of seasonal and geographic research effort and data collection off Namibia.

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FIGURES

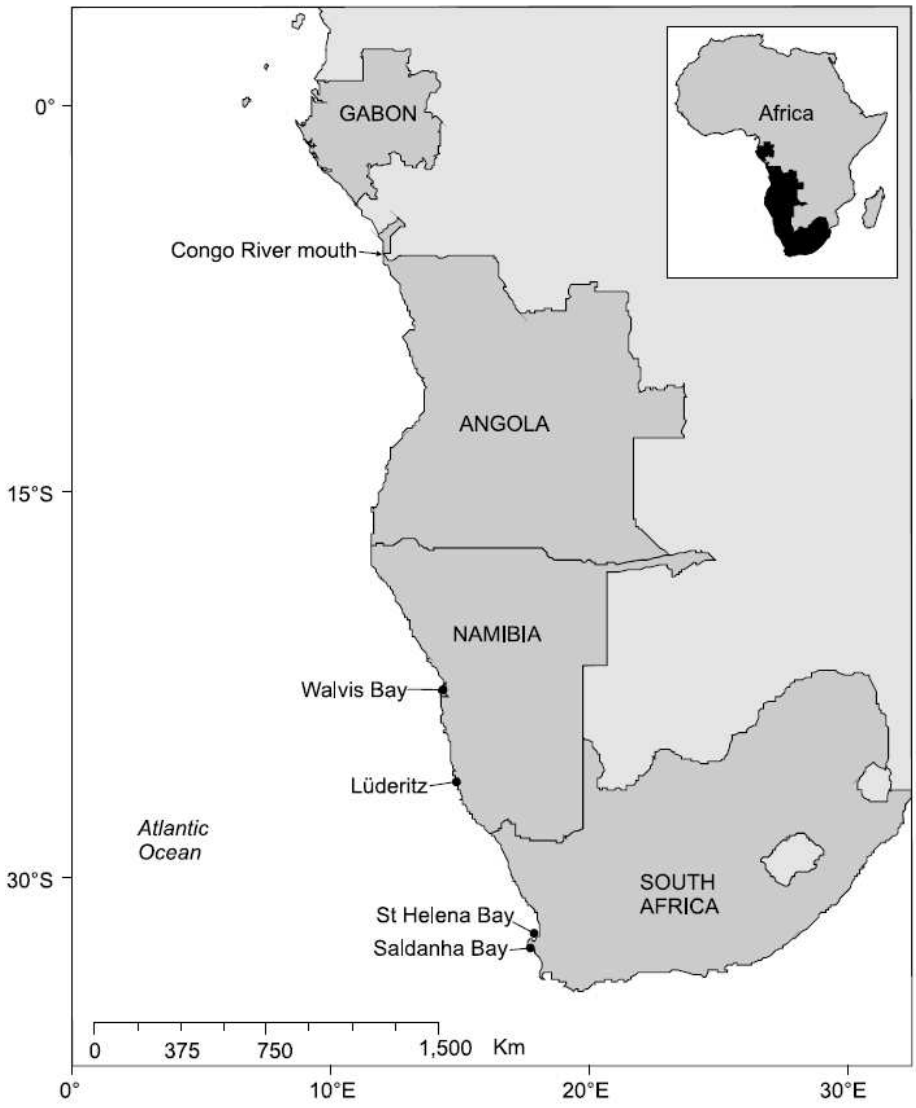

Figure 1. The west coast of Africa showing the most important localities of study effort for humpback whales, and other places of importance mentioned in the text.