SC/69B/SH/01

Sub-committees/working group name: SH

Progress report on Southern Hemisphere Blue Whale Catalogue: Period April 2023-February 2024

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INTERNATIONAL
WHALING COMMISSION

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ABSTRACT

The Southern Hemisphere Blue Whale Catalogue has a total of 2697 individual blue whale photo-identifications (photo-IDs) that include regions off Antarctica, Chile, Peru, Ecuador-Galapagos, Eastern Tropical Pacific (ETP), Australia, Timor-Leste, New Zealand, southern Africa, Madagascar and Sri Lanka. During 2023, Chilean datasets have been checked, compiled and are currently being used for modelling abundance estimates. Photo-ID comparisons with new entries from Australia were prioritized. Left side comparisons have already been completed and right side are almost completed. Other regions that have contributed important data but have still not been compared are Timor Leste, Sri Lanka, ETP, Galapagos and Madagascar.

INTRODUCTION

In the Southern Hemisphere, the pygmy blue whale (*Balaenoptera musculus brevicauda*) in the Indian Ocean and western Pacific Ocean, and the Antarctic blue whale (*B. m. intermedia*) in the Southern Ocean, are currently recognized as two subspecies by the Taxonomy Committee of the Society for Marine Mammalogy[1]. In addition, the yet unnamed subspecies or Chilean blue whale has been proposed as a separate subspecies (*B. m*. spp.) because it is morphologically (Branch *et al.* 2007; Leslie *et al*. 2020; Pastene *et al.* 2020), genetically (LeDuc *et al.* 2007; LeDuc *et al.* 2017), and acoustically (McDonald *et al.* 2006) distinct.

Since 2008, the International Whaling Commission (IWC) has been supporting the project "Southern Hemisphere Blue Whale Catalogue (SHBWC)". The SHBWC allows for simultaneous upload and comparisons between catalogues from regions off Antarctica, Chile, Peru, Ecuador-Galapagos, in the Eastern Tropical Pacific, Australia, Timor-Leste, New Zealand, Madagascar and Sri Lanka.

The IWC Scientific Committee is currently conducting blue whale assessments on non-Antarctic blue whales. Major comparisons off Australia, New Zealand, Sri Lanka have been completed with data received prior to 2018 (Galletti Vernazzani *et al*., 2019b). Comparisons within ETP and South America have been completed with data received prior to 2020 (Galletti Vernazzani *et al.*, 2022).

Assessment for Chilean, Australia and New Zealand blue whale datasets were prioritized. The Scientific Committee decided to undertake an intersessional analysis of whale abundance (IWC, 2022), led by Professor Rachel Fewster at the University of Auckland.

This report summarizes progress made between April 2023 to February 2024 on the work of the SHBWC.

[1] https://www.marinemammalscience.org/species-information/list-marine-mammal-species-subspecies/

PROGRESS

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 from the highly variable dorsal fin shape (Gendron and Ugalde de la Cruz, 2012). In some cases, permanent scars can be used to identify or confirm resighted individuals. The SHBWC holds photo-IDs from left and right sides of blue whales as well as from the fluke, when available.

Catalogues currently maintained in the SHBWC include those from 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, Indonesia and Sri Lanka. A total of 2,697 blue whales are currently in the SHBWC (1979 left side, 1923 right side and 136 flukes) (Table 1).

Chile, Australia and New Zealand blue whales

Priorities for the Sub-committee on other Southern Hemisphere whale stocks currently include blue whales off Australia and Chile (IWC, 2018), and more recently New Zealand (IWC, 2021). All matching of photographs uploaded before January 2018 and March 2021 for these regions have been completed (Galletti Vernazzani *et al.* 2019b, 2022). Matching for the New Zealand and Chilean regions were finalized in 2022. Matching on new entries for Australian have been prioritized at SC69a (IWC, 2023)

The australian catalogue consisted of 654 individuals taken off Perth, Geographe Bay and Bonney upwelling areas. Left side comparisons of new entries has been completed and found additional four matches. Right side comparisons are still ongoing.

During all matching processes for these regions, it has been found that several catalogues included duplicate individuals. The effect of duplicated animals on abundance estimates may need consideration.

The Scientific Committee decided to undertake an intersessional analysis of whale abundance, led by Professor Rachel Fewster at the University of Auckland, using multiple marks recapture models (i.e combining images from left and right sides of whales).

Matching of Chilean datasets have been completed. Metadata has been checked by contributors and a MOU signed. The datasets have been compiled for both sides, using different photo-quality standards, and have been provided to Dr. Fewster. Abundance estimates for Chilean population are currently being modelled.

The process to check metadata is still underway for New Zealand and Australia research groups. The MoU is still required for Australian groups.

Other regions

Regional comparisons within the Southern Ocean have been systematically conducted by Olson (Olson *et al*., 2020) under the IWC Antarctic Blue Whale Catalogue project, that also includes photo-ID data from the IWC-SOWER cruises, IWC-SORP voyages, the Institute of Cetacean Research's expeditions (JARPA, JARPAII, NEWREP-A), the South African Antarctic Blue Whale Survey, and from photographs contributed by naturalists and citizen scientists. Sixteen whales from the Southern Ocean were re-sighted in multiple years (one whale in two subsequent years); six of the whales were re-sighted within 19 to 753 km from their original location and two whales had a 12-year interval between sightings (Olson *et al.*, 2020).

New data from Timor-Leste (a lower-latitude part of the SE Indian Ocean population) has also been received but no comparisons have been conducted yet. Recent acoustic and telemetry data have shown important migratory movements of blue whales from Australia to Timor-Leste (Thums *et al.*, 2022; Sahri *et al.* 2022). Connectivity between individual blue whales photographed off Timor-Leste and those photo-ID's off Australia have been considered relevant at SC69a and with possible implications for assessment purposes of Australian datasets.

New photo-ID data from Eastern Tropical Pacific and Galapagos have been provided by the WHET Lab, Cascadia Research Collective and Pacific Whale Foundation from Ecuador. Increasing evidence from acoustic, telemetry and photo-identification data (Douglas, *et al.* 2015; Buchan *et al*., 2015; Torres-Florez *et al*., 2015; Hucke-Gaete *et al.*, 2018; Galletti Vernazzani *et al.,* 2022.) has shown migratory connections between whales off Chile with ETP/Galapagos. The new photo-IDs provided from ETP/Ecuador have not yet been compared to any of the catalogues.

Biosphere Foundation photographs and dataset from Sri Lanka from 1983-1984 and 2010-2015 have been received by the curator in the past. Unfortunately, consolidation of the Sri-Lanka catalogue has been delayed due to past year priorities focused on Chile, Australia and New Zealand datasets.

CONCLUSIONS AND NEXT STEPS

Chilean datasets have been fully prepared and are now being used for modelling abundance estimates. The matching process and photo-quality coding have been completed for New Zealand. Comparisons of Australian photo-ID are almost completed. Checking of metadata is underway for New Zealand and Australia. MoUs are still required among Australian research groups.

When Chile modelling trials are completed, the results are anticipated to be used to define relevant parameters, with the models potentially applied to the New Zealand dataset. Australia region will follow once the pending work is completed, and the combined datasets prepared to be used.

After Chile, Australia and New Zealand datasets are prepared for abundance estimates, next priorities in the short term should consider comparisons between Timor-Leste and Australia catalogues, ETP and Sri Lanka.

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Table 1 – Summary of blue whale photographic collections and catalogues in the SHBWC as of March 2024

Region	Group	Fluke	Left Side	Right Side	Area
ETP-South America	CRC	16	51	54	Peru, Ecuador, ETP
	SWFSC	0	64	54	Costa Rica Dome
	WHET Lab	0	12	9	Galapagos
	IWC Chile	0	14	9	Chile
	CCC	0	443	450	Chile
	MERI	9	48	45	Chile
	CBA-UACH	0	151	140	Chile
	CCC Northern Chile	0	25	27	Chile
	Eutropia	0	16	25	Chile
	Phantalassa	2	16	28	Chile
	Opportunistic Southeast Pacific	0	12	6	All
	Sub-total	**27**	**852**	**847**	
Sri Lanka-Australia-New Zealand-Coral Triangle	BWS	5	84	84	Australia
	WWR	0	30	23	Australia
	CWR	69	301	337	Australia
	FLINDERS	0	15	12	Australia
	AAD-Australia	0	35	36	Australia
	KWA	1	6	10	Australia
	Oceans Blueprint	0	4	4	Australia
	OSU	13	97	91	New Zealand
	AAD-NewZealand	0	12	11	New Zealand
	NIWA	1	7	2	New Zealand
	Opportunistic New Zealand	0	19	12	New Zealand
	UNTL	19	132	84	Timor-Leste
	APEX/Oceans Blueprint	0	0	0	Timor-Leste
	APEX	0	0	0	Indonesia
	Asha de Vos	0	89	79	Sri Lanka
	BF	0	0	0	Sri Lanka
	NARA	0	0	0	Sri Lanka
	Sub-total	**108**	**831**	**785**	
Southern Ocean	IWC SOWER	0	174	164	Antarctica
	MRI-SO	0	19	13	Antarctica
	AAD-Antarctica	0	83	94	Antarctica
	Opportunistic Southern Ocean	0	20	20	All
	KWA_SO	0	0	0	Antarctica
	Sub-total	**0**	**296**	**291**	
West and Central Indian Ocean	MRI-SA	0	0	0	South Africa, Madagascar
	Gardline	0	0	0	South Africa, Madagascar
	Opportunistic Madagascar	0	16	7	
	Sub-total	**0**	**16**	**7**	
	TOTAL	**135**	**1995**	**1930**	

Table 2 – Status of catalogue management and matching process, March 2024

Group	Area	Years	Uploaded Photo-ID	Uploaded Data (Date/Location)	Checked Data (Date/Location)	Matching Status
SWFSC	Peru, Ecuador, ETP	1992-2009	Yes	No	No	Completed
CRC	Costa Rica Dome	1999 and 2008/2009	Yes	Yes	No	No
WHET Lab	Galápagos	1993 and 2003/2004	Yes	Yes	No	No
CCC	Chile	2004-2015	Yes	Yes	Yes	Completed
IWC Chile	Chile	1997-1998	Yes	Yes	Yes	Completed
MERI	Chile	2014-2017	Yes	Yes	Yes	Completed
CBA-UACH	Chile	2003-2015	Yes	Yes	Yes	Completed
Eutropia	Chile	2006-2019	Yes	Yes	Yes	Completed
Phantalassa	Chile	2010-2019	Yes	Yes	No	Completed
Opportunistic Southeast Pacific	All	2010-2018	Yes	Yes	Yes	Completed
BWS	Australia	1998-2011	Yes	Yes	Yes	Completed
WWR	Australia	1999-2003	Yes	Yes	Yes	Completed
CWR	Australia	1996-2022	Yes	Yes	No	In progress
FLINDERS	Australia	2015	Yes	Yes	No	Completed
AAD-Australia	Australia	2012	Yes	Yes	No	Completed
KWA	Australia	2007-2018	Yes	Yes	No	Completed
Oceans Blueprint	Australia	2017-2018	Yes	Yes	No	Completed
OSU	New Zealand	2009-2017	Yes	Yes	In progress	Completed
AAD-NewZealand	New Zealand	2013 and 2015	Yes	Yes	Yes	Completed
NIWA	New Zealand	2018	Yes	Yes	No	Completed
Opportunistic New Zealand	New Zealand	2004-2018	Yes	Yes	Yes	Completed
UNTL	Timor-Leste	2014-2020	Yes	Yes	No	No
APEX/Oceans Blueprint	Timor-Leste	2018-2020	No	No	No	No
APEX	Indonesia	1999-2019	No	No	No	No
Asha de Vos	Sri Lanka	NA	Yes	No	No	No
BF	Sri Lanka	1983-1984 and 2010-2015	No	No	No	No
NARA	Sri Lanka	NA	No	No	No	No
IWC SOWER	Antarctica	1987-2009	Yes	No	No	Completed
MRI-SO	Antarctica	NA	Yes	No	No	Completed
AAD-Antarctica	Antarctica	2013-2019	Yes	Partially	No	Completed
Opportunistic Southern Ocean	Antarctica	2005-2020	Yes	Yes	No	Completed
KWA_SO	Antarctica	NA	No	No	No	No
MRI-SA	South Africa, Madagascar	NA	No	No	No	No
Gardline	South Africa, Madagascar	NA	No	No	No	No
Opportunistic Madagascar	South Africa, Madagascar	1996 and 2012	Yes	Yes	No	No

Annex 1 – List of Research Groups Names and Acronyms

Group	Acronym
NOAA Southwest Fisheries Science Center	SWFSC
Cascadia Research Collective	CRC
Whale Habitat, Ecology, and Telemetry Laboratory, Marine Mammal Institute, Oregon State University	WHET
Centro de Conservación Cetacea	CCC
Fundación MERI	MERI
Centro Ballena Azul, Universidad Austral de Chile	CBA-UACH
Centro de Investigación Eutropia	Eutropia
Phantalassa	Phantalassa
Blue Whale Study Inc.	BWS
Western Whale Research	WWR
Center for Whale Research Western Australia	CWR
Flinders University	FLINDERS
Australian Antarctic Division	AAD
Killer Whales Australia	KWA
Oceans Blueprint	Oceans Blueprint
Oregon State University, Marine Mammal Institute	OSU
National Institute of Water and Atmospheric research Ltd	NIWA
Asha de Vos	Asha de Vos
Biosphere Foundation	BF
National Aquatic Resources Research and Development Agency	NARA
Universidade Nacional Timor Lorosa'e	UNTL
APEX Environmental Pty	APEX
International Whaling Commission	IWC
Mammal Research Institute Whale Unit, University of Pretoria	MRI
Cardline	Cardline