SC/67B/PH/04

Progress report on Southern Hemisphere Blue Whale Catalogue: Period May 2017-April 2018

Barbara Galletti Vernazzani, Paula Olson, Chandra Salgado-Kent

INTERNATIONAL WHALING COMMISSION

Progress report on Southern Hemisphere Blue Whale Catalogue: Period May 2017-April 2018

Barbara Galletti Vernazzani, Paula Olson, Chandra Salgado-Kent

ABSTRACT
The Southern Hemisphere Blue Whale Catalogue has a total of 1,519 individual blue whale photo-identifications (photo-IDs) that include areas off Antarctica, Chile, Peru, Ecuador-Galapagos, Eastern Tropical Pacific (ETP), Australia, Timor Leste, New Zealand, southern Africa, Madagascar and Sri Lanka. From May 2017 to April 2018, SHBWC work focused on comparisons of catalogues from Australia, New Zealand and Sri Lanka. Future work will focus on comparisons among South America and ETP to be used for assessment purposes while between region comparisons to check for migration and connectivity will continue to be considered a second priority.

INTRODUCTION

Three subspecies of blue whales are currently recognized in the Southern Hemisphere: the pygmy blue whale (*Balaenoptera musculus brevicauda)* in the temperate and sub-Antarctic zone; the Antarctic blue whale (*B. m. intermedia*) which summers in the Antarctic Zone (Rice, 1998), and recently a yet unnamed subspecies has been accepted by the Taxonomy Committee of the Society for Marine Mammalogy (SMM, 2017), the Chilean blue whale, which is intermediate in size between pygmy blue whales and Antarctic blue whales (Branch *et al*., 2007).

The Southern Hemisphere Blue Whale Catalogue (SHBWC) is an international collaborative effort to facilitate cross-regional comparison of individual blue whale photo-identification catalogues.

In 2006 the Scientific Committee of the International Whaling Commission (IWC, 2007) agreed to initiate an in-depth assessment of Southern Hemisphere blue whales and in 2008, the Committee endorsed a proposal to establish a central web-based catalogue of blue whale identification photographs (IWC, 2009).

Individual blue whales are identifiable from unique patterns of mottling on both sides of the body near the dorsal fin (Sears *et al*., 1990) and in some cases, permanent scars can be used to identify or confirm individuals. The SHBWC uses specially designed online software that allows for simultaneous upload and comparisons of catalogues from different areas (IWC, 2009).

To date more than 1,500 individual blue whales have been contributed to the SHBWC from research groups working in areas off Antarctica, Chile, Peru, Ecuador-Galapagos, in the Eastern Tropical Pacific, off Australia, Timor Leste, New Zealand, Madagascar and Sri Lanka. Therefore the SHBWC has become the largest repository of Southern Hemisphere blue whale photo-identifications.

Results of comparisons among different regions will improve the understanding of basic questions relating to blue whale populations in the Southern Hemisphere such as defining population boundaries, migratory routes, visual health assessments, and provide data to model abundance estimates. The results will greatly contribute to the IWC Southern Hemisphere blue whale assessments.

The present report summarizes the progress made between May 2017 to April 2018 on the work of the SHBWC.

USERS &UPLOADING OF CATALOGUES

Catalogues currently maintained at the SHBWC include waters off Antarctica, Chile, Peru, Ecuador-Galapagos, in the Eastern Tropical Pacific (ETP), off southeastern Australia, western Australia, Timor Leste, New Zealand, Southern Africa, Madagascar and Sri Lanka. A total of 1,519 blue whales are currently comprised in the SHBWC; totaling 1,101 right side photo-IDs, 1,116 left side and 60 flukes (Table 1).

Overall, 17 blue whale research groups from all regions are contributing to the SHBWC. Although new groups with photo-IDs from West and Central Indian Ocean regions (Madagascar, Kenya, Sri Lanka) as well as new groups from Chile joined the SHBWC at the beginning of 2017, no new photo-ID was received during this period. Furthermore, previous groups have not updated their photo-ID data with new seasons. In this sense, groups are encouraged to contribute their catalogues and update them periodically.

Several groups have already fully uploaded their catalogues, and consequently their user categories were upgraded to have full viewing access of the other catalogues.

The Antarctic sub-catalogue uploaded to the SHBWC includes photographs of 320 individuals contributed by IWC IDCR/SOWER surveys from 1987-1988 to 2008-2009 that covers all six IWC Management Areas, the Australian Antarctic Division (AAD) from 2013 and 2015 and the Mammal Research Institute Whale Unit, University of Pretoria from 2014.

The Gulf of California/ETP/SouthAmerica sub-catalogue includes photographs of a total of 501 individuals contributed by the 1997/98 IWC/SOWER survey off Chile, Centro de Conservacion Cetacea off Chile between 2004 and 2009 and SWFSC/NOAA during various years between 1992 to 2009 off the Galápagos Islands, Peruvian waters and the Costa Rica Dome.

The Indonesia/Australian/New Zealand sub-catalogue includes photographs of 698 individuals contributed by Blue Whale Study Inc. (BWS), AAD and Flinders University from the Bonney Upwelling, Western Whale Research (WWR) from Geographe Bay & Timor Leste, Center for Whale Research Western Australia (CWR) from Perth Canyon, Asha de Vos from Sri Lanka and Oregon State University and AAD from New Zealand.

MATCHING PROGRESS

At last year's Scientific Committee meeting, due to increased numbers of photo-IDs it was agreed to give priority to within-region matching over between-region matching for the 2017-18 schedule. Priorities for the sub-committee on other Southern Hemisphere Whale Stock population assessments currently are Chile and Australia (IWC, 2017). The Scientific Committee supported the development of quality coding guidelines for blue whales. A quality coding guide for the SHBWC was completed in March 2018.

Priority was given in this period to compare catalogues under the Indonesia/Australian/New Zealand region that include photo-IDs from Australia, New Zealand and Sri Lanka. Left side comparisons have been finished and right side comparisons are underway. 698 photo-identified blue whales from seven different research groups working in the Perth Canyon (southwestern Australia), Geographe Bay (southwestern Australia), Bonney Upwelling (southern Australia), around New Zealand, and Sri Lanka provided sixteen whales resighted between different areas. Matches have been found within Australian catalogues and within New Zealand catalogues but no matches have been found between those two regions or with Sri Lanka. The results reinforce the hypothesis of separate populations. Details of these findings are reported in Galletti Vernazzani *et al*. (2018).

New entries from Chile are expected with updated seasons from previous groups and contributions from new ones. Therefore, priority in 2018 will be to compare catalogues from the ETP and South America.

The increase in new groups joining the SHBWC and new photo-ID's are expected to stabilize over the next few years since most catalogues will be fully contributed and only new field seasons should be expected. Therefore, in the future, it is likely that more between region comparisons could take place.

PROGRESS TOWARD AUSTRALIAN AND CHILEAN POPULATION ASSESSMENTS

The combined Australian database has been completely compared on the left side (Galletti *et al*., 2018) and comparisons of the right sides are currently underway. Final results regarding movements and sighting histories will be available after the right side comparisons are finished. At the completion of all comparisons, the Australian photographs will be ready for uniform quality coding, enabling the preparation of a database for a capture-recapture analysis.

The photographs from several Chilean collaborating institutions are still needed in order to finish photo comparisons and achieve results. The SHBWC is working with Chilean collaborators to upload their catalogues. Just prior to this meeting, EUTROPIA (Table 1) informed SHBWC that their photos were ready.

SOFTWARE IMPROVEMENTS

Improvements to the software have been continually identified and additional information needs to be integrated in order to fulfill the new IWC photo-ID catalogue guideline requirements (Olson *et al*., 2016).

These include, among others, to make data on date and location mandatory; an option that has already been implemented. Last year the Scientific Committee considered that the new IWC data requirements may potentially cause backlog in the uploading of photographs, due to the time needed to fill in the data, and agreed to allow contributors to bulk upload photographs without these data and then provide the ancillary data immediately afterward in a separate format (e.g. Excel sheet) (IWC, 2017).

This year the option to import data on date and location from Excel files into the SHBWC has been implemented.

In order to support the assessment work of the Scientific Committee, the next priority for 2018 on software improvements is to integrate the IWC photo-ID catalogue guidelines on photo-quality in order to be consistent and implement the same criteria for rating the quality of the photographs.

Future improvements being developed that were also suggested by the IWC include the inclusion of TAG data (name and number), age class and biopsy label. In addition, the development of matching reports, list of members and definition of regions, among others, have been proposed but will be addressed after priority improvements are implemented.

In addition, the IWC purchased a server compatible with SHBWC structure in order to support the existing catalogue. Currently, the software has been installed on the server and migration of the entire SHBWC software and database to the IWC server in Cambridge, England is being implemented.

Protocols for back-ups in the IWC server should consider daily back-ups of the data that can be kept for a month and deleted afterwards. In addition, a monthly back-up will be needed. Therefore, if some data are lost, a previous version will always be accessible.

Finally, because a large number of new improvements to the SHBWC software have been implemented, it will be necessary to update the 2016 user manual.

REFERENCES

Branch, T.A., Abubaker, E.M.N., Mkango, S. and Butterworth, D.S. 2007. Separating southern blue whale subspecies based on length frequencies of sexually mature females. *Mar. Mammal Sci.* 23(4): 803-33.

Galletti Vernazzani, B., Attard, C., Barlow, D.R., Burton, C., de Vos, A., Double, M., Gill, P., Jenner, C., Jenner, M.N., Moller, L., Olson, P., Salgado-Kent, C. and Torres, L.G. 2018. Preliminary Results of 2017 IWC Comparisons among Southern Hemisphere Blue Whale Catalogues off Australia, New Zealand and Sri Lanka regions. Paper SC/67b/SH16 presented to the IWC Scientific Committee, May 2018 [Available from IWC]

International Whaling Commission. 2007. Report of the Scientific Committee. Annex H Other Southern Hemisphere Whale Stocks. *J. Cetacean Res. Manage*.

International Whaling Commission. 2009. Report of the Scientific Committee. Annex H Other Southern Hemisphere Whale Stocks. *J. Cetacean Res. Manage*.

International Whaling Commission. 2015. Report of the Scientific Committee. Annex H Other Southern Hemisphere Whale Stocks. *J. Cetacean Res. Manage*.

International Whaling Commission. 2017. Report of the Scientific Committee. Annex S Ad hoc Working Group on Photo-ID. *J. Cetacean Res. Manage*.

Olson, P.A., Jackson, J.A., Donovan, G. 2016. IWC photo-identification catalogue guidelines. Paper SC/66b/DB01 presented to the IWC Scientific Committee, June 2016. [Available from IWC]

Rice, D.W. 1998. *Marine Mammals of the World: Systematics and Distribution,* Special Publication Number 4, The Society for Marine Mammalogy. Allen Press, USA. ix+231pp

Sears, R., Williamson, J.M., 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: 335-42.

Society for Marine Mammalogy.SMM. 2017. Committee on Taxonomy. List of marine mammal species and subspecies. www.marinemammalscience.org consulted on 25th April 2017

Table 1 – Summary of photographic collection within blue whale catalogues in the SHBWC

Region	Group	Fluke	Left Side	Right Side	Area
Gulf of California-ETP-SouthAmerica	CCC	0	288	299	Chile
	SWFSC	0	60	53	Peru, Ecuador, ETP
	IWC Chile	0	14	9	Chile
	MERI	0	0	0	Chile
	CBA-UACH	0	0	0	Chile
	EUTROPIA	0	0	0	Chile
	Sub-total	***0***	***362***	***361***	
Indonesia-Australian-NewZealand	BWS	5	85	84	Australia
	WWR	0	30	23	Australia
	Asha de Vos	0	89	79	Sri Lanka
	CWR	50	204	212	Australia
	CMST	0	0	0	Australia
	MARVEL	0	15	12	Australia
	OSU	5	40	36	New Zealand
	AAD-Australia	0	35	36	Australia
	AAD-NewZealand	0	12	11	Australia
	Sub-total	***60***	***510***	***493***	
Southern Ocean	IWC SOWER	0	158	157	Antarctica
	MRI-SO	0	19	13	Antarctica
	AAD-Antarctica	0	67	77	Antarctica
	Sub-total	**0**	**244**	**247**	Antarctica
West and Central Indian Ocean	MRI-SA	0	0	0	South Africa, Madagascar
	Gardline	0	0	0	South Africa, Madagascar
	Sub-total	***0***	***0***	***0***	
	TOTAL	**60**	**1116**	**1101**	