

# New Zealand blue whales: initial photo-identification of a little-known population

Paula A. Olson<sup>1</sup>, Paul Ensor<sup>2</sup>, Carlos Olavarria<sup>2</sup>, Natalie Schmitt<sup>2</sup>, Simon Childerhouse<sup>3</sup>, Rochelle Constantine<sup>4</sup>, Brian S. Miller<sup>2</sup>, Michael C. Double<sup>2</sup>

<sup>1</sup> Southwest Fisheries Science Center NMFS/NOAA, 8901 La Jolla Shores Drive, La Jolla, CA 92037 USA

<sup>2</sup> Australian Marine Mammal Centre, Australian Antarctic Division, Channel Highway, Kingston Tasmania 7050 Australia

<sup>3</sup> Blue Planet Marine, Canberra, ACT Australia

<sup>4</sup> School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland, New Zealand

*Paula.Olson@noaa.gov*

## ABSTRACT

Eighteen blue whales were photo-identified from coastal waters around the North and South Islands of New Zealand from 2004-2013 in five different months of the year. No photographic matches were found between locations. The photo-ID collection provides a foundation for future study on this little-known population. Fourteen of the photo-identifications were obtained in January and March 2013 during transits of the Antarctic Blue Whale Voyage from Nelson, NZ to Antarctica and return. This voyage also allowed for observations of the external morphology and behaviour of the blue whales encountered. Body length and proportion, head shape, body condition and skin condition were similar to Australian but not Antarctic blue whales. Feeding behaviour was observed off the South Island's west coast in January 2013 and strong evidence of feeding off the east coast in March 2013, the first this has been reported for these locations. Feeding behaviour was also observed in the Hauraki Gulf in November 2010. The population identity, taxonomic status, habitat use and ecology of New Zealand blue whales are uncertain and more research is warranted.

KEYWORDS: BLUE WHALE, PHOTO-ID, NEW ZEALAND, FEEDING GROUNDS

## INTRODUCTION

Blue whales (*Balaenoptera musculus spp.*) are found in the waters surrounding New Zealand although relatively little is known about them. There is evidence of more than one type – pygmy type and Antarctic blue whales – within the region but taxonomic status is unclear (Branch *et al.*, 2007). To date no genetic analysis has been reported comparing New Zealand blue whales to other Southern Hemisphere populations. A New Zealand-specific population of blue whales may exist based on the discontinuity in the distribution of sightings between New Zealand and other regions in the southeast Pacific (including Australia) and on the unique blue whale sounds recorded off New Zealand (Branch *et al.*, 2007; Miller *et al.*, 2013). More data are needed to clarify the population identity(s) of blue whales in New Zealand waters as well as their distribution and movement. Sightings of blue whales in the New Zealand region are infrequent and recent concern over anthropogenic activities in the coastal waters inhabited by blue whales has highlighted the need for more research (Torres, 2013).

In this paper we present the first photo-identifications of individual blue whales from New Zealand waters as well as observations of the external morphology of blue whales encountered off the South Island of New Zealand in January and March 2013. Observations of behaviour are reported for blue whales seen in 2010 and 2013.

## METHODS

Blue whales were detected visually (and acoustically) near the South Island of New Zealand during the transits of the 65m *FV Amaltal Explorer* from Nelson, NZ to Antarctica and return for the 2013 Antarctic Blue Whale Voyage (Double *et al.*, 2013). During the transits a visual survey was conducted by observers from the vessel's flying bridge using binoculars and naked eye. When blue whales were detected the ship altered course to

approach the whales for photo-identification and visual observations. Both left and right sides of each whale were photographed whenever possible. Real time acoustic tracking and recording of blue whales using sonobuoys were an integral part of the research (for details and acoustic results see Miller *et al.* (2013).

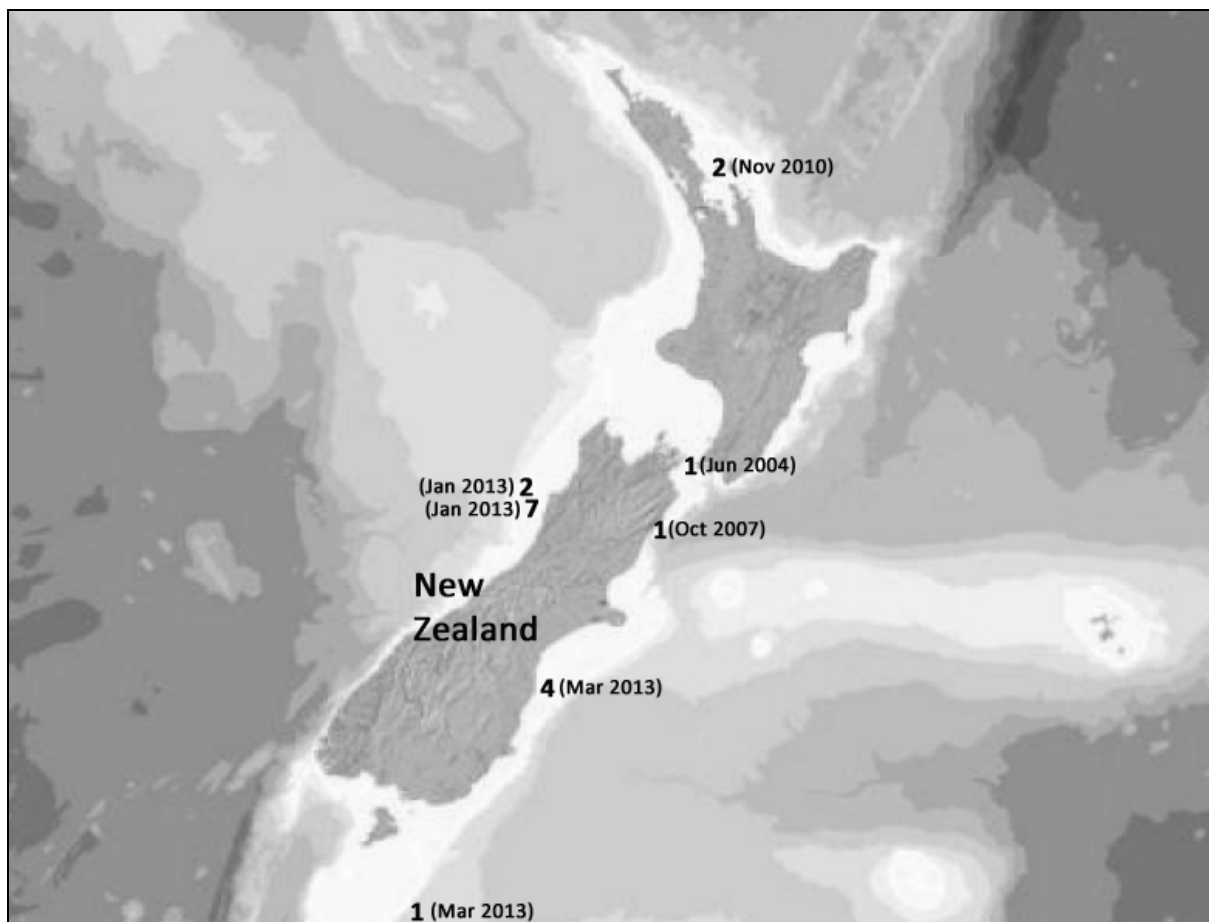
Photographs from the 2013 voyage were inter-matched (using methods outlined in Sears *et al.*, 1990) and compared to images collected opportunistically in New Zealand waters by S. Childerhouse (in 2004), Miranda Van de Linde/B. Miller (in 2007) and R. Constantine (in 2010).

## RESULTS

### Photo-identification

A total of 18 individual New Zealand blue whales were photo-identified (15 left sides, 9 right sides) from all four sources. Fourteen blue whales were photographed from the *FV Amaltal Explorer* in 2013 (9 whales from the west coast in January and 5 whales near the east coast in March); 1 whale in Cook Strait, June 2004; 1 whale off Kaikoura, October 2007 and 2 whales (mother/calf) in Hauraki Gulf, November 2010 (Fig. 1). No whales were re-sighted (photographically matched) between any of these encounters.

Figure 1. Locations of photo-identified blue whales around New Zealand. Numbers indicate the number of photo-identified whales from that location; month and year are in parentheses.



## Observations of external morphology and behaviour

### *Observations in 2013*

New Zealand blue whales were observed for more than 5 hours in total from the *FV Amaltal Explorer* in January and March 2013. Our conclusion was that New Zealand blue whales and Australian blue whales appear broadly similar in appearance. We suspect there are subtle morphological differences of the head region, warranting further examination of photographs. On an interim basis, we classified all the whales detected in this region as 'New Zealand blue whales' and did not specify subspecies.

We estimated the body lengths of the whales we approached in New Zealand to be a maximum of 18-20 meters. The head was broad with a rounded rostrum, similar to pygmy blue whales seen off Australia and flatter than that of Antarctic blue whales. The blowhole splashguards were large and prominent (as for Australian pygmy blue whales). The caudal peduncle was substantially shorter in proportion to the remainder of the body compared to Antarctic blue whales. The body condition appeared poor; the whales were thin with vertebral processes pronounced in comparison to the surrounding tissue (Fig. 2). The skin condition was also poor with numerous scars from lesions and cookie cutter bites (Fig. 3). The body and skin conditions were similar to Australian pygmy blue whales and also to that reported for Chilean blue whales (Brownell *et al.*, 2007, Galletti *et al.*, 2007); not as healthy as Antarctic blue whales.

Figure 2. A thin blue whale with an observable backbone in New Zealand 14 March 2013.



Figure 3. A blue whale with skin in poor condition in New Zealand 31 January 2013.



The New Zealand blue whales surfaced slowly with the blowhole and dorsal fin occasionally visible at the same time. The tip of the rostrum often remained underwater on surfacing. Upon diving, the rostrum nearly always curved sharply under the water and often the whales exhibited a high-back profile (e.g. raised up between head and dorsal fin; Fig. 2) rather than a high arch of the dorsal fin and caudal peduncle. The whales fluked up frequently.

On 31 January off the west coast one whale in a loose aggregation of up to 11 whales was observed lunge-feeding and rolling at the surface exposing its left pectoral fin. Surfacing patterns of all other whales in that location and on 14 March off the east coast suggested feeding at depth. Dives averaged 11 minutes and the whales exhibited unpredictable changes in direction between surfacings but not moving far. Water depths ranged from approximately 100 to 250 m. Seabirds were associated with the whales at both locations and on the west coast several boats were actively fishing within 11km of the aggregation of blue whales, suggesting these were areas of productivity. On 14 March in the vicinity of the blue whales off Oamaru (east coast), plankton swarms were visible near the water's surface in scattered 'balls' 1-4m in diameter and blue whales there were discharging orange-red faecal plumes consistent with feeding on euphausiids. Only one whale (15 March, near Kaikoura) appeared to be travelling, heading steadily to the south at approximately 15km/hr.

#### *Observations in 2010*

In November 2010 a mother/calf pair of blue whales was photographed by one of us (R.C.) in the Hauraki Gulf. The pair was observed intermittently over several hours during the course of other research. The mother of the pair was feeding in the same area as a loose aggregation of Bryde's whales (*Balaenoptera edeni*) that were also feeding. The aggregation covered an approximately 8 sq km area. The blue whale alternated lunge-feeding with periods of slow movement. Small krill could be seen in the water and this appeared to be the prey targeted by the whales. Shearwaters and petrels (Procellariidae) were surface feeding.

## **DISCUSSION**

The photo-identification of 18 New Zealand blue whales, from locations around the North and South Islands and from five different months of the year, provides a solid start for future photo-ID studies. Photo-ID (particularly if combined with other research methods) would yield much needed information about the distribution, movement, and population identity of blue whales in New Zealand waters.

Our observations of the external morphology of the blue whales encountered off the South Island of New Zealand in January and March suggest that these whales are more similar in appearance to blue whales off Australia than to Antarctic blue whales. On the 2013 voyage, unique sounds recorded in the presence of, and directionally linked to, the New Zealand blue whales seen in January and March (Miller *et al.*, 2013) suggest that the whales are likely to represent a group distinct from other Southern Hemisphere populations. This further highlights the need for additional study of the population structure and taxonomic relationship of all blue whales in the Southern Hemisphere.

We observed surface feeding behaviour of blue whales off the west coast and strong evidence of feeding off the east coast of the South Island, which to our knowledge has not been reported in these locations before. Surface feeding was also observed in the Hauraki Gulf. In the light of our opportunistic observations, and that a putative foraging ground was recently described in the South Taranaki Bight (Torres, 2013), it appears that blue whales utilize multiple areas of productivity around New Zealand. This emphasises the need for in-depth research to ascertain the habitat use and ecology of the poorly known population(s) of blue whales in the New Zealand region.

## **ACKNOWLEDGMENTS**

We thank the many people who worked on the 2013 Antarctic Blue Whale Voyage, including the scientists and support staff at the Australian Marine Mammal Centre and the Australian Antarctic Division, the superb crew of the *FV Amaltal Explorer* and our fellow voyage scientists. The US National Oceanic and Atmospheric Administration (NOAA) funded the participation of Paula Olson during the voyage. The New Zealand Whale and Dolphin Trust sponsored the fieldwork for Miranda Van de Linde and Brian Miller in 2007.

## **REFERENCES**

Branch, T.A., Stafford, K.M., Palacios, D.M., Allison, C., Bannister, J.L., Burton, C.L.K., Cabrera, E., Carlson, C.A., Galletti Vernazzani, B., Gill, P.C., Huccke-Gaete, R., Jenner, K.C.S., Jenner, M.N.M., Matsuoka,

- K., Mikhalev, Y.A., Miyashita, T., Morrice, M.G., Nishiwaki, S., Sturrock, V.J., Tormosov, D., Anderson, R.C., Baker, A.N., Best, P.B., Borsa, P., Brownell Jr, R.L., Childerhouse, S., Findlay, K.P., Gerrodette, T., Ilangakoon, A.D., Joergensen, M., Kahn, B., Ljungblad, D.K., Maughan, B., McCauley, R.D., McKay, S., Norris, T.F., Rankin, S., 2007. Past and present distribution, densities and movements of blue whales *Balaenoptera musculus* in the Southern Hemisphere and northern Indian Ocean. *Mammal Rev.* 37, 116-175.
- Brownell Jr., R.L., Carlson, C.A., Galletti Vernazzani, B. and Cabrera, E. 2007. Skin lesions on blue whales off southern Chile: Possible conservation implications? IWC SC/59/SH21.
- Double, M.C., Barlow, J., Miller, B.S., Olson, P., Andrews-Goff, V., Leaper, R., Ensor, P., Kelly, N., Lindsay, M., Peel, D., Calderan, S., Collins, K., Davidson, M., Deacon, C., Donnelly, D., Olavarria, C., Owen, K., Rekdahl, M., Schmitt, N., Wadley, V. and Gales, N. 2013. Cruise report of the 2013 Antarctic blue whale voyage of the Southern Ocean Research Partnership. Paper SC/65/XX presented to the IWC Scientific Committee.
- Galletti Vernazzani, B., Carlson, C.A., Cabrera, E. and Brownell, Jr., R.L. 2007. Status of blue whales off Isla de Chiloe, Chile, during 2007 field season. IWC SC/59/SH1.
- Miller, B.S., Collins, K., Barlow, J., Calderan, S., Leaper, R., McDonald, M., Ensor, P., Olson, P., Olavarria, C. and Double, M.C. 2013b. Blue whale songs recorded around the South Island of New Zealand. 2013. Paper SC/65/XX presented to the IWC Scientific Committee.
- Sears, R.J., Williamson, M.J., Wenzel, F.W., Bérubé, M., Gendron, D. and Jones, P. 1990. Photographic identification of the Blue Whale (*Balaenoptera musculus*) in the Gulf of St. Lawrence, Canada. *Rep. Int. Whal. Commn.*, Special Issue 12, pp. 335-342.
- Torres, L.G. 2013. Evidence for an unrecognized blue whale foraging ground in New Zealand. *New Zeal. J. Mar. Fresh.* DOI:10.1080/00288330.2013.773919