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Migratory movements of humpback whales (*Megaptera novaeangliae*) between eastern Australia and the Balleny Islands, Antarctica, confirmed by photo-identification

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ABSTRACT

Using photo-identification, we report here migratory movements of three humpback whales (*Megaptera novaeangliae*) between the E1 breeding area (eastern Australia) and the Area V Antarctic feeding grounds. Comparisons between a Balleny Island fluke catalogue (11 individuals), and fluke catalogues from Hervey Bay (1556 individuals), Byron Bay (916 individuals), Ballina (648 individuals), New Zealand (41 individuals), Fiji (3 individuals) and Samoa (2 individuals) yielded three matches between the Balleny Islands and Hervey Bay, Byron Bay and Ballina. Only three previous individual matches have been reported between the E1 breeding grounds and Antarctic Area V feeding grounds. Photo-identification has revealed a matrix of migratory interchange among Eastern Australian and Oceania breeding areas (E and F), and this method can significantly contribute to the understanding of linkages between and within breeding and feeding areas and of humpback whale population structure in the South Pacific and Southern Oceans.

INTRODUCTION

Discovery marks gave the first evidence of migratory interchange between the breeding areas of Eastern Australia and the Oceania region, and linkages between the feeding and breeding grounds within Areas IV, V and VI (Chittleborough 1959, Dawbin 1964, Paton and Clapham 2006).

Further evidence of the complex matrix of migratory interactions amongst Oceania breeding regions, including New Caledonia, Vanuatu, Tonga, Samoa, American Samoa, Cook Islands and French Polynesia was obtained from long term photo-identification studies of humpbacks undertaken by members of the South Pacific Whale Research Consortium and systematic comparison between those catalogues (Abernethy et al., 1992; Hauser et al., 2000; Garrigue et al., 2000, 2002, 2007a; Poole, 2002; Gibbs and Childerhouse, 2004).

Recent photo-identification matching between Eastern Australian fluke catalogues (Hervey Bay and Byron Bay) and ten regional Oceania fluke catalogues for the period 1999 to 2004 (Garrigue et al. 2007b), provide further evidence of low levels of migratory interchange and complexity of linkages between eastern Australia and Oceania.

To date, only three individual photo-identification matches have been reported between Group E breeding grounds and Antarctic Area V feeding grounds (Kaufman et al. 1990, Rock et al. 2006). No photo-identification matches have been reported between any other Oceania breeding areas and Area V or Area VI Antarctic feeding grounds. Here we use photo-identification to document the migratory movements of three individual humpback whales between the Balleny Islands (in Antarctic Area V) and Hervey Bay, Byron Bay and Ballina on the eastern coast of Australia (Breeding Stock E1).
METHODS

Observations of humpback whales were undertaken in close proximity to the Balleny Islands (67°S, 163°E), from the 14th to the 25th February 2006 during a marine biodiversity research cruise organised by the New Zealand Ministry of Fisheries. Locations of humpback pods ranged between latitudes of 66°0 10.260S and 67° 34.771S and longitudes of 162° 20.005E and 164° 49.663E. The Balleny Islands (BI) Fluke Catalogue consists of 11 unique individuals. Vessel-based photo-identification of humpback pods in Hervey Bay, Queensland (25°S, 153°E) was undertaken between 1996 and 2005 as part of a long-term study of the behaviour and ecology of humpbacks by two of the authors (TF and WF). The reconciled Hervey Bay (HB) Fluke Catalogue for 1999-2005 consists of 1556 unique individuals. Photo-identification was also utilized in studies of humpback whales on their northern migration at Byron Bay (BB) (28°38 S, 153°38 E) and southern migration at Ballina (BA) (28°52 S, 153°36 E), resulting in catalogues of 916 fluke photographs (BB, 1999-2005) and 648 fluke photographs (BA, 2003-2005), respectively.

Comparisons of the Balleny flukes were made to each of the HB, BB and BA catalogues, as well as smaller fluke catalogues from New Zealand (41 individuals, photos obtained by NG and SC between 1994-2006), Fiji (3 individuals, photographed in 2002-2005 by DP), and Samoa (2 individuals photographed in 2001 by DP).

RESULTS

Comparisons of the BI catalogue to each of the HB, BB and BA catalogues resulted in three matches between the Balleny Islands and eastern Australia. Locations of the survey sites for which matches were found are shown in Figure 1. Each of the matching fluke photographs is shown in Figure 2. Photograph BI-0601 matched to HB-2003-2369 and BB0204407. This whale was photographed in the Balleny Islands on 14/Feb/2006, in Hervey Bay on 9/Sep/03 and on 8/Jul/2002 at Byron Bay. Photograph BI-0606 matched to HB-2005-4518 and BB04121. This whale was photographed at the Balleny Islands on 14/Feb/06, at Hervey Bay on 25/Sep/05 and at Byron Bay on 6/Jul/2004. Photograph BI-0607 matched to BA03137. This whale was photographed at the Balleny Islands on 14/Feb/2006 and Ballina on 17/Oct/2003.

No matches were found from the comparison between the Balleny Island catalogue and the New Zealand, Samoan and Fijian catalogues.

DISCUSSION

The matches reported here between the Balleny Islands and Hervey Bay, Byron Bay and Ballina double the number of photo-identification matches previously reported between Southern Ocean Area V feeding grounds and the eastern Australia (E1) breeding areas. Collection of photo-identification on individual humpbacks in Antarctic feeding grounds and systematic comparison with established and growing fluke catalogues from the breeding grounds can significantly add to understanding of the migratory movement of individual humpbacks between and within Southern Hemisphere.

Long-term photo-identification of individual humpbacks combined with genetic analysis and newly emerging satellite-tagging technology offer an effective and non-lethal means to provide data to address questions on the biology, behaviour, abundance and ecology of Southern Ocean humpback whale populations.

ACKNOWLEDGMENTS

We acknowledge Fond Pacifique for funding through Opération Cétacés and the South Pacific Whale Research Consortium the project of matching the catalogues of East Australia and Oceania. The study of humpbacks undertaken in Oceania by the SPWRC is partly supported by the International Fund for Animal Welfare (IFAW). The long-term study of humpbacks in Hervey Bay being conducted by Trish and Wally Franklin is supported by The Oceania Project and the International Fund for Animal Welfare (IFAW).

REFERENCES

Figure 1. Relative locations Eastern Australian and Oceania breeding grounds, Feeding areas IV, V and VI and the location of the Hervey Bay, Byron Bay, Ballina and the Balleny Islands
Figure 2. Photographs of confirmed matches between Balleny Islands and Hervey Bay, Byron Bay and Ballina. Left column: HB to BI and BB. Central column: HB to BI and BB. Right column: BA to BI.

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Photo-identification photography:
- Hervey Bay (HB) – Trish Franklin
- Balleny Island (BI) - Franz Smith
- Byron Bay (BB) – Dave Paton & Daniel Burns
- Ballina (BA) – Daniel Burns