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Blue whale photo-identifications reveal strong site fidelity to feeding areas from the Southeast Pacific and connectivity between southern Chile and Eastern Tropical Pacific¹

Barbara Galletti Vernazzani, Elsa Cabrera, Paula Olson, Sonia Español-Jimenez, Frederick Toro, María José Perez-Alvarez, Guido Pavez, Rodrigo Moraga, Diego Cortés-Peña, Isabella L. K. Clegg, Verena Häussermann, Ken Findlay, Sheila Wright and Robert L. Brownell Jr

Abstract

Blue whales occur in the Southeast Pacific and Eastern Tropical Pacific (ETP) but little is known about their long-term movements. The Southern Hemisphere Blue Whale Catalogue is a platform to share individual photo-identification catalogues among blue whale research groups. 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 ETP. Other matches were found within southern Chile and within northern Chile, providing further evidence for strong site fidelity to feeding areas. The longest re-sighting occurred over 18 years, within southern Chile. One animal was seen 11 times on six different years, also within southern Chile. This is the first regional assessment of blue whale photo-identification and habitat use along the Southeast Pacific and the ETP. Our results highlight the importance of collaborative work to understand blue whale movements and migration, and show that some groups of whales use discrete feeding areas.

Introduction

In the Southern Hemisphere, the pygmy blue whale (*Balaenoptera musculus breviceauda*) 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 Mammalogy². In addition, the yet unnamed subspecies or Chilean blue whale has been proposed as a separate subspecies because it is morphologically (Branch *et al.* 2007; Pastene *et al.* 2020), genetically (LeDuc *et al.* 2007; LeDuc *et al.* 2017), and acoustically (McDonald *et al.* 2006) distinct. More recently, Leslie *et al.* (2020) used drone photographs to show that these Chilean blue whales are morphologically intermediate in size (both total length and relative tail length) between pygmy and Antarctic blue whales and reinforced the uniqueness of these whales.

Chilean blue whales are known to feed during the austral summer and autumn (late December to early May) in southern Chile off Isla Grande de Chiloe and in the Corcovado Gulf (Cummings and Thompson 1971a, b; Gilmore 1971; Findlay *et al.* 1998; Huckle-Gaete *et al.* 2004; Cabrera *et al.* 2005; Abramson and Gibbons, 2010; Försterra and Häussermann 2012; Galletti Vernazzani *et al.* 2012a). An additional feeding aggregation of blue whales off Isla Chanaral in northern Chile was first reported in 2012 (Galletti Vernazzani *et al.* 2012b).

Photo-identification data from long-term studies and a coordinated, multi-site effort is required to accurately assess population abundance, population trend and connectivity of blue whales (IWC 2017). Since 2008, the International Whaling Commission (IWC) Scientific Committee has supported the collaborative Southern Hemisphere Blue Whale Catalogue (SHBWC) to facilitate this work (IWC 2009). To date, the SHBWC represents the most important collection of blue whale catalogues in the Southern Hemisphere. Blue whales off Chile and Australia have become assessment priorities for the sub-committee on Other Southern Hemisphere Whale Stock population assessments (IWC 2017).

¹ This paper is respectfully and fondly dedicated to the memory of Dr. Carole Carlson and Greg Kaufman who greatly contributed to the research and studies of the Chilean blue whale population.

² <https://www.marinemammalscience.org/species-information/list-marine-mammal-species-subspecies/>

Previous photo-identification comparisons from SHBWC catalogues from areas off the Southeast Pacific, the Eastern Tropical Pacific (ETP), the Southern Ocean (Galletti Vernazzani and Cabrera 2011; Galletti Vernazzani and Olson 2012; Olson *et al.* 2020) and waters off Australia, New Zealand and Sri Lanka (Galletti Vernazzani *et al.* 2019) have been reported.

The first matching process for different areas off Chile and ETP was conducted with about 300 individuals uploaded to the SHBWC through 2009. Only one match between different catalogues was found over a ten-year period; both sighting locations were in southern Chile (Galletti and Cabrera 2011). Following the first matching process, the SHBWC has received important new contributions for the Southeast Pacific region (Galletti Vernazzani *et al.* 2021) and the matching process for identification photos from this region has been completed. This paper presents results of comparisons between catalogues of blue whales off Chile, Peru and the ETP received at the SHBWC through March 2021.

Methods

The SHBWC now contains photo-IDs of more than 2,000 individual blue whales. These whales have been geographically separated into four major regions from waters off: 1) Antarctica, 2) Australia/New Zealand/Indonesia, 3) Southern Africa/Madagascar, and 4) Gulf of California/Eastern Tropical Pacific/South America (Galletti Vernazzani *et al.* 2021). Blue whales are individually identifiable from the unique pattern 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). Separate photographic collections for left sides, right sides and flukes are maintained. Left and right side photographs of individual blue whales were compared between each group to determine the number of individuals re-sighted in different study sites.

By March 2021, the Eastern Tropical Pacific/South America subset of the SHBWC included photographs of 872 individuals comprising 639 left side IDs, 651 right side IDs, and 11 photo-IDs from flukes (Table 1). Records in the regional catalogue from the Eastern Tropical Pacific/South America area were contributed by: 1) the 1997/98 IWC/SOWER survey off Chile, 2) Centro de Conservacion Cetacea (CCC) off southern and northern Chile between 2004 and 2015, 3) the MERI Foundation off southern Chile between 2014 and 2017, 4) Panthalassa off northern Chile between 2010 and 2019, 5) Eutropia off northern Chile between 2006 and 2019, 6) SWFSC/NOAA during various years between 1992 to 2009 off the Galápagos Islands, Peruvian waters and the Costa Rica Dome, and 7) opportunistic sightings off Peru, northern Chile and southern Chile from 2010-2018. Details on photographs collected opportunistically are given in Table 2.

Whale photographs received by March 2021 from South America and ETP were compared for this report (n=872 IDs). Details, when available, are given for each match found between records contributed by different research groups. Matching histories of each whale within the catalogues of each research group are not included.

Results

Comparisons of left and right photo-IDs were completed and 38 matches were found (Table 3). 22 matches occurred within southern Chile. They covered a wide area from 40°S to 47°S latitude. There were 15 matches within northern Chile (all at approximately 29°S). However, seven of these corresponded to individuals re-sighted during same season. No matches were found between northern and southern waters of Chile.

One additional match provided important evidence about migration movements and connectivity of blue whales between southern Chile and the southern edge of the Eastern Tropical Pacific. The individual involved (Figure 1 - ID#38, Table 3) was first photographed by SWFSC/NOAA on 21 October 2003 about 500 miles south of Galapagos Islands and 700 miles west of Peru (9.06°S-89.02°W). It was later photographed by the CCC three times on 22 February 2006 (41.89°S-74.12°W) and again on 21 and 22 February 2008 (41.99°S-74.17°W and 42.00°S-74.09°W) off northwestern Isla de Chiloe. The distance between the ETP locations and the southern Chile locations is approximately 2,450 nautical miles.

The longest time between recaptures was 18 years. The first match of whale ID#22 was made between a sighting on 5 January 1998 from IWC SOWER Cruise 1997/98 and a sighting made by CCC on 13 March 2008, approximately 220 km apart in southern Chile, (previously reported by Galletti Vernazzani and Cabrera (2011)). The whale was matched again during this study, to a photograph taken later by CCC off northwestern Isla de Chiloe on 21 February 2015 (ID#22, Table 3).

Two whales have been seen over a period of 12 field seasons/years, also in the CCC Catalogue. These whales were previously named by CCC as *Moro* (ID#19, Table 3) and *Shimi* (ID#17, Table 3).

Moro was last seen on 23 November 2018 in the Gulf of Penas by Isabella Clegg and the crew of the research group Patagonia Projects, who contributed their opportunistic photographs to the SHBWC. The whale had been seen previously by CCC off northwestern Isla de Chiloe during 2007, 2008 and 2014.

Shimi was seen four times in 2006, 2010 and 2017 off northwestern Isla de Chiloé. In 2006, this whale exhibited a severe skin condition along the entire body that was classified as blister-like lesions (Brownell *et al.* 2008). The last opportunistic photographs from 2017 were contributed by Sheila Wright. Preliminary photo-ID comparisons showed that these lesions persisted over a 11-year period (Figure 2). However, the appearance of the lesions remained virtually unchanged over this period – perhaps indicating, at least in this animal, that they were not a progressive, or even life-threatening, disease.

Six whales have been seen over 11 years in southern Chile. One of them, named *Valentina* (ID#2, Table 3), has been sighted 11 times and recorded on six different years. This is the whale that have been found more times over the studied period.

Another whale (ID#15 and 16, Table 3) was first seen by CCC at northwestern Isla de Chiloe in 2009, resighted in 2010 by the Huinay Scientific Field Station (Försterra and Häussermann, 2012) and again by the MERI foundation in 2016, both in the east inlets. This corresponds to one of the previously two (ID#20) reported matches between CCC and Huinay Scientific Field Station (Försterra and Häussermann, 2012).

In northern Chile, 15 matches were found off Isla de Chañaral (Table 3). Two individuals were seen by all three research groups with catalogues from northern Chile. Both whales were first seen by CCC in 2013 and later resighted by Phantalassa and Eutropia in 2017. 7 of the 15 matches (ID#29, 30, 31, 33, 34, 35 and 36, Table 3) have been of individuals sighted during the same season or even during the same day.

The longest time between photographic recaptures in northern Chile was 14 years. This match (ID#27, Table 3) was first seen by Eutropia on 22 January 2006 and later resighted by Phantalassa on 11 and 13 January 2019. The second longest time was 10 years of an individual (ID#28, Table 3) first seen by Eutropia on 20 December 2006 and later resighted by Phantalassa on 11 February 2016.

Discussion and conclusions

Our results document strong site fidelity for summer feeding areas off northern (Isla de Chañaral) and southern Chile (Isla de Chiloe) and also support the inter-seasonal connectivity between southern Chile and the ETP.

Galletti Vernazzani *et al.* (2017) reported that blue whales seen in Chiloe were not seen in Isla de Chañaral (northern Chile) because of the lack matches between these areas. In the present study we found 15 matches within northern Chile, 22 matches within southern Chile, and no matches between northern and southern Chile. These data provide further evidence of strong site fidelity to feeding areas.

Only one match between northern and southern Chile has been reported (Galletti Vernazzani *et al.* 2012a) to date. In this regard, it has been suggested that Chilean blue whales regularly visit multiple feeding sites along the Chilean coast during the summer season, explaining both the regional site fidelity and the lack of population structuring between feeding sites (Galletti Vernazzani *et al.* 2017).

The 22 matches among blue whales off southern Chile found in this study is consistent with the high overall annual return rate previously reported for Isla de Chiloe (Galletti Vernazzani *et al.* 2012, 2017). Using photo-ID data from 2004 to 2012, the number of blue whales feeding in the waters off Isla de Chiloe was estimated as ~570-760 whales, with periodic fluctuations in abundance suggesting that use of this survey area varies between years (Galletti Vernazzani *et al.* 2017). Försterra and Häussermann (2012) already reported that two out of five whales opportunistically photographed in the east inlets waters of the Chiloe region were previously sighted off northwestern Isla de Chiloe. The matches found in this study between the west coast of Isla de Chiloe and the east inlets of Chiloe region provide further evidence that whales travel between these two areas.

The match of a known individual from the Isla de Chiloe area to the Gulf of Penas extends the range of the subpopulation and raises further questions about its habitat use. Furthermore, it may represent an expansion of the southern Chile feeding area or another feeding site. It is also possible that this feeding area is only temporary due to fluctuating oceanographic conditions.

Our match between the ETP and southern Chile provides further evidence on the migration of blue whales and the connectivity between these regions. Based on year-round sightings of unidentified blue whales, the Eastern Tropical Pacific (ETP – including the Costa Rica Dome and Galapagos waters) has been proposed as a possible winter destination of this population (Reilly and Thayer 1990; Palacios 1997). Genetic, acoustic, satellite tag and photo-identification data have also found connections between the whales found off southern Chile and the ETP (Buchan *et al.* 2014, 2015; Torrez-Flores *et al.* 2015, Hucke-Gaete *et al.* 2018). These observations strongly suggest that at least some Chilean blue whales from southern Chile feeding ground migrate to the area west and south of the Galapagos Islands and into the ETP for breeding and calving.

Chilean blue whales are not the only Southern Hemisphere baleen whale to use the southern ETP during winter. Southern Hemisphere humpback whales also winter in Central American waters (Acevedo *et al.* 2007, Rasmussen *et al.* 2007). Therefore, this unique spatial overlap occurs in populations of both species from the Southern Hemisphere and Northern Hemisphere. In both cases, the warmer ETP waters may be important for rapid calf development and growth (Acevedo *et al.* 2007, Rasmussen *et al.* 2007).

The photo-id collection of the SHBWC also provides the opportunity to assess other important aspects such as health status. The images of the match of the individual with skin lesions over 11-year period are a clear illustration of this, and also indicate the value that such data can have for conducting other studies such as the prevalence of scars.

Our study is the first regional assessment of blue whale photo-identification and habitat use along the Southeast Pacific and the ETP. Our results highlight the importance of collaborative work to better understand blue whale movements that provided insights into blue whale migration and showed the discrete use of feeding areas for certain groups of whales. Continued international collaboration will contribute to a better understanding of blue whales in this region and help identify critical areas that need further management and their health status.

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Figure 1 – Individual blue whale (ID#38, table 3) sighted a) ETP in 2003 and b) southern Chile in 2006

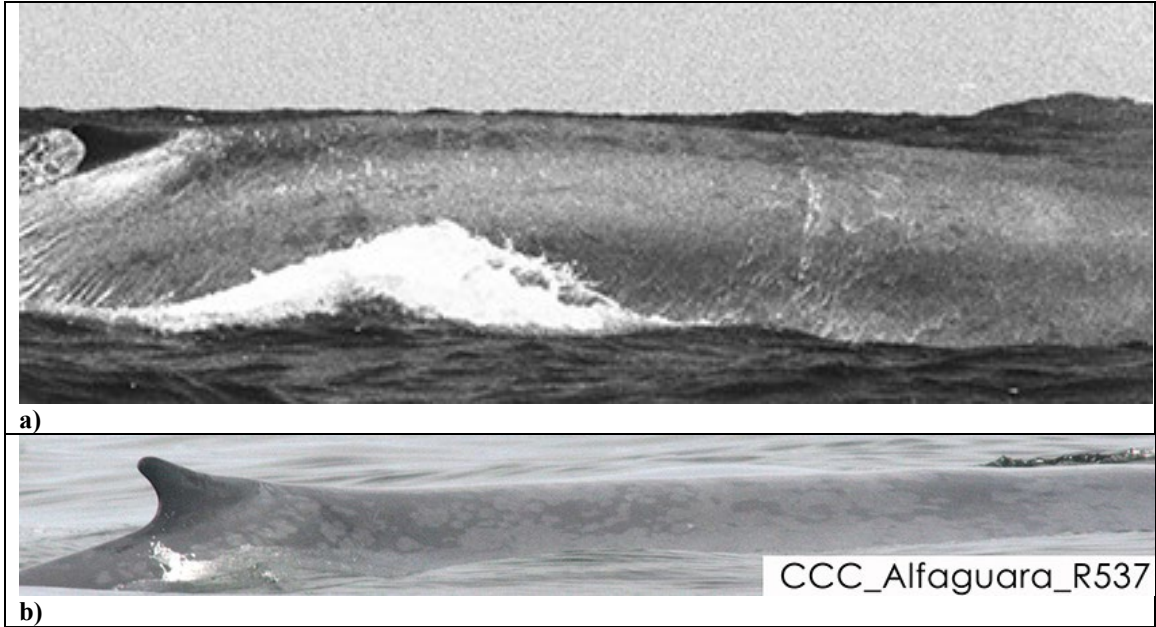


Figure 2 - Individual blue whale (ID#17, table 3) with blister-like lesions sighted off northwestern Isla de Chiloe on a) 2006 and b) 2017

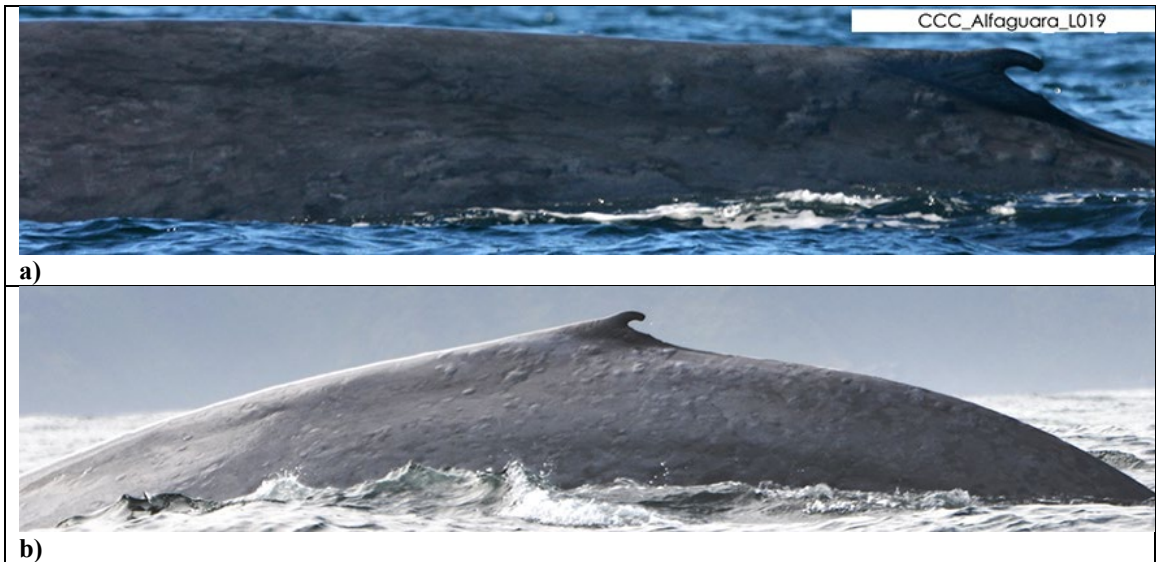


Table 1 – Summary of photographic collection of blue whale photo-identifications under the Gulf of California/ETP/South America subset of the SHBWC as of March 2021

Group	Years	Whales IDs	Fluke	Left	Right	Area
SWFSC	1992-2009	83	0	64	54	ETP: Peru, Ecuador, Costa Rica Dome
CCC	2004-2015	621	0	469	484	Northern and southern Chile
IWC Chile	1997-1998	21	0	14	9	Chile
MERI	2014-2017	60	9	48	45	Southern Chile
Phantalassa	2010-2019	37	2	16	28	Northern Chile
Eutropia	2006-2019	34	0	16	25	Northern Chile
Opportunistic Southeast Pacific	2010-2018	16	0	12	6	All
Sub-total		872	11	639	651	

Table 2 – Summary of opportunistic blue whale photo-identifications in Southeast Pacific as of March 2021

WhaleID	Contributor	Date of sighting	Location	Lat	Long
Huinay10 001	Vreni Haussermann – Huinay Foundation	24-04-2010	Fiordo Comau, southern Chile	-42,314012	-72,485994
Huinay10 002	Vreni Haussermann – Huinay Foundation	24-04-2010	Fiordo Comau, southern Chile	-42,314012	-72,485994
Huinay10 003	Vreni Haussermann – Huinay Foundation	26-05-2010	Fiordo Comau, southern Chile	-42,314012	-72,485994
Huinay10 004	Vreni Haussermann – Huinay Foundation	26-05-2010	Fiordo Comau, southern Chile	-42,314012	-72,485994
Huinay10 005	Vreni Haussermann – Huinay Foundation	26-05-2010	Fiordo Comau, southern Chile	-42,314012	-72,485994
Chiloe11	Fabian Ritter	02-03-2011	Cruce Corcovado-Moraleda, southern Chile	-43,534640	-73,347384
Chiloe13	Juan Pablo Castro	01-02-2013	Isla Lilihuapi, southern Chile	-42,1444	-72,585000
Peru15	Aldo Pacheco / Fiorella Sanchez-Salazar	28-08-2015	Los Organos, northern Peru	-4,129233333	-81,1685
Peru15b	Aldo pacheco / Fiorella Sanchez-Salazar	28-08-2015	Los Organos, northern Peru	-4,129233333	-81,1685
Peru15c	Aldo pacheco / Fiorella Sanchez-Salazar	28-08-2015	Los Organos, northern Peru	-4,129233333	-81,1685
Corcovado16	Marcelo Flores	31-03-2016	Golfo Corcovado, southern Chile	-43.878	-73.23
Mejillones16	Ana Maria Garcia Cegarra	20-11-2016	Peninsula de Mejillones, northern Chile	-23,20861111	-70,6072222
Chiloe17	Sheila Wright	08-02-2017	Puñihuil, southern Chile	-41,92472222	-74,0391666
Chiloe17b	Sheila Wright	08-02-2017	Puñihuil, southern Chile	-41,92472222	-74,0391666
Peru18	Aldo Pacheco	12-08-2018	Los Organos, northern Peru	-4,09368	-81,0996
GolfoPenas18	Isabella Clegg	23-11-2018	Golfo Penas, southern Chile	-46,724682	-75,510022

Table 3 - Results from comparisons among SHBWC groups from western South America and ETP as of March 2021

ID	Groups	Whales IDs	Date and Location 1	Date and Location 2	Date and Location 3	Date and Location 4	Date and Location 5	Date and Location 6	Date and Location 7	Date and Location 8	Date and Location 9	Date and Location 10	Date and Location 11	#Years Seen	Time spanning (seasons)
Southern Chile															
1	CCC & MERI	CCC_037 and Bm 054	16-02-06 -41,91111 -74,10222	20-02-08 -41,84253 -74,21783	26-02-16 -42,99051 -72,87564									3	11
2	CCC & MERI	CCC_043* and Bm019	17-02-2006 -41,92806 -74,09917	20-04-2007 -41,75911 -74,17815	21-04-2007 -41,897 -74,139	20-01-2008 -41,965 -74,090	02-03-2008 -42,00776 -74,28084	13-03-2008 -41,95693 -74,25914	20-02-2010 -41,85797 -74,12638	24-03-2010 -41,90308 -74,20868	25-04-10 -41,88951 -74,25352	04-03-2015 -43,0407 -72,9172	22-02-2016 -42,88766 -72,8817	6	11
3	CCC & MERI	CCC_057 and Bm041	22-02-2006 -41,88722 -74,12917	12-02-2010 -41,77006 -74,10218	21-02-2016 -42,93982 -72,86562									3	11
4	CCC & MERI	CCC_071 and Bm032	24-02-2006 -41,98417 -74,14361	02-02-2008 -41,9089 -74,1810	10-02-2008 -41,96335 -74,17275	02-03-2008 -42,02002 -74,16606	18-02-2016 -42,8832 -73,12686							3	11
5	CCC & MERI	CCC_074 and Bm023	01-03-2006 -41,82972 -74,10944	22-02-2007 -41,96077 -74,21408	05-03-2015 -42,4311 -72,9661									3	10
6	CCC & MERI	CCC_096 and Bm067	21-03-06 -41,91667 -74,14639	11-03-15 -41,62010 -74,15500	02-03-16 -42,60742 -72,92172									3	11
7	CCC & MERI	CCC_203 and Bm017	26-04-07 -41,88413 -74,20288	03-03-14 -43,35120 -73,15970										2	8
8	CCC & MERI	L337 and Bm043	06-04-2010 -41,96007 -74,11016	22-02-2016 -42,94008 -72,85789										2	7
9	CCC & MERI	L349 R859 and Bm008	24-04-10 -41,95338 -74,33427	25-04-10 41,91777 74,28621	04-03-15 -42,86730 -72,99990									2	6
10	CCC & MERI	L358 and Bm076	25-04-2010 -41,84252 -74,31728	03-03-2017 -42,40131 -72,82657										2	8
11	CCC & MERI	L458 and Bm037	15-03-2013 -42,22581 -74,45403	01-04-2013 -41,96771 -74,18470	23-02-2015 -41,93553 -74,32824	19-02-2016 -42,95552 -72,88731								3	4
12	CCC & MERI	L458, R954 / R983 and Bm064	15-03-13 -42,22581 -74,45403	01-04-13 -41,96771 -74,18470	23-02-15 -41,93553 -74,32824	01-03-16 -42,65032 -72,93481								3	4
13	CCC & MERI	R957 and Bm 057	01-04-13 -41,98293 -74,20119	28-02-16 -43,06036 -72,95380										2	4
14	CCC & MERI	L487 and Bm072	04-03-2015 -41,97252 -74,20985	25-02-2017 -42,45093 -73,1014										2	3
15 & 16	CCC & MERI & Opportunistic	CCC_387 - Bm065 and Huinay 003	19-04-2009 -42,05151 -74,41516	26-05-2010 -42,31401 -72,48599	02-03-2016 -42,58027 -72,9023									3	8

17	CCC & Opportunistic	CCC_027* * and Chiloe 17b	16-02-06 -41,91806 -74,25278	25-02-06 -42,04000 -74,18528	30-01-10 -41,95821 -74,18208	08-02-17 -41,92472 -74,03917									3	12
18	CCC & Opportunistic	CCC_159 and Chiloe 17	08-03-07 -41,96474 -74,24531	08-02-17 -41,92472 -74,03917											2	11
19	CCC & Opportunistic	CCC_200* ** and Golfo Penas 18	26-04-07 -41,90218 -74,18292	27-04-07 -41,848140 -74,266720	17-03-08 -41,12283 -74,04732	27-01-14 -42,07393 -74,22601	28-01-14 -42,06798 -74,21519	23-11-18 -46,72468 -75,51002							4	12
20	CCC & Opportunistic	CCC_216 and Huinay 002	27-04-07 -41,84687 -74,23619	24-04-10 -42,314012 -72,485994											2	4
21	CCC & Opportunistic	CCC_276 and Chiloe 13	20-02-08 -41,98965 -74,18537	21-02-08 -41,95978 -74,15201	28-02-13 -42,14440 -72,58500										2	6
22	IWC SOWER & CCC	Ch009 - CCC 315	05-01-98 -39,96000 -74,15000	13-03-08 -41,94 -74,29	21-02-15 -41,84575 -74,26669										3	18
Northern Chile																
23, 24	CCC & Eutropia & Phantalassa	L432/ R935 - Bm_015 - PTHS011	16-02-13 -28,98290 -71,56507	15-01-17 -28,981189 -71,540836	18-01-17 -29,0507 -71,549811	18-01-17 -29,063397 -71,520039									2	5
25, 26	CCC & Eutropia & Phantalassa	L429 - Bm_018, Bm_014 - PTHS025	15-02-13 -29,06649 -71,57204	17-02-13 -29,00095 -71,58929	27-01-17 -29,05572 -71,59218	18-01-17 -29,04818 -71,53063	11-02-17 -29,041697 -71,561681	14-02-17 -29,02614 -71,53584	15-02-17 -29,010709 -71,560619						2	5
27	Eutropia & Phantalassa	Bm_021 - azu13 - PTHS001	01-02-06 -29,02851 -71,53011	11-01-19 -29,03431 -71,53412	13-01-19 -29,04665 -71,56215											
28	Eutropia & Phantalassa	Azul6 - P THS031	20-12-06 -29,02851 -71,53011	11-02-16 -29,03333 -71,58333												
29	Eutropia & Phantalassa	Bm_006 - PTHS036	22-01-16 -29,04892 -71,62596	27-01-16 -29,03333 -71,58333												
30	Eutropia & Phantalassa	Bm_008 - PTHS019	04-02-16 -29,06739 -71,54942	04-02-16 -29,03333 -71,58333	24-02-16 -29,06488 -71,58333											
31	Eutropia & Phantalassa	Bm_013 - PTHS010	15-01-17 -29,03431 -71,53412	15-01-17 -29,09623 -71,51864												
32	Eutropia & Phantalassa	Bm_016 - PTHS007	14-01-17 -29,00185 -71,55398	25-01-17 -29,06169 -71,59536	10-02-18 -29,04124 -71,59883											
33	Eutropia & Phantalassa	Bm_017 - PTHS014	23-01-17 -29,01951 -71,52758	28-01-17 -29,03431 -71,53412	29-01-17 -29,04979 -71,58742											
34	Eutropia & Phantalassa	Bm_020 - PTHS003	09-01-18 -29,04372 -71,62550	14-01-18 -29,02512 -71,59862	15-01-18 -29,03431 -71,53412											

35	Eutropia & Phantalassa	Bm_022 - PTHS002b	16-01-19 -29,03431 -71,53412	16-01-19 -29,01886 -71,56244	26-01-19 -29,06392 -71,59727										
36	Eutropia & Phantalassa	Bm_023 - PTHS002	16-01-19 -29,03431 -71,53412	16-01-19 -29,01886 -71,56244											
37	Eutropia & Phantalassa	Bm_011 - PTHS018	17-02-16 -29,01974 -71,51265	27-01-17 -29,05572 -71,59218											
ETP and southern Chile															
38	SWFSC/NOA & CCC	E0318 – CCC 058	21-10-2003 -9,06 -89,02	22-02-2006 -41,88722 -74,12916	21-02-2008 -41,98616 -74,16531	22-02-2008 -42,0006 -74,09354									3 6

* Whale named *Valentina*

** Whale named *Shimi*

*** Whale named *Moro*