

# **SC/68D/SH/04**

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**Progress report on Southern Hemisphere Blue Whale Catalogue: Period April 2021-March 2022**

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## ABSTRACT

The Southern Hemisphere Blue Whale Catalogue has a total of 2209 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. From April 2021 to March 2022, new collections of photo-identifications (+80 IDs) have been received from areas off Galapagos and Costa Rica Dome. Photo comparisons with new collections received up to March 2021 within the Southeast Pacific and ETP, and within New Zealand have also been completed. One match between southern Chile and the ETP provides evidence of migratory movements. A total of 37 matches within southern Chile (n=22) or within northern Chile (n=15) reveal strong site fidelity to feeding areas. Quality control of datasets from Australia, New Zealand and Chile has also been completed and data are now being prepared to be used for regional blue whale assessments.

## 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<sup>1</sup>. 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 has been supporting the project “Southern Hemisphere Blue Whale Catalogue (SHBWC)” as an international collaborative effort to facilitate cross-regional comparisons of individual blue whale photo-identification catalogues and contribute to Southern Hemisphere blue whale assessments (IWC, 2009).

The SHBWC uses specially designed online software that 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. Therefore, the SHBWC has become the largest repository of Southern Hemisphere blue whale photo-identifications (Galletti Vernazzani *et al.*, 2019a).

Comparisons among different regions will improve the understanding of basic questions relating to blue whale populations in the Southern Hemisphere. The IWC Scientific Committee is currently conducting blue whale assessments on non-Antarctic blue whales and the work of the SHBWC has focused over the past years in comparing photo-IDs from these regions in order to provide useful data to produce abundance estimates.

This report summarizes the progress made between April 2021 to March 2022 on the work of the SHBWC.

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<sup>1</sup> <https://www.marinemammalscience.org/species-information/list-marine-mammal-species-subspecies/>

## USERS & UPLOADING OF CATALOGUES

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 2,209 blue whales are currently in the SHBWC; totaling 1,584 right side photo-IDs, 1,630 left side and 90 flukes (Table 1).

Overall, 26 blue whale research groups from all regions are contributing to the SHBWC (Annex 1).

New blue whale photo-ID entries have been received from Cascadia Research Collective (Costa Rica Dome), from Whale Habitat, Ecology, and Telemetry Laboratory (Galapagos) and Oregon State University (OSU-New Zealand).

Centro de Conservación Cetacea (CCC) is finalizing their internal catalogue consolidation with new photo-ID encountered between 2016-2019 off southern Chile that consists of additional 155 blue whales. This large new dataset is not included yet in the summary table (Table 1). Photos and data are expected to be fully available before end of June 2022 to be compared with the other southeast Pacific catalogues during the next matching process.

Cascadia Research Collective (CRC) submitted their photo and data, consisting of 64 individuals from Costa Rica Dome between 1999-2008, and are currently in the process of being uploaded into the system. Biosphere Foundation photographs and dataset from Sri Lanka from 1983-1984 and 2010-2015 have been received and are currently being internally matched to consolidate its catalogue before uploading them into the SHBWC.

Photograph collections from Blue Whale Center off southern Chile, consisting of 206 individuals between 2003-2015 (Torrez-Flores, 2021) have not yet been received.

Details on groups catalogues, areas and general data can be found on Table 1 and 2.

## MATCHING 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 individuals. The SHBWC holds photo-IDs from left and right side of blue whales as well as the fluke, if available.

Comparisons have been underway among all regions (Galletti and Cabrera, 2011; Galletti Vernazzani and Olson, 2013; Galletti Vernazzani *et al.*, 2016), but with increasing contributions from catalogue holders, the matching process has focused on blue whale populations off Australia, New Zealand and Chile-ETP to be used for assessment purposes (IWC, 2021).

Comparisons of 872 photo-identified blue whales from six different research groups working in southern and northern Chile and the ETP, as well as opportunistic sightings, provided 38 re-sightings. One match revealed information on the connectivity and migration of blue whales from southern Chile to the southern ETP. Other matches were found within southern Chile (n=22) and within northern Chile (n=15), providing further evidence for strong site fidelity to feeding areas (Galletti Vernazzani *et al.*, 2022).

Comparisons of 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 eighteen whales resighted between different areas. Matches were found within Australian catalogues and within New Zealand catalogues, but no matches were found between those two regions or with Sri Lanka (Galletti Vernazzani *et al.*, 2019b).

Comparisons of 164 photo-identified blue whales from three research groups working off New Zealand provided two re-sightings. In addition, four individual whales' photographs from the OSU catalogue and opportunistic sightings off New Zealand were identical and can be considered duplicated rather than matches.

Regional comparisons within Southern Ocean have been systematically conducted by Olson (Olson *et al.*, 2020), under the IWC Antarctic Blue Whale Catalogue project, that also include photo-ID data from the Institute of Cetacean Research's expeditions (JARPA, JARPAII, NEWREP-A), and from photographs contributed by 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 sighting interval (Olson *et al.*, 2020).

Additional photo-ID data from CCC between 2016-2019 and BWS from 2003-2015 from southern Chile are expected to be uploaded and compared to Chile-ETP region. New ETP data from the WHET Lab and from CRC may also be compared to Chile-ETP region during the next round of matching. Also, new photo-IDs from the Australia region continues to be collected every year, but all have not yet been uploaded to SHBWC.

Additional data have been received from whales found off Australia (n=16) since 2018 and have not yet been matched. New data from Timor-Leste has also been received but no comparisons have been conducted yet for this region. In addition, new data from Southern Ocean have been received and comparisons have already been completed.

During all matching processes, it has been found that several catalogues included duplicate individuals; these have been corrected, and the contributors notified. It is not an unusual situation, particularly with large catalogues, and may affect abundance estimates. Photo-quality control can play an important role in reducing this risk, but sometimes duplicate photo-IDs may all be of good quality and inadvertently included. The effect of duplicated animals on abundance estimates produced by models used may need to be considered.

## **PROGRESS TOWARD POPULATION ASSESSMENTS**

Priorities for the Sub-committee on other Southern Hemisphere whale stocks currently include blue whales off Australia and Chile (IWC, 2017), 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).

Two important aspects need to be addressed to prepare the database for a capture-recapture analysis. These include photo quality control and data management. Afterwards, the encounter histories of the animals may be used in mark-recapture abundance estimate models.

### *Photo-quality control*

A photo quality control guide was developed for the SHBWC (Olson *et al.*, 2021). Photo-IDs were evaluated based on angle (of the whale to the photographer), exposure (lighting), and focus. A photo-ID expert evaluated all the images. After completing each regional catalogue, all categories were double-checked to maximize standardization.

Photo-IDs are now categorized into four categories: 1=Excellent, 2=Good, 3=Fair, and 4=Poor. Excellent and Good categories comprise the best photo-IDs for mark-recapture analyses. Fair category includes images that could be useful to match whales but will require more time and will need further efforts by the analyst (like image editing). The Poor category includes images considered unacceptable for use in abundance estimates.

Photo-quality control has been completed for Australian and New Zealand catalogues and photo-quality control of South America/ETP is almost complete. To date a total of 2107 photographs have been

categorized. About 80% of the photographs archived in the SHBWC are of Excellent and Good photo quality. Only 5% of the photos were considered of Poor quality and about 15% of Fair quality. Preliminary results for each region and catalogue holder are shown in Table 3.

It is important to highlight that the SHBWC requests that only the best photo-ID of an individual is uploaded, so it is no surprise that the catalogue comprises 80% of high quality photographs.

#### *Data management*

Most groups that joined the SHBWC at the beginning of its development were not requested to upload their associated data, which includes dates and locations. Data on dates are key for mark-recapture abundance estimate models. Over the past year, most of the groups have already contributed their photo-ID associated data.

Instructions to upload missing data were developed and a special report containing all IDs and data have been compiled for each group. These data are confidential under the data sharing agreement. Regional coordinators have approached each research group to complete missing data in the SHBWC, and some groups have completed this but others are still pending. It is very important to make sure that re-sightings between years of identified whales are all included in the data submitted by each research group.

In addition, it seems there are some typographical errors, particularly regarding sighting dates.

Therefore, data need to be checked by each group before any abundance estimates are carried out.

A summary of the status of different catalogues, including uploading of photo-ID, matching and data management is shown in Table 2.

Matching has been completed for Australia, Chile and New Zealand with available photo-ID data at SHBWC. Photo-quality control has been completed for Australia and New Zealand and ongoing for Chile. Data need to be checked by groups that haven't undertaken this yet and a request for full sighting histories of one group from Australia and another group from New Zealand is still required in order to use these datasets to produce abundance estimates.

The SHBWC software includes a special report function that produces encounter histories of selected groups to be used for the purpose of abundance estimation. The tool has the option to set a month in order to consider a "period" as a migratory cycle from breeding to feeding grounds rather than standard year from January to December.

In Table 4, details on numbers of whale photo-IDs per season for each group from Australia, Chile and New Zealand are provided. According to data uploaded into SHBWC, blue whale sightings are recorded mostly during summer/autumn (December-April), however there are some sightings recorded since September. In this sense, we selected a "migratory cycle" from September until August of next year for purposes of display at the table. This information provides insight on the span of the season and unique numbers of IDs available for mark-recapture analysis and can assist in identifying the datasets to be used in future populations assessments. As migratory cycle may differ from different regions, analysts will have to decide which months should be used for abundance estimates on each blue whale population.

#### **SOFTWARE IMPROVEMENTS**

Over the years, improvements to the software have been continually identified and additional information integrated in order to fulfill the new IWC photo-ID catalogue guideline requirements (Olson *et al.* 2017) and the requirements of the Scientific Committee. Several improvements have already been implemented and others have been postponed in order to give priority to those needed for assessment purpose. Priority issues included migration to IWC server and integration of photo-quality control option.

During 2020, the SHBWC software and database have been entirely and successfully moved to IWC servers. A new photo-quality control tool has been implemented in the software and reporting formats are being adapted to filter by photo-quality control. It is expected that the next IT work will be focused on upgrading/re-writing the software language.

## **CONCLUSIONS AND NEXT STEPS**

The matching process is completed for Australia, New Zealand and Chile for data received before March 2021. Photo-quality coding is completed for Australia and New Zealand and is ongoing for Chile.

There are still some data missing for a few groups and some other groups have still not uploaded their catalogues.

The dataset from Biosfere Foundation (BF) off Sri Lanka is being analyzed to finish the catalogue reconciliation and matching with other catalogues from the region. The Timor-Leste catalogue from Universidade Nacional Timor Lorosa'e (UNTL) also has important information that has not yet been compared to any groups.

The question on potential duplicated individuals should be discussed, and, if there is value in measuring its impact on abundance estimates, data should be collected when the matching process is undertaken.

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**Table 1 – Summary of blue whale photographic collections and catalogues in the SHBWC as of March 2022**

<b>Region</b>	<b>Group</b>	<b>Fluke (New)</b>	<b>Left Side (New)</b>	<b>Right Side (New)</b>	<b>Area</b>
ETP-South America	SWFSC	0	64	54	Peru, Ecuador, ETP
	CRC	0	0	0	Costa Rica Dome <sup>2</sup>
	WHET Lab	0	12	9	Galapagos
	CCC	0	469	484	Chile
	IWC Chile	0	14	9	Chile
	MERI	9	48	45	Chile
	CBA-UACH	0	0	0	Chile
	Eutropia	0	16	25	Chile
	Phantalassa	2	16	28	Chile
	Opportunistic Southeast Pacific	0	12	6	All
	<b>Sub-total</b>	<b>11</b>	<b>651</b>	<b>660</b>	
Sri Lanka-Australia-New Zealand-Coral Triangle	BWS	5	85	84	Australia
	WWR	0	30	23	Australia
	CWR	50	204	212	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	9	97	64	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
<b>Sub-total</b>	<b>79</b>	<b>699</b>	<b>640</b>		
Southern Ocean	IWC SOWER	0	158	157	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
	<b>Sub-total</b>	<b>0</b>	<b>280</b>	<b>284</b>	
West and Central Indian Ocean	MRI-SA	0	0	0	South Africa, Madagascar
	Gardline	0	0	0	South Africa, Madagascar
	<b>Sub-total</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>TOTAL</b>	<b>90</b>	<b>1630</b>	<b>1584</b>		

<sup>2</sup> Contributed 64 individual blue Whales that are in process of uploading.

**Table 2 – Status of catalogue management and matching process, March 2022**

<b>Group</b>	<b>Area</b>	<b>Years</b>	<b>Uploaded Photo-ID</b>	<b>Uploaded Data (Date/Location)</b>	<b>Checked Data (Date/Location)</b>	<b>Matching Status</b>
SWFSC	Peru, Ecuador, ETP	1992-2009	Yes	No	No	Completed
CRC	Costa Rica Dome	1999 and 2008/2009	In progress	In progress	No	No
WHET Lab	Galápagos	1993 and 2003/2004	Yes	Yes	No	No
CCC	Chile	2004-2015	Yes	Yes	No	Completed
IWC Chile	Chile	1997-1998	Yes	Yes	Yes	Completed
MERI	Chile	2014-2017	Yes	Yes	Yes	Completed
CBA-UACH	Chile	NA	No	No	No	No
Eutropia	Chile	2006-2019	Yes	Yes	No	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	NA	Yes	No	No	Completed
FLINDERS	Australia	2015	Yes	Yes	No	Completed
AAD-Australia	Australia	2012	Yes	Yes	No	Completed
KWA	Australia	2007-2018	Yes	Yes	No	No
Oceans Blueprint	Australia	2017-2018	Yes	Yes	No	No
OSU	New Zealand	2009-2017	Yes	Partially	No	Completed
AAD-NewZealand	New Zealand	2013, 2015	Yes	Yes	No	Completed
NIWA	New Zealand	2018	Yes	Yes	No	Completed
Opportunistic New Zealand	New Zealand	2004-2018	Yes	Yes	No	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	Completed
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	No
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

**Table 3 – Summary of photo-quality control**

<b>Group</b>	<b>Total #Photos Right</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>	<b>Total #Photos Left</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>
CCC	368	168	130	52	18	361	177	122	44	18
IWC Chile	11	0	5	4	2	18	0	9	6	3
MERI	50	28	20	2	0	56	34	19	2	1
Eutropia	25	20	4	1	0	16	12	2	2	0
Phantalassa	40	24	12	4	0	23	12	9	2	0
Opportunistic Southeast Pacific	6	2	1	3	0	12	3	8	1	0
<b>Chile-ETP</b>	<b>500</b>	<b>242</b>	<b>172</b>	<b>66</b>	<b>20</b>	<b>486</b>	<b>238</b>	<b>169</b>	<b>57</b>	<b>22</b>
	<b>%</b>	<b>48,4</b>	<b>34,4</b>	<b>13,2</b>	<b>4,0</b>	<b>%</b>	<b>49,0</b>	<b>34,8</b>	<b>11,7</b>	<b>4,5</b>
BWS	91	45	37	8	1	97	43	48	5	1
WWR	23	8	12	3	0	30	14	11	4	1
CWR	267	84	109	53	21	262	97	103	40	22
MARVEL	13	9	3	1	0	20	11	7	1	1
AAD-Australia	36	21	14	1	0	35	17	17	1	0
<b>Australia</b>	<b>430</b>	<b>167</b>	<b>175</b>	<b>66</b>	<b>22</b>	<b>444</b>	<b>182</b>	<b>186</b>	<b>51</b>	<b>25</b>
	<b>%</b>	<b>38,84</b>	<b>40,70</b>	<b>15,35</b>	<b>5,12</b>	<b>%</b>	<b>40,99</b>	<b>41,89</b>	<b>11,49</b>	<b>5,63</b>
OSU	92	17	42	23	10	101	33	40	23	5
AAD-NewZealand	11	0	5	3	3	12	2	6	4	0
Opportunistic New Zealand	12	1	7	4	0	19	6	8	3	2
	<b>115</b>	<b>18</b>	<b>54</b>	<b>30</b>	<b>13</b>	<b>132</b>	<b>41</b>	<b>54</b>	<b>30</b>	<b>7</b>
<b>New Zealand</b>	<b>%</b>	<b>15,65</b>	<b>46,96</b>	<b>26,09</b>	<b>11,30</b>	<b>%</b>	<b>31,06</b>	<b>40,91</b>	<b>22,73</b>	<b>5,30</b>
<b>Total</b>	<b>1045</b>	<b>427</b>	<b>401</b>	<b>162</b>	<b>55</b>	<b>1062</b>	<b>461</b>	<b>409</b>	<b>138</b>	<b>54</b>
	<b>%</b>	<b>40,86</b>	<b>38,37</b>	<b>15,50</b>	<b>5,26</b>	<b>%</b>	<b>43,40</b>	<b>38,51</b>	<b>12,99</b>	<b>5,08</b>

**Table 4 – Summary of unique blue whale IDs per season (Sep-Aug) for Australian, Chilean and New Zealand catalogues matched as of March 2022**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Total*
<b>CHILE</b>																							
<b>IWC-Chile</b>	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<b>21</b>
<b>CCC</b>	0	0	0	0	0	0	5	17	82	122	147	85	110	70	28	77	29	59	0	0	0	0	<b>831</b>
<b>MERI</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	16	37	6	0	0	<b>64</b>
<b>Phantalassa</b>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	11	14	6	4	<b>38</b>
<b>Eutropia</b>	0	0	0	0	0	0	0	0	5	3	1	0	0	0	0	0	0	1	11	7	1	5	<b>34</b>
<b>Opportunistic SEP</b>	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	1	0	3	1	3	1	1	<b>16</b>
<b>TOTAL</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>17</b>	<b>87</b>	<b>125</b>	<b>148</b>	<b>85</b>	<b>116</b>	<b>71</b>	<b>28</b>	<b>80</b>	<b>34</b>	<b>79</b>	<b>60</b>	<b>30</b>	<b>8</b>	<b>10</b>	<b>1004</b>
<b>AUSTRALIA</b>																							
<b>BWS</b>	1	2	4	0	0	8	0	29	9	19	3	35	23	6	0	0	0	0	0	0	0	0	<b>139</b>
<b>WWR</b>	0	0	2	2	3	1	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<b>40</b>
<b>AAD-Australia</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0	0	0	0	0	0	0	<b>46</b>
<b>Flinders</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1**	17	0	0	0	0	<b>18</b>
<b>TOTAL</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>2</b>	<b>3</b>	<b>9</b>	<b>32</b>	<b>29</b>	<b>9</b>	<b>19</b>	<b>3</b>	<b>35</b>	<b>23</b>	<b>6</b>	<b>46</b>	<b>0</b>	<b>1</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>243</b>
<b>NEW ZEALAND</b>																							
<b>OSU</b>											0	0	0	1	2	4	24	6	26	47	9	0	<b>119</b>
<b>NIWA</b>											0	0	0	0	0	0	0	0	0	0	7	0	<b>7</b>
<b>AAD-New Zealand</b>											0	0	0	0	0	14	0	1	0	0	0	0	<b>15</b>
<b>Opportunistic NZ</b>											4	0	0	6	1	1	2	2	1	0	8	1	<b>26</b>
<b>TOTAL</b>											<b>4</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>3</b>	<b>19</b>	<b>26</b>	<b>9</b>	<b>27</b>	<b>47</b>	<b>24</b>	<b>1</b>	<b>167</b>

\* It includes re-sightings between years within same group

\*\*It seems a typographical error and should corresponded to 2015

### Annex 1 – List of Research Groups Names and Acronyms

<b>Group</b>	<b>Acronym</b>
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