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While large mass mortality events (MMEs) are well known for toothed whales, they have been rare in baleen whales due to their less gregarious behaviour. Although the cause for most mortalities was never conclusively revealed, some baleen mortality events were linked to bio-oceanographic conditions such as harmful algal blooms (HABs). In southern Chile HABs can be triggered by the atmospheric phenomenon El Niño,which is increasing in frequency and magnitude due to climate change. In March 2015, the by far largest ever reported baleen whale mass mortality took place in a small gulf in southern Chile. Here we show that the synchronous death of the at least 305 primarily sei whales can be attributed to HABs during the ongoing strong El Niño. Although considered an oceanic species, the sei whales were killed while feeding near to the shore in previously unknown large aggregations. Older remains of whales in the same area indicate that MMEs have occurred more than once in recent years. Large HABs and reports from marine mammal MMEs along the north-east Pacific coast may indicate similar processes in both hemispheres. Increasing MMEs through HABs may become a serious concern for conservation of endangered whale species.

Largest baleen whale mass mortality during strong El Niño event is likely related to harmful toxic algal bloom

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Abstract

While large mass mortality events (MMEs) are well known for toothed whales, they have been rare in baleen whales due to their less gregarious behaviour. Although the cause for most mortalities was never conclusively revealed, some baleen mortality events were linked to bio-oceanographic conditions such as harmful algal blooms (HABs). In southern Chile HABs can be triggered by the atmospheric phenomenon El Niño, which is increasing in frequency and magnitude due to climate change. In March 2015, the by far largest ever reported baleen whale mass mortality took place in a small gulf in southern Chile. Here we show that the synchronous death of the at least 305 primarily sei whales can be attributed to HABs during the ongoing strong El Niño. Although considered an oceanic species, the sei whales were killed while feeding near to the shore in previously unknown large aggregations. Older remains of whales in the same area indicate that MMEs have occurred more than once in recent years. Large HABs and reports from marine mammal MMEs along the north-east Pacific coast may indicate similar processes in both hemispheres. Increasing MMEs through HABs may become a serious concern for conservation of endangered whale species.

Introduction

Although most populations of whales have been fully protected from industrial hunting for half a century, a number of those were reduced to such low levels that recovery is very slow (Baker & Clapham, 2004). Today whales still face many threats such as ship strikes, entanglement and by-catch, underwater noise, pollution and habitat loss (Clapham et al., 1999). Since oceanographic conditions directly influence quality and availability of prey species of baleen whales the effects of global warming are also becoming a concern (Simmonds & Isaac, 2007). Therefore mass mortalities, especially of great whales are alarming. Mass mortality events of marine mammals generally involve social species such as dolphins or sea lions, but are rare in baleen whales due to their less gregarious behaviour (Perrin et al., 2009). They often extend over several months and large areas (Table 1). In the Northeast Pacific, seven to eight times more gray whales (*Eschrichtius robustus*) washed ashore throughout the years 1999 and 2000 than usually in this time span, 106 of which died within three months in Mexico (Gulland et al., 2005). In the course of 2012, 116 southern right whales (*Eubalaena australis*), mostly calves, washed ashore at their breeding ground in Valdés Peninsula, Argentina (Anonymous, 2015). Few MMEs have been reported for rorqual whales: 46 humpback whales (*Megaptera novaeangliae*) stranded in Australia in the course of 2009 (Coughran et al., 2013) and 96 in Brazil during 2010, most of them calves and juveniles (Rowntree et al., 2013). Even less frequent and much smaller in magnitude are sudden and locally restricted rorqual whale mortalities. The largest of those involved 14 humpback whales which died around Cape Cod during five weeks in November 1987 (Geraci et al., 1989) (Table 1). The causes of most events have not been conclusively identified (e.g. Anonymous, 2015; Coughran et al., 2013; Gulland et al., 2005); however, paralytic shellfish poisoning during harmful algal blooms (HABs) has been cited as one of the main causes of mass mortalities of marine vertebrates (Cook et al., 2015; D'Agostino et al., 2015; Doucette et al., 2006; Durbin et al., 2002; Geraci et al., 1989; Rowntree et al., 2013; Wilson et al., 2015).

Here we describe the by far largest ever recorded MME of rorqual, primarily sei whales, at one time and place. Our analyses focus on the location and the cause of the mortality and on the feeding behaviour of the whales at the time of death.

Materials and Methods

The study area

The area around Penas Gulf and Taitao Peninsula (Fig. 1) is a very remote, uninhabited and poorly studied area. It is influenced by the West Wind Drift, a net eastward (onshore) flow which diverges at the coast to form the northward Humboldt Current and the southward Cape Horn Current (Thiel et al., 2007). The fjordic nature of the coastline of the Golfo de Penas area produces significant local complexity, with many inlets and dispersed freshwater sources. High productivity in these coastal waters (Fig. S1) is driven by the availability of both terrestrial nutrients, carried by large rivers originating at the Northern and Southern Patagonian Icefields, and marine nutrients (González et al., 2010; Torres et al., 2014). While this region experiences coastal winds that favor net coastal downwelling (Fig. S2), intermittent upwelling, in particular in summer and north of Taitao Peninsula (47°S), is expected to enhance the supply of marine nutrients to coastal waters, and the relative balance between upwelling and downwelling varies from year to year.

The tidal amplitude in the area during March and April 2015 was less than 2m. The highest tides of the year are in June and July.

Field surveys

During the vessel-based SCUBA diving expedition Huinay FIORDOS 24 from April 15th to May 8th 2015 to the area between Tres Montes Gulf (northern Penas Gulf, 46°30'W) and Puerto Eden (49°S), VH and her team discovered 35 recently dead rorqual whales and 12 skeletal remains in and close to the entrance of the 14 km long Slight Inlet (31 carcasses, 12 skeletal remains) and in the Castillo Channel situated 235 km southward (4 carcasses), as well as many whale bones on different beaches (Fig. 2, Table S1). Georeferences and photographs of different views were taken, whales measured, and species and sex identified whenever possible. Between May 25th and 31st, the Chilean Fisheries Service, Armada de Chile and the Criminal Investigation Department organized a vessel-based trip to the dead whales in Slight Inlet with the purpose to investigate possible anthropogenic reasons behind the mortality. During this trip, genetic samples for species identification were taken, one ear bone was extracted and stomach and intestine content was tested for presence of PST and AST (Fiscalia de Aysen, 2015). During a subsequent aerial survey with a Cessna 206 between June 23th and 27th, 2015 CSG, VH and FH surveyed the coasts along the shores of Penas Gulf between the Jungfrauen Group (48°S) and Newman Inlet (46°39'S) from altitudes between 100m and 850m and at speeds between 100km/h and 200km/h (Figs. 1, 3). We counted 249 carcasses and nine skeletal remains. Due to limited flying time (unstable weather conditions and no refueling possible in the area) data collection was focused on counting whale carcasses, recording GPS position and taking photographs. A GoPro camera filmed continuously until reaching Newman Inlet. Four people were in the plane, all of them were counting carcasses while a voice recording device was running during the entire flight recording carcass number, position and orientation of the carcass, photo number, photographer, and geomorphology of the beach. Two researchers were taking photographs and one was marking GPS points. Counts were repeated in all areas except Newman Inlet due to adverse weather conditions. Since there are no landing opportunities in this remote and unpopulated area it was not possible to take samples or close-up photos or to search for additional whale bones. On some photos appeared what could have been carcasses of smaller animals (possibly dolphins and/or sea lions), but due the flying altitude, speed and weather conditions, the photo quality and resolution did not allow a positive identification as actual carcasses. In addition to this total of 284 whale carcasses and 21 skeletons from the two surveys, 21 whales carcasses and 11 whale skulls were reported between February and June 2015 by boat crews navigating the west coast of Taitao Peninsula and the coast between 49°15' and 51°S (Table S1).

Satellite image

A high resolution satellite image was taken of Newman Inlet on August 13th, 2015 using the Pleiades-1 Satellite. The 16-Bit ortho-rectified GeoTIFF Multispectral (R-G-B-NIR) and Panchromatic files have been analyzed for numbers and positions of whale carcasses.

Taxonomic analysis

The whales were identified *in situ* based on morphological characteristics during the vessel-based expedition. Of the 28 whales identified as sei whales (24 during the vessel-based survey and further four from photos), the identification of 15 specimens from Slight Inlet was confirmed genetically by MJP (Fiscalia de Aysen, 2015). Sex was determined whenever possible: we were able to identify seven males and ten females. (Table S1)

Taphonomy

A biostratinomic analysis was carried out by CSG on the 337 whale remains registered during the overflight and during the vessel-based survey. The photographs were analyzed and cross-matched with the GPS data. The geomorphologic analysis was made using photographs and Google Earth (Terrametrics, 2015). The biostratinomic evaluation of the depositional state of the carcasses followed Pyenson et al. (2014) and Liebig et al. (2003). The analyzed aspects were: disarticulation degree (nine categories created in a *post hoc* analysis of the assemblage, Table 2), type of depositional locality (sand/pebble dominated beach or rocky outcrop), anatomic position of the carcass (ventral, dorsal or lateral sides up) (Table 3). Analysis of the proportion of the biostratinomic classes was performed twice, first by using the total number of whales and then by using the number of whales that could be classified to generate the proportion (%) (see Tables 2, 3). The nine categories were evaluated to indicate time since death and time of transportation at sea, which are slightly different in terms of articulation of the carcass and state of decomposition. After that they were grouped into three main stages reflecting a ñtime since deathò sequence. The classes were merged into three groups: (1ī 3) weeks to one month, (4ī 6) more than one month, (8ī 9) more than one year. Assemblages corresponding to synchronous events were also classified and fused to reflect time at sea into three groups: (1ī 4), (5ī 7) and (8ī 9). To compare the density of these assemblages with the known extinct and extant assemblages we measured linear distances of the geomorphologic formations exclusively where the assemblages were found.

Areas of the assemblages were measured and a density was calculated by dividing the number of specimens found in each area of accumulation by the area (Table 4). The average density is one third of the density calculated for Cerro Ballena (Miocene of North Chile) fossil site (3000/km^2) (Pyenson et al., 2014). This might be due to the bias of sampling along the coastline in the Penas Gulf assemblages (excluding seafloor).

Analysis of the petrotympanic complex (ear bone)

CSG extracted and studied the bones of the middle and inner ear of one whale. A volumetric computer tomography in the Morita tomograph (box of 60mm, 500 cuts) was carried out. All anatomic structures were in good condition showing no damages and the bony tissue showed no fractures (Fig. S3).

Analysis of PST/AST

Bivalve tissue sampled on April 22nd and on May 25th, 2015, respectively. Stomach content and intestine content of two whales were sampled on May 25^{th}, 2015. All samples were analyzed by DC. The tissue was homogenized using a blender and mixed in a 1:1 ratio with a field extraction fluid composed of 2.5 parts of rubbing alcohol (70%) and one part white vinegar. The mixture was then homogenised manually and filtered through a paper filter (paper filter #4). The extract obtained after filtration was then used to detect the presence of toxins through rapid field test kits from Scotia Rapid Testing for PST and AST. For this, 100 ε l of the extract was placed in a test tube containing running buffer, mixed and then 100 ε l of this mixture was placed in a lateral flow ELISA (enzyme-linked immunosorbent assay) test strip with antibodies specific for PST (saxitoxin and its derivative toxins) and AST (domoic acid). These tests were left to develop for 1 hour before the results were read.

These qualitative PST test strips are extremely sensitive due to the local toxin profile, which is high in GTX2/3, resulting in detection limits below 32 ε g STX Eq/100 g of tissue The detection limit for the AST tests was reduced to 2 ppm of domoic acid by modifying the standard sample preparation protocol by eliminating the dilution of the sample before mixing it with the buffer.

A graphical analysis of the geographic and temporal distribution of PSP events, presence of harmful microalgae and environmental variables in the affected region (43°Sī 51°S) from 2010 to July 2015 was performed with the data obtained from the red tide monitoring program conducted by the National Fisheries Service (pers. comm. Galdames RS, 2015). For this, mytilid samples are analyzed at several stations throughout Chilean Patagonia approx. once a month by the ñLaboratorios de la SEREMI de Saludò, Aysén and Magallanes.

Drift models

Surface floating objects are directly affected by surface currents, wind and waves. Wind drives both the Ekman drift of surface water (Ardhuin et al., 2009) and exerts a direct drag on the emerged surface of a floating object (Breivik et al., 2012). Stokes drift from waves, the net forward transport due to non-closed particle trajectories, also contributes to the transport of a drifting object on the surface.

MB simulated the drift of whale carcasses by parametrising the contribution of these components based on objects of a similar size from search and rescue models (Breivik et al., 2012; Peltier et al., 2012). Due to the large uncertainty in carcass drift characteristics, the parameters varied stochastically within a wide range of possible values.

The winds used were from a WRF model downscaling of NCEP NFL operational boundary conditions. Currents were from HYCOM daily 10^{th} degree and waves from ECMWF interim reanalysis. A diffusion term was included to represent sub grid scale physical processes. The resolution available in these models limits the capability to predict drift within the fjords and near shore.

Drift scenarios were run both backward in time (from the stranding locations) and forward (from likely sites of mortality). With the relatively poor resolution of the underlying current and wave models, and the steeply sloping bathymetry limiting the areas of origin, the most pertinent results are from the forward running models.

Results and Discussion:

Three-hundred and five carcasses mapped between Newman Inlet (46º39'S) and Castillo Channel (~49ºS) could be grouped into five assemblages (Figs. 1, 4, Table S1), distributed around Penas Gulf; 32 of these carcasses and 32 additional skulls were found isolated or in groups of up to five. The 28 whale carcasses that could be identified unambiguously to species level were all sei whales (*Balaenoptera borealis*); 192 could be identified as rorquals

(Balaenopteridae), similar in size range and shape to sei whales. We also found one dead pinniped. The 30 whales examined in detail were between 6 m and 15 m long, hence included both juvenile and fully grown specimens. Some carcasses were floating, but most were deposited along the shore (Fig. 2). They were tide-oriented and most were lying on their side (Table 3). None of the examined whales showed any evidence of disease or traumatic damage (Fig. S3). The analysis of locally collected mytilids in April and May and of the stomach and intestine content of two whales in May showed presence of PST and amnesic shellfish toxin (AST).

The analysis of all photographed carcasses showed that at least 89% of them could be attributed to a single event that happened during approx. four weeks between March and early April 2015 (Table 2, Fig. S4). The skeletal remains were attributed to more than one earlier event dating back to before 1977 (Table 1). The orientation and position of the carcasses indicate that the whales died at sea and the lateral position gives evidence that their tongues were very inflated by decomposition gases when they washed ashore (Table 3, Fig. S5). A drift model combining wind, current and wave model data suggests that the carcasses, excluding individual findings south of 49°S, originated from three to five different sites. The whales found in Newman and Slight Inlet (62% of the total) probably died not far from where they stranded, either in the Tres Montes Gulf, or more likely inside the inlets (see Figs. 1, 4). Modeled winds were toward the head of Newman Inlet on March 20th and during April 14th to18th but almost never were in the case of Slight Inlet (Fig. S6) Those on the west coast of Taitao Peninsula died very close to shore either locally or slightly to the north. The whales found between the southern end of Penas Gulf and 49°S either died very close to where they washed ashore or were transported from the large concentrations in Penas Gulf by clockwise flow within the gulf. The five whales between 49°S and 51°S probably died locally. The models cannot conclusively explain the accumulation of carcasses in the convoluted and extremely shallow Escondido Inlet (Fig. S7).

The presence of PST in mytilids from the area and in the whale carcasses and the absence of evidence for other causes of death leaves paralytic shellfish poisoning (PSP) as the only plausible cause of death (Table 5). A mixed assemblage of 40 skeletons from the Miocene in the north of Chile, dominated by rorqual whales and attributed to four recurrent HAB events shows many similarities to the assemblages described here (Pyenson et al., 2014). The characteristics of the MME and the repetition in the same locality are common features for HAB-mediated mortalities (Brongersma-Sanders, 1957) (see Tables 2, 4, 5). MMEs through PSP in rorquals are thus no recent phenomenon in the South East Pacific. Nevertheless, whale bone accumulations and reports of mortalities in Chilean Patagonia of up to 15 rorquals going back to at least 1977 suggest an increase in the frequency of mortalities (Table 1). Since 1972, the area between Cape Horn and Chiloé Island has shown a steady increase in the extent and frequency of HABs caused by the dinoflagellates *Alexandrium* spp. (Pizarro et al., 2011). Since the early 1990s HABs have been recorded every year in spring and autumn along the entire Patagonian coast but patterns are patchy and generally restricted to bays and fjords. The same is true the coast of the Northeast Pacific: HAB events have been increasing in strength and extension (Cook et al., 2015). A higher abundance and frequency of HABs in the Aysén Region has been correlated with the environmental and climatic changes brought by the El Niño phenomenon (Cassis et al., 2002). El Niño events have increased in frequency and strength due to global warming (Cai et al., 2014). A strong El Niño event began to build in September 2014, which has the potential to become the strongest El Niño of all time (NOAA, 2015a). Exceptionally high levels of PST, ten times higher than usual peaks, were reported in March 2015 from the closest monitoring site 120km north of the mortality area; no monitoring exists in the area itself (Fig. 5, pers. comm. Galdames RS, 2015).

PST is known to accumulate in the pelagic stage of the squat lobster *Munida gregaria* (MacKenzie & Harwood, 2014), an important prey of sei whales (Matthews, 1932). Older reports (Tabeta & Kanamura, 1970) and recent observations by boat crews (pers. comm. Pashuk KL, 2015) indicate that squat lobster abundance fluctuates strongly and can reach extremely high concentrations, especially in Tres Montes Gulf (Tabeta & Kanamura, 1970). This MME and historical data suggest that at least during ñsquat lobster yearsò the Penas Gulf area, a productive region (Fig. S1), is one of the most important feeding grounds for sei whales, hosting the largest and densest known sei whale aggregations outside the polar regions. Surveys state sei whales sightings in all seasons with up to 600 individuals, some even near to the shore of Penas Gulf (Table 6).

Rorqual whales sink shortly after death (Smith et al., 2015). Once carcasses have sunk below a depth of 50 m to 100 m, they tend not to re-float since hydrostatic pressure compresses decomposition gases (Smith et al., 2015). The bathymetry in the Penas Gulf area and off the steeply sloping Taitao Pensinsula (Fig. 6) requires that the whales that washed ashore all died near the shore. We conclude that despite common belief (Perrin et al., 2009) sei whales opportunistically feed close to shore and may even follow their prey into narrow and shallow inlets and channels. It has been calculated that less than 10% of the gray whales that are estimated to die each year in the eastern North Pacific are washed ashore, while most sink and do not resurface (Rugh et al., 1999). Assuming a similar ratio, our observations may greatly underestimate the actual magnitude of this mortality event. Many whales may have sunk and never re-surfaced, and a significant number of carcasses may have been washed ashore on the many remote beaches that could not be surveyed due to adverse weather conditions. Others may have been destroyed by wave action from winter storms on the high-energy rocky shores that dominate the area. Discoveries of dead whales in this remote area are chance finds. To clarify extent, frequency and magnitude of MMEs, an assessment and systematic monitoring of whale populations in Central Chilean Patagonia is necessary.

Since it is likely that all or most of the affected whales were sei whales, the documented mortality may represent a significant increase over the usual death rate of Southern Hemisphere sei whales (Reilly et al., 2008). If the frequency and magnitude of MMEs increase due to climate change this would have a significant impact on the local population and threaten the recovery of this endangered species, which in the Southern Hemisphere was reduced by whaling from about 100,000 to 24,000 individuals by 1980 (Perrin et al., 2009).

This MME coincided with increased mortality of baleen whales along the west coast of North America in 2015 (NOAA, 2015b), and with the most extended and longest lasting HAB event registered there (NOAA, 2015c). The events could indicate that marine mammals may be among the first oceanic megafauna victims of global warming.

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Figures

Fig. 1. Location of dead whales and skulls found in Chilean Patagonian. Boat track: green (HF24), flight track: blue (HF25) A) Golfo de Penas, B) Golfo Tres Montes, C) Seno Escondido.

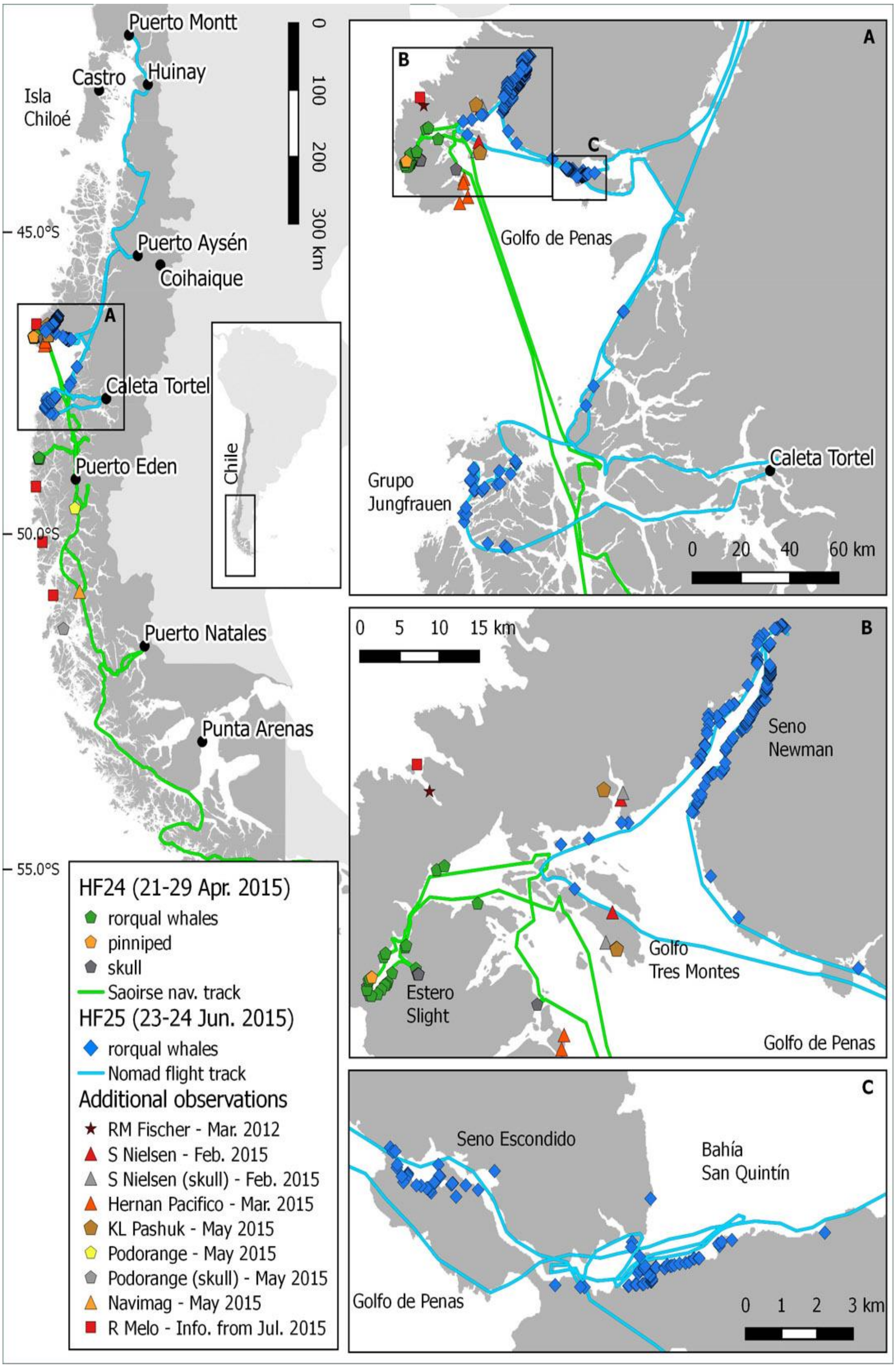


Fig. 2: Documented whale carcasses and skeletal remains during a vessel survey in April 21st 2015 in Caleta Buena, Slight Inlet. A) and B) skeletal remains C) Recently dead sei whale. Photos: Keri-Lee Pashuk**,** all rights reserved.

Fig. 3: Documented whale carcasses and skeletal remains during an overflight on June 25st 2015. The numbers correspond to the whale identification numbers in Table S1. Photos: Vreni Häussermann, all rights reserved.

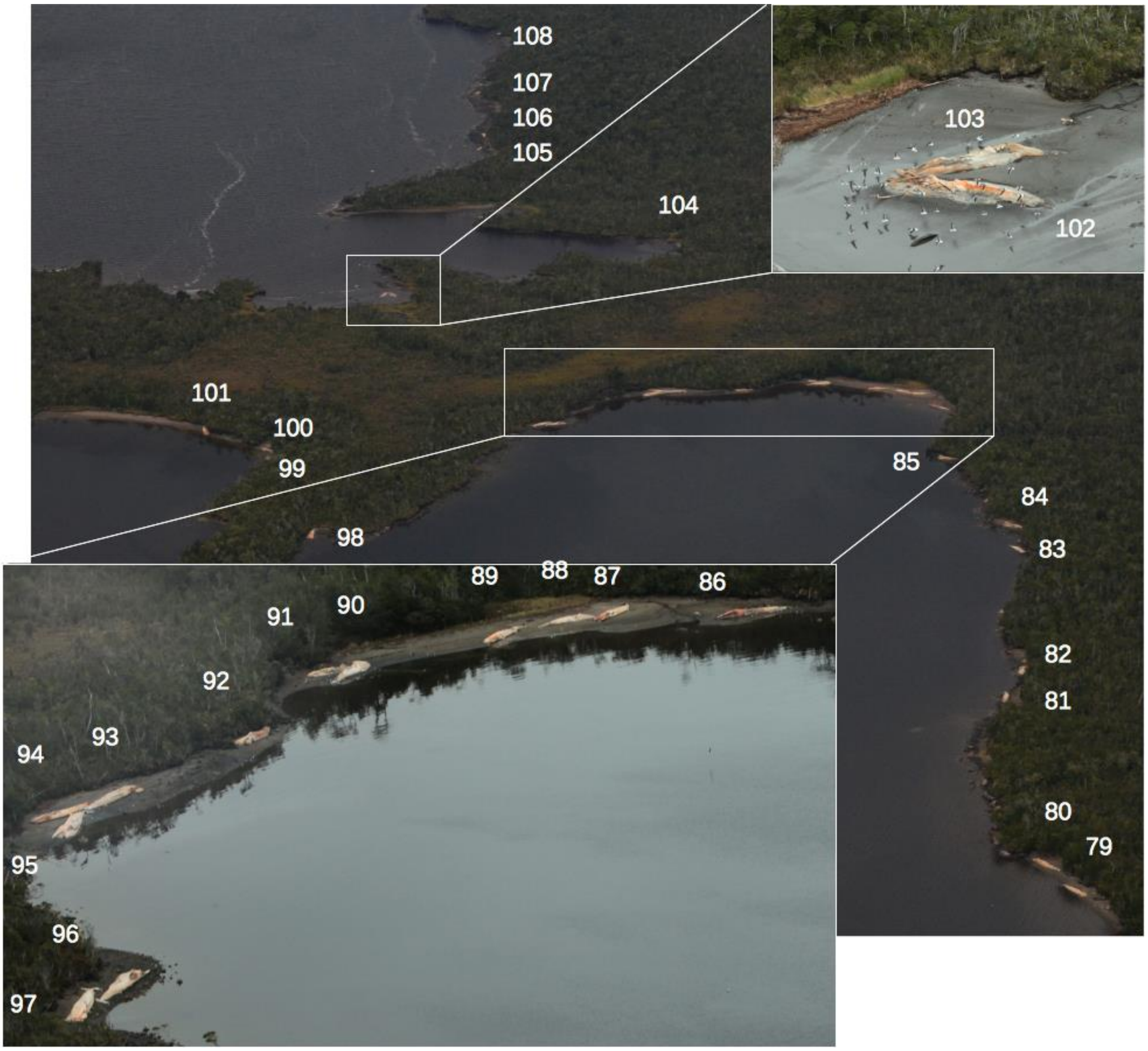


Fig. 4: Maps showing the five assemblages of whale carcasses. (A) Penas Gulf, (B) Jungfrauen Group, (C) Slight Inlet, (D) Escondido Inlet, (E) Newman Inlet. State of decomposition color-coded: light to dark yellow tones (state 1ī 4; least decomposed, all articulated), dark yellow to orange tones (state 4ī 6, intermediate), light to dark red (state 7ī 9; most decomposed).

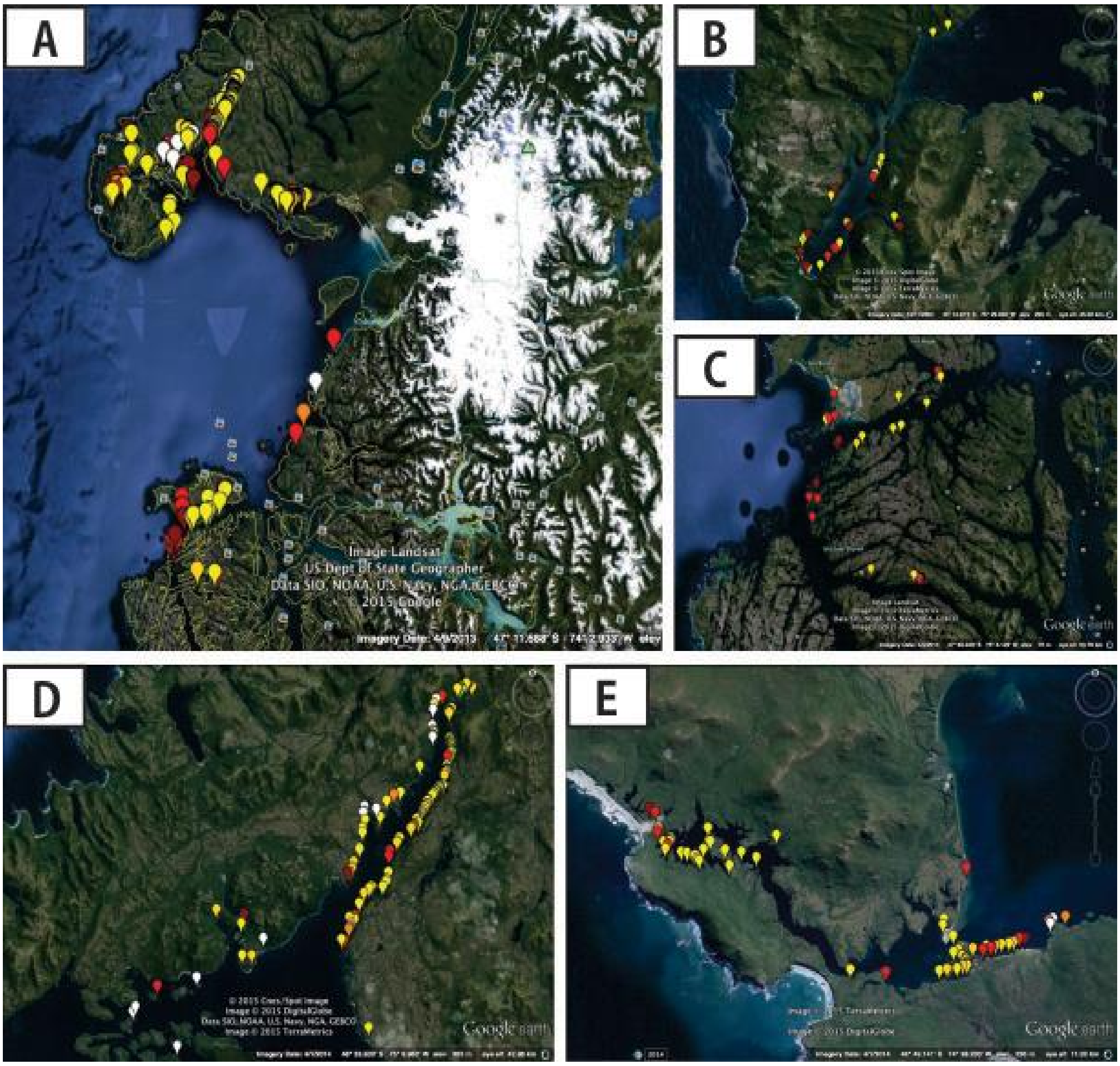


Fig. 5: Spatial distribution of PST (STX. Eq./100g tissue) as measured in mytilids and the relative abundance of *Alexandrium catenella* between 43°S and 51°S in March 2015. Insert shows the toxin level at the closest site to the Penas Gulf, Isla Canquenes (45°43´31"S; 74°06´51"W) measured between March 2010 and March 2015. Shellfish consumption is unsafe for humans if values rise above 80εg STX. Eq./100g tissue.

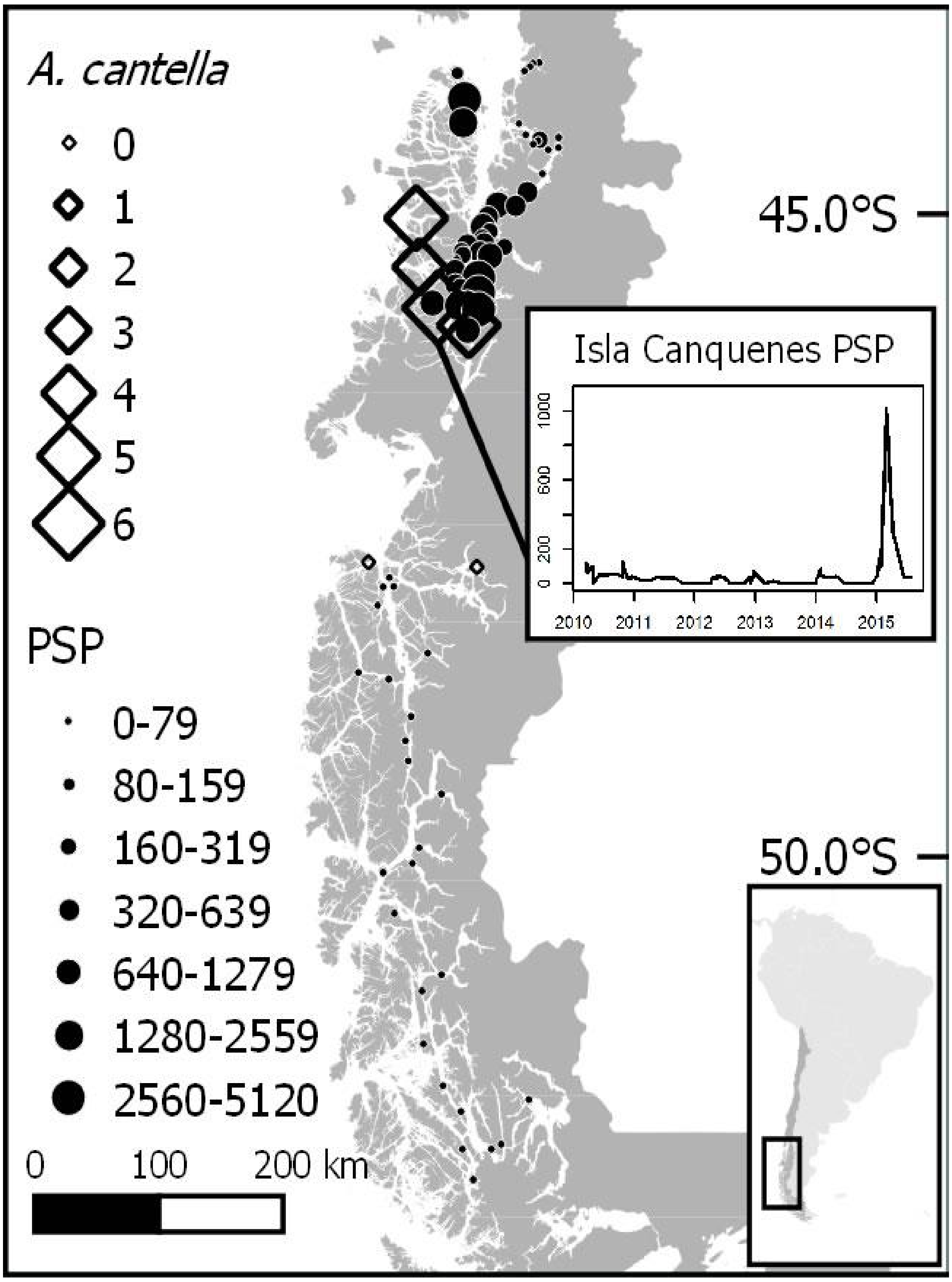
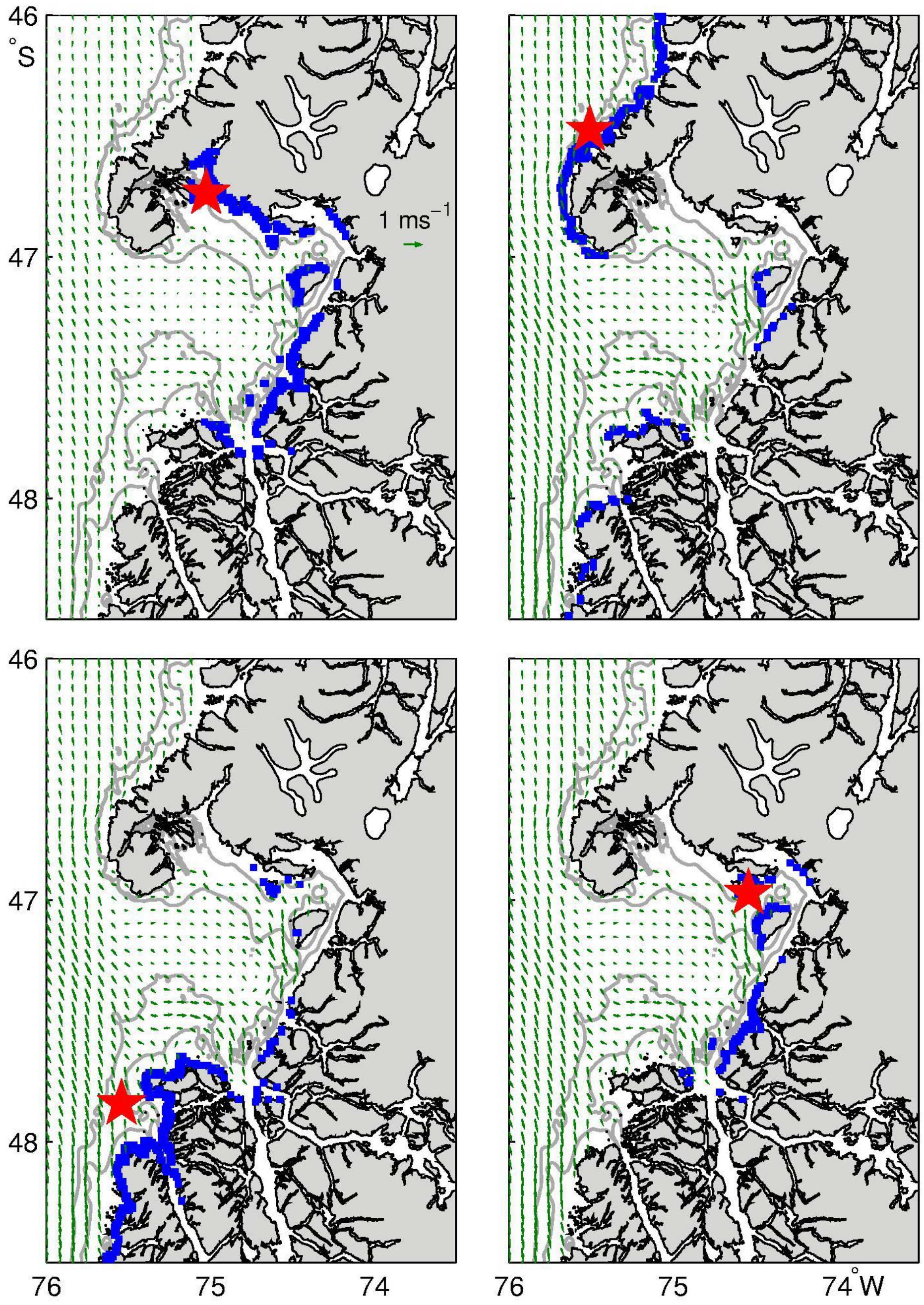


Fig. 6: Location of washed carcasses (blue) predicted by the drift model from four possible mortality locations. Mortalities during a 2-month period are simulated, from mid February to mid April 2015. Green vectors show time-averaged surface currents for this period (HYCOM model). Depth contours at 50 m and 100 m are indicated (GEBCO), although nearshore waters and inlets are not resolved.



Tables

Table 1: Recorded mass mortality events of baleen whales (updated from Table 1 in Rowntree et al. (2013))

Region/site	Time span	Species	Number	Age classes	Cause of death	Source
Caleta Buena/Slight Inlet, Southern Chile	November/December 1977	rorqual	4 fresh, numerous skeletons		unknown	Pers. Comm. Salas M, 2015
Cape Cod (USA)	5 weeks (11/1987)	humpback	14		HAB (saxitoxin)	Geraci et al., 1989
Upper Gulf of California (Mexico)	? (1995)	fin, minke and bryde[1]	8		unknown	Vidal & Gallo-Reynoso, 1996
Eastern North East Pacific	throughout 1999	gray	283[2]	mostly adults	malnutrition?	Gulland et al., 2005
Eastern North East Pacific	throughout 2000	gray	368	mostly adults	malnutrition?	Gulland et al., 2005
Upper Gulf of California (Mexico)	? (2009)	unknown	10		unknown	Rowntree et al., 2013
Australia	throughout 2009	humpback	46	mostly calves and juv.	unknown	Coughran et al., 2013
Brazil	throughout 2010	humpback	96	mostly calves and juv.	unknown	Rowntree et al., 2013
Peninsula Valdés (Argentina)	2005-2011[3]	southern right	420	mostly calves	unknown (HAB-related?, starvation?, kelp gull harassment?)	D'Agostino et al., 2015; Wilson, 2015
Puerto Edén area (Chile)	March 2011	sei and/or minke	3		unknown	this paper
Estero Cono (Chile)	March 2012	sei and/or minke	15		unknown	Pers. comm. Fischer RM, 2015
Puerto Edén area (Chile)	January 2014	sei and/or minke	5		unknown	Pers. comm. Cristie C, 2015
Between 46° and 51°S, mainly Golfo de Penas (Chile)	February to early April 2015[4]	probably all sei	305	all	HAB	this paper
Alaska/British Columbia (USA/Canada)	Mai/June 2015	fin, humpback, grey	38		unknown (HAB?)	NOAA, 2015b

[1] In total, 400 cetaceans died, including 8 baleen whales
[2] 106 in Mexico during 3 months
[3] 116 died during 2012
[4] 271 died within one month

Table 2: Minimal no. of individuals (MNI) and proportion of carcasses in each of the recorded nine classes of decomposition / disarticulation stage

	Class	MNI	Proportion (%)
Classes of decomposition	Unknown	17	5.04
	1	31	9.2
	2	72	21.36
	3	55	16.32
	4	26	7.72
	5	10	2.97
	6	18	5.34
	7	17	5.04
	8	2	.59
	9	7	2.08
	Merged	82	24.33
	Total	**377**	**100**
Merged classes	1-2	35	42.68
	1-3	15	18.29
	1-4	3	3.66
	2-3	6	7.32
	6-7	2	2.44
	8-7	21	25.61
	Total	**82**	**100**
Time of death	1-3	214	66.88
	4-6	57	17.81
	7-9	49	15.31
	Total	**320**	**100**
Time at sea	1-4	243	75.94
	5-7	47	14.69
	8-9	30	9.38
	Total	**320**	**100**

Table 3: Proportion of carcasses in each anatomical position as recorded from the overflight survey and posterior photographic analysis.

Anatomical position of Carcass	Unknown	Dorsal Up	Ventral Up	Lateral Up	Total
Count	136	2	41	158	337
Proportion (%)	40.36	0.59	12.17	46.88	100
Proportion (%) based on classified individuals only		1	20.4	78.61	100

Table 4: Density of specimens in assemblages (specimens/km²).

	Area (km²)	No. of specimens	Density (specimens/km²)
Eastern North East Pacific 1999	23.5	269	11.44
Eastern North East Pacific 2000	23.5	368	15.65
Assemblage 1 - Jungfrauen Group	0.19	30	156
Assemblage 2 - Escondido Inlet	0.02	47	1906
Assemblage 3 - Escondido Inlet	0.01	32	1987
Assemblage 4 - Newman Inlet	0.60	149	248
Assemblage 5 - Slight Inlet	0.04	40	952
Density of total area of assemblages/specimens	0.87	298	**341**
Average density at Penas Gulf assemblages	0.17	59	**1050**

Table 5: Main biostratinomic pathways and their significance in understanding the thanatocenosis.

Time since death	**Condition of the carcasses**	**Age proportions**	**Sex proportions**	**Geographic position**	**Observed**
Catastrophic ï single event	Highly homogenous. Majority within one to a few classes	Same as population rate	Same as population rate	Homogenous	Homogenous (see Supplementary Table 1)
Time averaged	Highly heterogeneous. Several classes present.	Same as proportion of annual mortality of the population.	No pattern, different from ratio of population.	Heterogeneous	Homogenous (see Supplementary Table 1)
Location of death	**Condition of the carcasses**	**Anatomic position expected**	**Anatomic position expected**	**Orientation**	**Anatomic position observed**
Authocthonous	Very well preserved, low disarticulation	Position of life: dorsal up.	Dorsal up	No trend	Dorsal up: 1.00%
Allocthonous	Disarticulation and scattering present, depending on time and distance to final deposit	Heterogeneous depending on time since death or time of drift. Majority ventral to lateral up (see Extended Data Table 2).	Ventral up ï lateral up	One main direction (current-wind) and/or two main directions (tide)	Ventral up: 20.40% Lateral Up: 78.61%

Table 6: Sei whales observed in Chilean Patagonia (whaling in Chile ended in 1976).

Region/site	No. of whales	Time span	Distance to shore (mi)	Source
Slight Inlet (~46°45'S)	3-4 daily	November/December 1977	Inside fjord	Pers. Comm. Salas M, 2015
43ī 45°S	286	25 March - 03 Apr. 1966	60ī 70	Aguayo-Lobo, 1974
39ī 41°S	345	09-20 Oct. 1966	60ī 120	Aguayo-Lobo, 1974
46ī 48°S	114	13-23 Dec. 1966	20ī 60	Aguayo-Lobo, 1974
Penas Gulf (~46°30'ī 48°S)	600	March 1966	11ī 24	Pers. comm, Pastene L, 2015
Penas Gulf (~46°30'ī 48°S)	small number	25-28 May 1971	inshore	Gilmore, 1971
53ī 55°S	large concentrations	Feb. 1994	Not mentioned	Pastene & Shimada 1999
Slight Inlet (~46°45'S)	2	July 2015	Near to shore	Pers. Comm, Cabezas J, 2015

Supplementary material:

Figures

Fig. S1: Satellite image (MODIS Aqua) showing the concentration of chlorophyll a on March 23rd, 2015. Areas where most whales were found are circled.

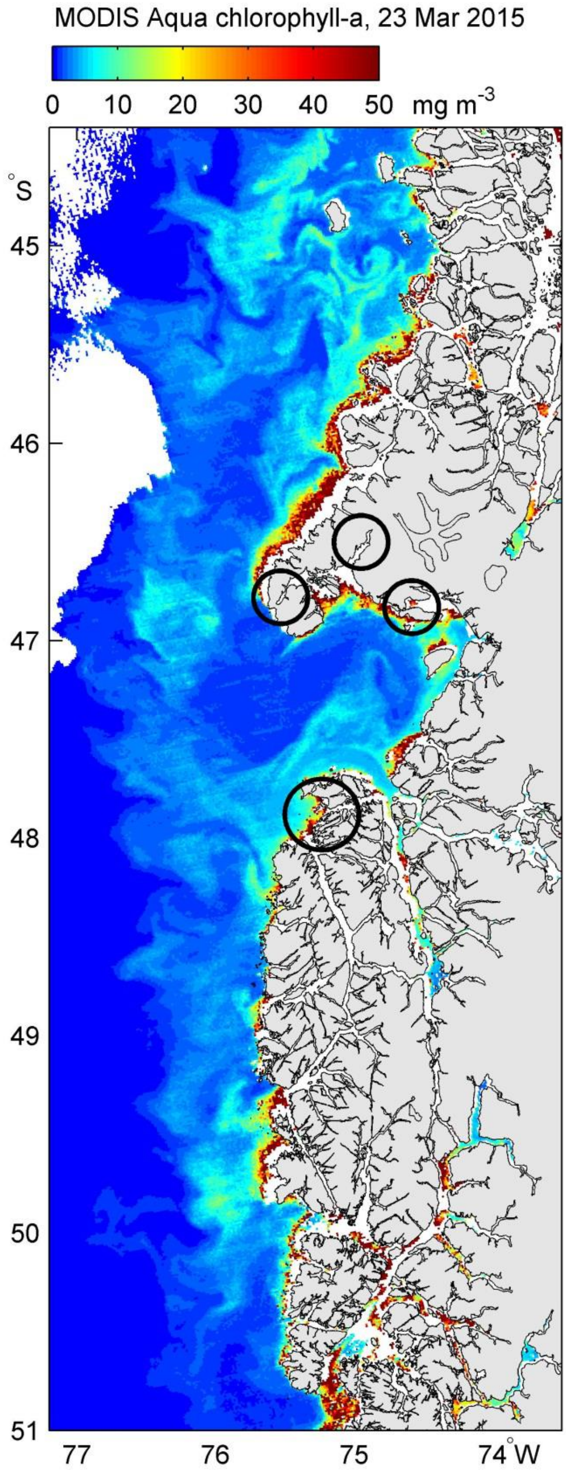


Fig. S2: Cumulative alongshore component of near-shore wind stress (red) from three latitudes, with an origin time of the vernal equinox, September 21, 2014. Stress has been calculated according to Large & Pond (1981) using ECMWF ERA-Interim reanalysis winds (Dee et al. 2011). A negative stress

represents poleward, downwelling-favorable winds, so an upward (or downward) trend represents net upwelling (or downwelling). Gray shading shows the envelope of variability experienced during 1995ī 2014, with darker shading indicating one standard deviation from the mean for this period. Vertical lines show the timing of vessel (green) and aerial (blue) observations of whale carcasses.

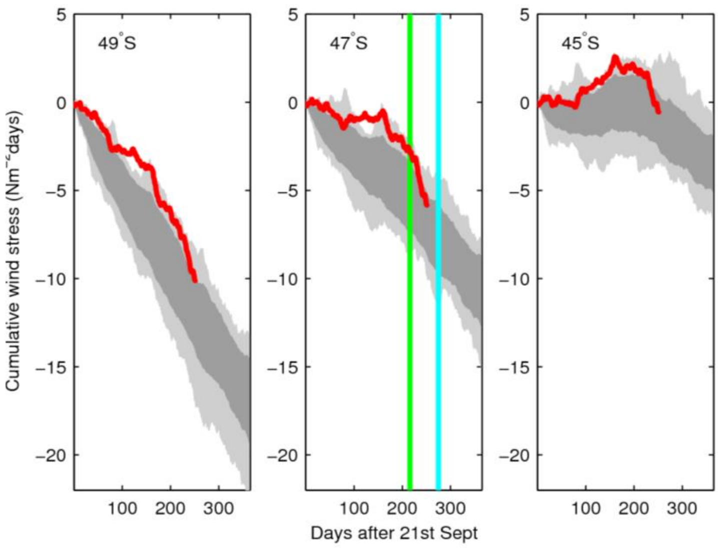


Fig. S3: Digital images obtained through computed volumetric tomography (CVT) scanned at Morita Tomography (box of 60 mm, 500 slices). All acoustic anatomical structures of the middle ear (ossicles: stapes), internal ear (cochlea: spiral lamina) and the semicircular canals are seen in perfect condition.

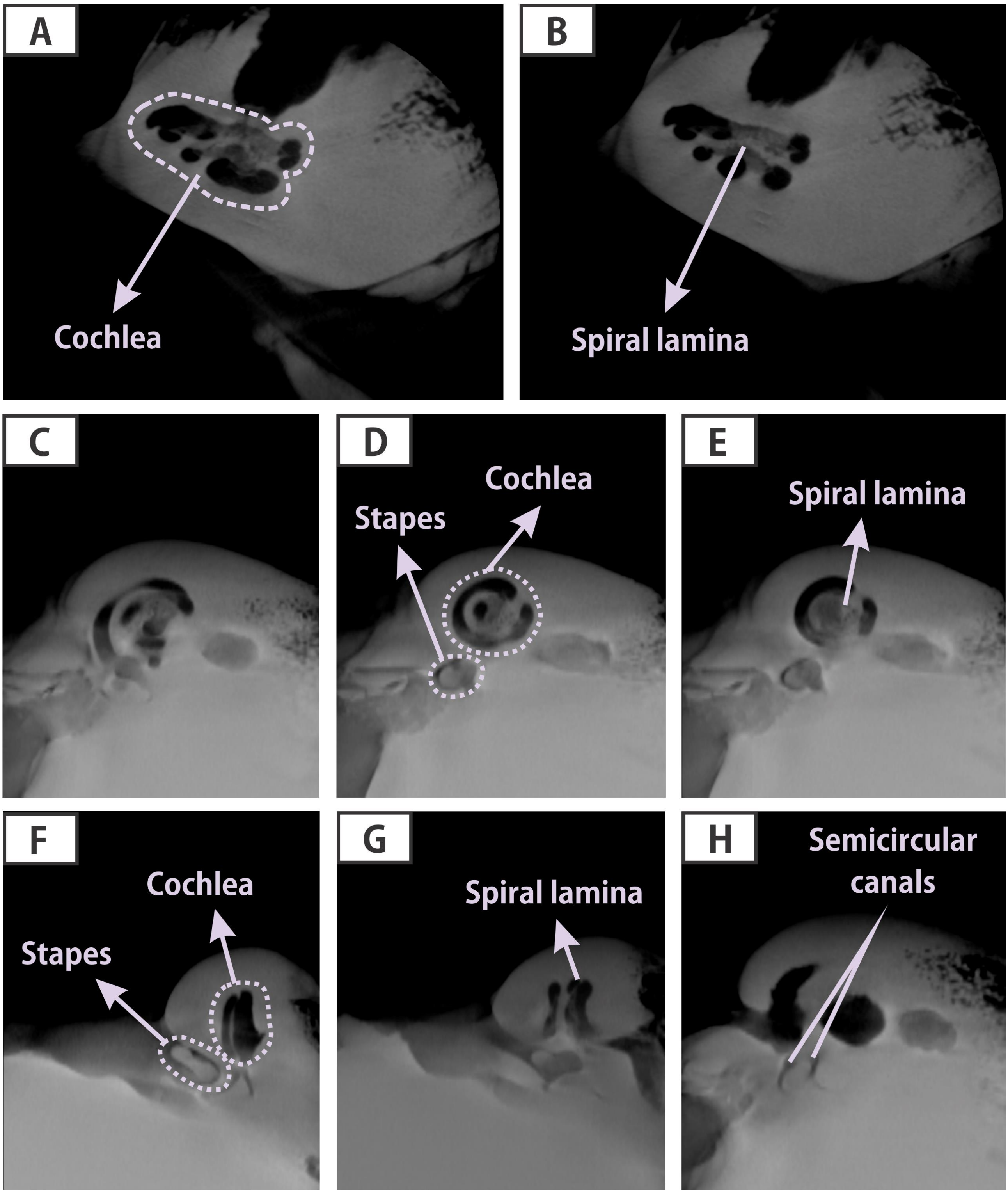


Fig. S4: Taphonomic classification of the dead whales found at Penas Gulf, southern Chile. The classes correspond to nine categories of decomposition/desarcitulation of carcasses/skeletal remains created to represent the totality of the taphonomic stages observed. A) State 1, complete carcass with skin, B) State 2, complete carcass without skin, C) State 3, complete carcass with exposed bones, D) State 4, complete articulated skeleton with highly decomposed tissue, E) State 5, carcass without skull, F) State 6, tissue and scattered skeletal elements, ñbag of bonesò (*42*), G) tissue only, mainly floating, H) skeletal remains, skull and articulated skeletons with skulls, I) Skeletal remains, without skull.

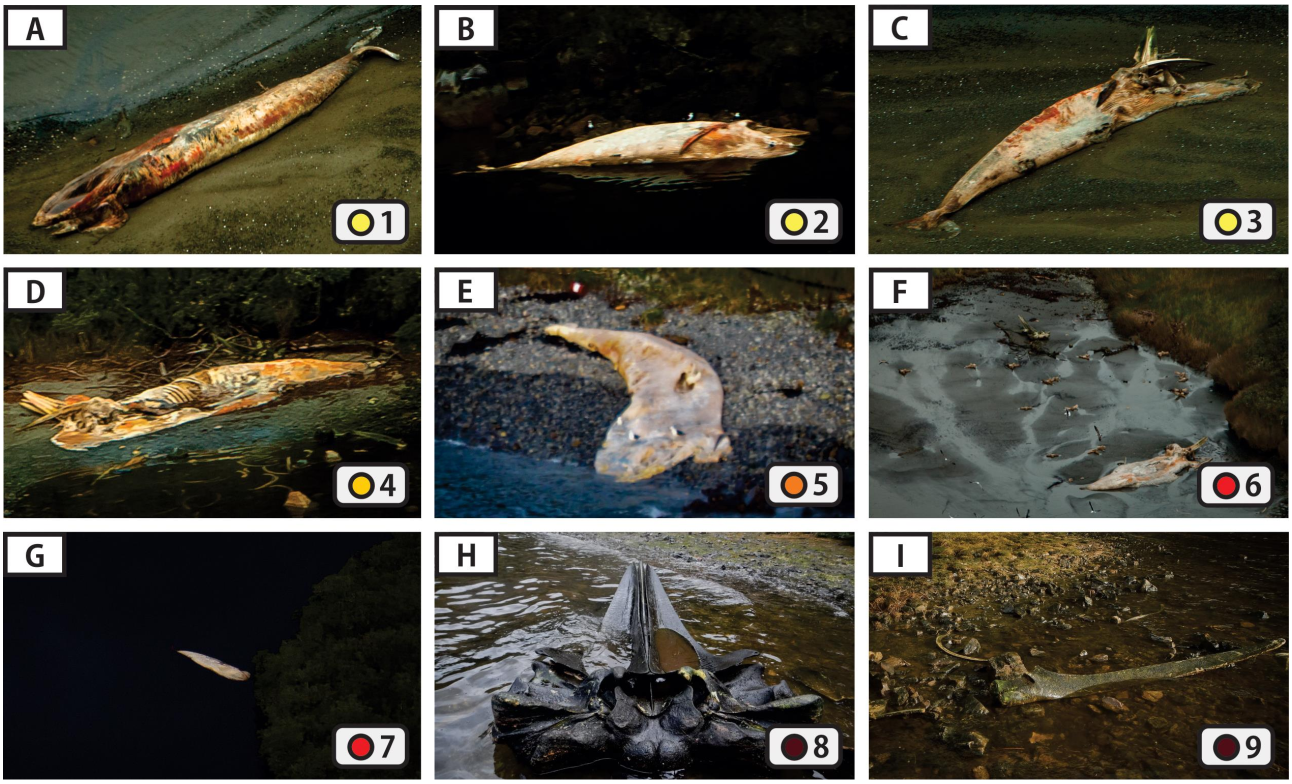


Fig. S5: Inflation of the tongue and its implication for whale carcass deposition. The greater proportion of carcasses deposited in lateral position and in lesser degree with ventral-up position reflects the hydrodynamics of the body in the sea as determined by the inflation of the abdominal region (*9*) and mainly of their tongues. A) inflated tongue in a very recently dead sei whale (weeks) indicated by the arrow head. B) Close-up of the mouth with dislocate mandibles due to the previous inflation of the tongue (arrow head), which is decayed and removed by scavengers. C) Whale carcass seen from the overflight deposited in lateral position and its protuberant inflated tongue (arrow head).

Fig. S6: Wind roses at the entrance to two inlets, Newman Inlet (A) and Slight Inlet (B), derived from a local high-resolution implementation of the WRF model. Spoke lengths indicate the frequency of occurrence of winds from each direction. Colors represent speed. Newman Inlet has a significant up-inlet component (winds from SSW) but Slight Inlet does not (winds from NNE).

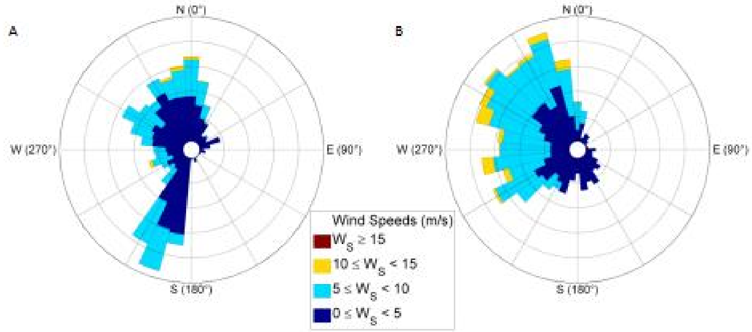
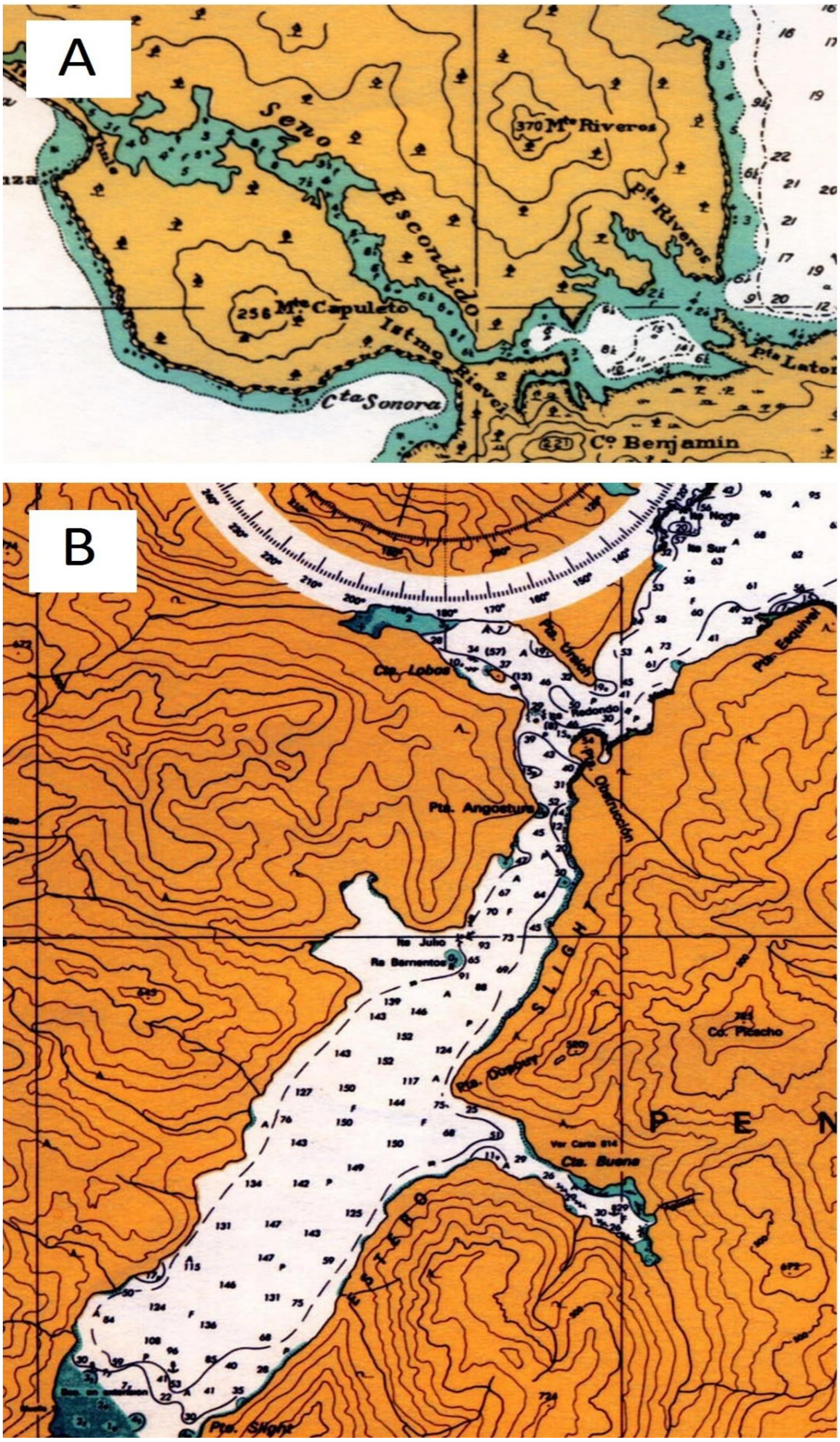


Fig. S7: Nautical maps of Escondido and Slight Inlet. A) Section of the Bahia San Quintin showing Escondido Inlet (maximum depth 15m). B) Section of Hoppner Bay showing Slight Inlet (maximum depth 152m). Sources: Map nr 8820 and 8810 from armada de Chile. Newman Inlet is poorly charted with only five depths indicated along the inlet, the largest being 82m.



Tables:

Table S1: List of whale carcasses, their degree of decomposition/disarticulation, location and date of finding.

Supplementary Table 1:

HF24 Expedition

Date	Locality	Whale ID	Latitude	Longitude	State of decomposition	Carcass position	Beach type	Species	Sex
21-Apr-2015	West of Isla Centro	1	46º 43.158' S	75º 22.09' W	1	Lateral up	Rocky	*Balaenoptera borealis*	
21-Apr-2015	West of Isla Centro	2	46º 43.069' S	75º 22.553' W	1	Lateral up	Rocky	*Balaenoptera borealis*	M
21-Apr-2015	West of Isla Centro	3	46º 43.095' S	75º 22.759' W	1	Lateral up	Rocky	*Balaenoptera borealis*	
21-Apr-2015	West of Isla Centro	4	46º 43.561' S	75º 26.079' W	2	Unknown	Rocky	Balaenopteridae	
21-Apr-2015	Caleta Buena	5	46º 46.92' S	75º 30.057' W	1	Ventral up	Floating	*Balaenoptera borealis*	F
21-Apr-2015	Caleta Buena	6	46º 47.25' S	75º 29.872' W	1	Lateral up	Floating	*Balaenoptera borealis*	M
21-Apr-2015	Caleta Buena	7	46º 47.248' S	75º 29.876' W	8 - 9	Ventral up	Floating		
21-Apr-2015	Caleta Buena	8	46º 47.275' S	75º 29.837' W	1	Lateral up	Rocky	*Balaenoptera borealis*	M

21-Apr-2015	Caleta Buena	9	46º 47.268' S	75º 29.82' W	1 - 4	Lateral up	Rocky	*Balaenoptera borealis*	
21-Apr-2015	Caleta Buena	10	46º 47.264' S	75º 29.807' W	1	Lateral up	Rocky	*Balaenoptera borealis*	F
21-Apr-2015	Caleta Buena	11	46º 47.261' S	75º 29.798' W	1	Lateral up	Rocky	*Balaenoptera borealis*	F
21-Apr-2015	Caleta Buena	12	46º 47.253' S	75º 29.789' W	1	Lateral up	Rocky	*Balaenoptera borealis*	M
21-Apr-2015	Caleta Buena	13	46º 47.249' S	75º 29.787' W	8 - 9	Ventral up	Rocky		
21-Apr-2015	Caleta Buena	14	46º 47.258' S	75º 29.8' W	8	Ventral up	Floating		
21-Apr-2015	Caleta Buena	15	46º 47.261' S	75º 29.812' W	8 - 9	Ventral up	Floating		
22-Apr-2015	Estero Slight	16	46º 47.135' S	75º 32.269' W	4	Lateral up	Rocky	*Balaenoptera borealis*	
22-Apr-2015	Estero Slight	17	46º 47.214' S	75º 34.332' W	8 - 9	Ventral up	Rocky		
22-Apr-2015	Estero Slight	18	46º 47.817' S	75º 32.788' W	1 - 3	Lateral up	Rocky	*Balaenoptera borealis*	F
22-Apr-2015	Estero Slight	19	46º 47.951' S	75º 32.973' W	6	Unknown	Floating	*Balaenoptera borealis*	

22-Apr-2015	Estero Slight	20	46º 48.023' S	75º 33.055' W	6	Unknown	Rocky	*Balaenoptera borealis*	
22-Apr-2015	Estero Slight	21	46º 48.264' S	75º 33.425' W	6	Ventral up	Rocky	*Balaenoptera borealis*	F
22-Apr-2015	Estero Slight	22	46º 48.51' S	75º 33.909' W	1	Lateral up	Rocky	*Balaenoptera borealis*	F
22-Apr-2015	Estero Slight	23	46º 48.508' S	75º 33.914' W	1	Lateral up	Rocky	*Balaenoptera borealis*	M
22-Apr-2015	Estero Slight	24	46º 48.515' S	75º 34.668' W	1	Lateral up	Sandy	Balaenopteridae	
22-Apr-2015	Estero Slight	25	46º 48.511' S	75º 34.684' W	8	Dorsal up	Sandy	*Balaenoptera borealis*	F
22-Apr-2015	Estero Slight	26	46º 48.206' S	75º 34.905' W	8 - 9	Ventral up	Rocky		
22-Apr-2015	Estero Slight	27	46º 48.204' S	75º 34.909' W	2	Lateral up	Rocky	*Balaenoptera borealis*	
22-Apr-2015	Estero Slight	28	46º 48.09' S	75º 34.9' W	8 - 9	Ventral up	Rocky		
22-Apr-2015	Estero Slight	29	46º 48.01' S	75º 34.909' W	8 - 9	Lateral up	Rocky		
22-Apr-2015	Estero Slight	30	46º 48.008' S	75º 34.902' W	8 - 9	Lateral up	Rocky		

22-Apr-2015	Estero Slight	31	46º 47.919' S	75º 34.86' W	3	Lateral up	Floating	*Balaenoptera borealis*	F
22-Apr-2015	Estero Slight	32	46º 47.642' S	75º 34.753' W	3	Lateral up	Rocky	Balaenopteridae	
22-Apr-2015	Estero Slight	33	46º 47.538' S	75º 34.651' W	3	Lateral up	Rocky	Balaenopteridae	
22-Apr-2015	Estero Slight	34	46º 47.442' S	75º 34.463' W	8 - 9	Lateral up	Rocky		
22-Apr-2015	Estero Slight	35	46º 46.173' S	75º 33.247' W	1 - 2	Ventral up	Rocky	*Balaenoptera borealis*	M
22-Apr-2015	Estero Slight	36	48º 46.016' S	75º 33.071' W	8 - 9	Ventral up	Rocky		
22-Apr-2015	Estero Slight/ Baja Julio	37	48º 45.626' S	75º 31.102' W	6	Unknown	Floating		
22-Apr-2015	Estero Slight/ Baja Julio	38	48º 45.506' S	75º 30.935' W	1	Lateral up	Rocky	Balaenopteridae	
22-Apr-2015	Estero Slight/ Baja Julio	39	46º 45.205' S	75º 30.75' W	2	Lateral up	Rocky	*Balaenoptera borealis*	
22-Apr-2015	Estero Slight/ Baja Julio	40	46º 45.008' S	75º 30.674' W	1	Lateral up	Rocky	*Balaenoptera borealis*	
22-Apr-2015	Islote Amarillo	41	46º 40.967' S	75º 27.983' W	2	Lateral up	Rocky	Balaenopteridae	

22-Apr-2015	Islote Amarillo	42	46º 40.722' S	75º 27.21' W	2	Lateral up	Rocky	Balaenopteridae	
22-Apr-2015	Isla Esmeralda	43	48º 48.08' S	75º 24.29' W	Unknown	Unknown	Unknown		
22-Apr-2015	Isla Hyatt	44	48º 47.95' S	75º 26.5' W	Unknown	Unknown	Unknown		
22-Apr-2015	Isla Hyatt	45	48º 47.3' S	75º 26.13' W	Unknown	Unknown	Unknown		
22-Apr-2015	Isla Hyatt	46	48º 47.26' S	75º 26.01' W	Unknown	Unknown	Unknown		
22-Apr-2015	Isla Hyatt	47	48º 47.19' S	75º 25.91' W	Unknown	Unknown	Unknown		

HF25 Expedition

Date	Locality	Whale ID	Latitude	Longitude	State of decomposition	Carcass position	Beach type	Species	Sex
23-Jun-2015	Jungfrauen Group	48	47º 32.29' S	74º 32.484' W	5	Dorsal up	Rocky		
23-Jun-2015	Jungfrauen Group	49	47º 36.16' S	74º 34.997' W	7	Unknown	Floating		

24-Jun-2015	Jungfrauen Group	50	48º 3.874' S	75º 1.788' W	1	Unknown	Floating	Balaenopteridae
24-Jun-2015	Jungfrauen Group	51	48º 3.875' S	75º 1.791' W	1	Unknown	Floating	Balaenopteridae
24-Jun-2015	Jungfrauen Group	52	48º 4.209' S	75º 1.052' W	7	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	53	48º 3.361' S	75º 7.514' W	4	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	54	47º 59.048' S	75º 15.302' W	6	Lateral up	Rocky	
24-Jun-2015	Jungfrauen Group	55	47º 57.402' S	75º 15.671' W	6	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	56	47º 57.554' S	75º 14.56' W	7	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	57	47º 56.28' S	75º 14.706' W	9	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	58	47º 51.025' S	75º 13.345' W	1 - 3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Jungfrauen Group	59	47º 50.923' S	75º 12.912' W	6	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	60	47º 50.701' S	75º 12.218' W	6	Ventral up	Rocky	

24-Jun-2015	Jungfrauen Group	61	47º 50.799' S	75º 13.279' W	6	Ventral up	Rocky	
24-Jun-2015	Jungfrauen Group	62	47º 48.885' S	75º 12.317' W	6	Unknown	Sandy	
24-Jun-2015	Jungfrauen Group	63	47º 48.598' S	75º 12.183' W	1	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Jungfrauen Group	64	47º 52.994' S	75º 11.915' W	9	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	65	47º 52.766' S	75º 11.704' W	9	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	66	47º 53.019' S	75º 9.343' W	5	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	67	47º 53.004' S	75º 9.316' W	5	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	68	47º 52.409' S	75º 8.578' W	2	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Jungfrauen Group	69	47º 51.775' S	75º 4.472' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Jungfrauen Group	70	47º 51.527' S	75º 3.374' W	2	Unknown	Rocky	Balaenopteridae
24-Jun-2015	Jungfrauen Group	71	47º 49.123' S	75º 3.696' W	3	Ventral up	Rocky	Balaenopteridae

24-Jun-2015	Jungfrauen Group	72	47º 49.698' S	75º 59.956' W	3	Unknown	Rocky	Balaenopteridae
24-Jun-2015	Jungfrauen Group	73	47º 47.558' S	74º 58.11' W	1	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Jungfrauen Group	74	47º 47.474' S	74º 58.107' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Jungfrauen Group	75	47º 47.089' S	74º 58.445' W	7	Unknown	Rocky	
24-Jun-2015	Jungfrauen Group	76	47º 17.614' S	74º 22.75' W	7	Unknown	Sandy	
24-Jun-2015	Jungfrauen Group	77	47º 17.454' S	74º 22.494' W	7	Unknown	Sandy	
24-Jun-2015	San Quintin Bay I	78	46º 50.51' S	74º 37.41' W	6	Unknown	Sandy	
24-Jun-2015	San Quintin Bay I	79	46º 49.324' S	74º 35.952' W	7	Unknown	Sandy	
24-Jun-2015	San Quintin Bay I	80	46º 49.905' S	74º 36.359' W	3	Lateral up	Sandy	*Balaenoptera borealis*
24-Jun-2015	San Quintin Bay I	81	46º 49.973' S	74º 36.381' W	1	Lateral up	Sandy	*Balaenoptera borealis*
24-Jun-2015	San Quintin Bay I	82	46º 50.495' S	74º 36.442' W	3	Lateral up	Rocky	Balaenopteridae

24-Jun-2015	San Quintin Bay I	83	46º 50.488' S	74º 36.428' W	1 - 3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	84	46º 50.476' S	74º 36.304' W	4	Ventral up	Sandy - Rocky	
24-Jun-2015	San Quintin Bay I	85	46º 50.474' S	74º 36.288' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	86	46º 50.476' S	74º 36.262' W	4	Ventral up	Sandy - Rocky	
24-Jun-2015	San Quintin Bay I	87	46º 50.47' S	74º 36.128' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	88	46º 50.467' S	74º 36.104' W	4	Lateral up	Rocky	
24-Jun-2015	San Quintin Bay I	89	46º 50.444' S	74º 36.02' W	4	Lateral up	Sandy - Rocky	
24-Jun-2015	San Quintin Bay I	90	46º 50.437' S	74º 35.943' W	1	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay I	91	46º 50.431' S	74º 35.931' W	1	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay I	92	46º 50.428' S	74º 35.925' W	1 - 2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay I	93	46º 50.422' S	74º 35.926' W	2	Lateral up	Sandy	Balaenopteridae

24-Jun-2015	San Quintin Bay I	94	46º 50.405' S	74º 35.924' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay I	95	46º 50.404' S	74º 35.921' W	4	Lateral up	Sandy	
24-Jun-2015	San Quintin Bay I	96	46º 50.371' S	74º 35.951' W	4	Lateral up	Sandy	
24-Jun-2015	San Quintin Bay I	97	46º 50.357' S	74º 35.96' W	1 - 2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay I	98	46º 50.355' S	74º 35.957' W	1	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay I	99	46º 50.353' S	74º 35.96' W	1 - 3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay I	100	46º 50.326' S	74º 36.22' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	101	46º 50.322' S	74º 36.024' W	3	Ventral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	102	46º 50.285' S	74º 36.188' W	3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay I	103	46º 50.256' S	74º 36.102' W	4	Unknown	Rocky	
24-Jun-2015	San Quintin Bay I	104	46º 50.254' S	74º 36.094' W	4	Unknown	Rocky	

24-Jun-2015	San Quintin Bay I	105	46º 50.23' S	74º 36.073' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	106	46º 50.1' S	74º 36.194' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	107	46º 50.243' S	74º 35.836' W	4	Ventral up	Sandy	
24-Jun-2015	San Quintin Bay I	108	46º 50.247' S	74º 35.834' W	6	Ventral up	Sandy	
24-Jun-2015	San Quintin Bay I	109	46º 50.251' S	74º 35.652' W	6	Ventral up	Sandy	
24-Jun-2015	San Quintin Bay I	110	46º 50.258' S	74º 35.639' W	8 - 9	Ventral up	Sandy	
24-Jun-2015	San Quintin Bay I	111	46º 50.212' S	74º 35.585' W	1 - 3	Ventral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	112	46º 50.229' S	74º 35.513' W	6	Lateral up	Sandy - Rocky	
24-Jun-2015	San Quintin Bay I	113	46º 50.222' S	74º 35.483' W	6	Unknown	Rocky	
24-Jun-2015	San Quintin Bay I	114	46º 50.214' S	74º 35.429' W	3	Ventral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	115	46º 50.195' S	74º 35.315' W	1 - 4	Ventral up	Rocky	

24-Jun-2015	San Quintin Bay I	116	46º 50.184' S	74º 35.18' W	3	Ventral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay I	117	46º 50.172' S	74º 35.1' W	4	Ventral up	Rocky	
24-Jun-2015	San Quintin Bay I	118	46º 50.126' S	74º 34.995' W	6	Unknown	Sandy - Rocky	
24-Jun-2015	San Quintin Bay I	119	46º 50.122' S	74º 34.894' W	9	Unknown	Sandy - Rocky	
24-Jun-2015	San Quintin Bay I	120	46º 49.958' S	74º 34.433' W	Unknown	Unknown	Rocky	
24-Jun-2015	San Quintin Bay I	121	46º 49.928' S	74º 34.459' W	5	Unknown	Rocky	
24-Jun-2015	San Quintin Bay I	122	46º 49.902' S	74º 34.385' W	Unknown	Unknown	Rocky	
24-Jun-2015	San Quintin Bay I	123	46º 49.879' S	74º 34.158' W	5	Ventral up	Sandy - Rocky	
24-Jun-2015	San Quintin Bay I	124	46º 50.482' S	74º 38.058' W	1 - 2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	125	46º 48.956' S	74º 39.394' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay II	126	46º 49.207' S	74º 39.756' W	1	Lateral up	Sandy	Balaenopteridae

24-Jun-2015	San Quintin Bay II	127	46º 49.145' S	74º 40.03' W	1 - 3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay II	128	46º 49.299' S	74º 40.244' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	129	46º 49.136' S	74º 40.346' W	1 - 3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay II	130	46º 49.134' S	74º 40.346' W	1 - 3	Ventral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay II	131	46º 49.117' S	74º 40.317' W	1 - 3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay II	132	46º 49.12' S	74º 40.324' W	1 - 3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay II	133	46º 48.872' S	74º 40.634' W	2	Unknown	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	134	46º 49.026' S	74º 40.594' W	1 - 2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	135	46º 49.017' S	74º 40.617' W	1 - 3	Unknown	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	136	46º 49.111' S	74º 40.713' W	1 - 3	Ventral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	137	46º 49.109' S	74º 40.727' W	2	Lateral up	Rocky	Balaenopteridae

24-Jun-2015	San Quintin Bay II	138	46º 49.243' S	74º 40.792' W	1 - 2	Unknown	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	139	46º 49.218' S	74º 40.821' W	2	Unknown	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	140	46º 49.182' S	74º 40.863' W	2	Unknown	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	141	46º 49.185' S	74º 40.893' W	1 - 2	Unknown	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	142	46º 49.155' S	74º 41.014' W	1 - 3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	143	46º 49.146' S	74º 41.118' W	1 - 2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	144	46º 48.985' S	74º 41.307' W	1 - 3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	145	46º 49.003' S	74º 41.312' W	1 - 3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	146	46º 49.008' S	74º 41.313' W	1	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	147	46º 49.028' S	74º 41.327' W	1	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	148	46º 49.061' S	74º 41.359' W	6 - 7	Unknown	Rocky	

24-Jun-2015	San Quintin Bay II	149	46º 49.104' S	74º 41.404' W	2	Unknown	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	150	46º 49.027' S	74º 41.441' W	3	Unknown	Rocky	Balaenopteridae
24-Jun-2015	San Quintin Bay II	151	46º 48.909' S	74º 41.55' W	7	Unknown	Floating	
24-Jun-2015	San Quintin Bay II	152	46º 48.87' S	74º 41.539' W	2	Unknown	Floating	Balaenopteridae
24-Jun-2015	San Quintin Bay II	153	46º 48.64' S	74º 41.697' W	9	Unknown	Sandy	
24-Jun-2015	San Quintin Bay II	154	46º 48.691' S	74º 41.584' W	7	Unknown	Sandy	
24-Jun-2015	San Quintin Bay II	155	46º 46.879' S	74º 46.086' W	1	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	San Quintin Bay II	156	46º 49.78' S	74º 32.109' W	4	Unknown	Rocky	
24-Jun-2015	Seno Newman	157	46º 43.813' S	74º 57.964' W	7	Unknown	Sandy	
24-Jun-2015	Seno Newman	158	46º 41.327' S	75º 0.753' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	159	46º 37.458' S	75º 2.434' W	7	Unknown	Sandy - Rocky	

24-Jun-2015	Seno Newman	160	46º 37.415' S	75º 2.637' W	2	Unknown	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	161	46º 37.415' S	75º 2.635' W	4	Unknown	Sandy - Rocky	
24-Jun-2015	Seno Newman	162	46º 36.941' S	75º 2.113' W	5	Unknown	Sandy	
24-Jun-2015	Seno Newman	163	46º 36.918' S	75º 2.082' W	3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	164	46º 36.854' S	75º 2.004' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	165	46º 36.756' S	75º 1.976' W	Unknown	Unknown	Rocky	
24-Jun-2015	Seno Newman	166	46º 36.539' S	75º 1.71' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	167	46º 36.441' S	75º 2.075' W	1 - 4	Ventral up	Sandy	
24-Jun-2015	Seno Newman	168	46º 36.369' S	75º 1.672' W	7	Unknown	Floating	
24-Jun-2015	Seno Newman	169	46º 35.82' S	75º 1.375' W	3	Ventral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	170	46º 35.377' S	75º 1.041' W	4	Ventral up	Rocky	

24-Jun-2015	Seno Newman	171	46º 35.161' S	75º 0.66' W	3	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	172	46º 35.087' S	75º 0.513' W	3	Unknown	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	173	46º 35.089' S	75º 0.49' W	4	Unknown	Sandy	
24-Jun-2015	Seno Newman	174	46º 35.083' S	75º 0.42' W	2	Unknown	Floating	Balaenopteridae
24-Jun-2015	Seno Newman	175	46º 35.085' S	74º 59.71' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	176	46º 34.88' S	74º 59.475' W	3	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	177	46º 34.794' S	74º 59.426' W	3	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	178	46º 34.449' S	74º 59.313' W	3	Unknown	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	179	46º 33.721' S	74º 59.271' W	6	Ventral up	Sandy	
24-Jun-2015	Seno Newman	180	46º 33.501' S	74º 59.192' W	7	Unknown	Sandy - Rocky	
24-Jun-2015	Seno Newman	181	46º 33.125' S	74º 58.681' W	4	Unknown	Rocky	

24-Jun-2015	Seno Newman	182	46º 33.12' S	74º 58.674' W	6 - 7	Unknown	Rocky	
24-Jun-2015	Seno Newman	183	46º 32.939' S	74º 58.52' W	3	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	184	46º 32.521' S	74º 57.707' W	4	Unknown	Rocky	
24-Jun-2015	Seno Newman	185	46º 32.473' S	74º 57.635' W	4	Unknown	Rocky	
24-Jun-2015	Seno Newman	186	46º 32.424' S	74º 57.582' W	5	Unknown	Rocky	
24-Jun-2015	Seno Newman	187	46º 32.388' S	74º 57.532' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	188	46º 32.346' S	74º 57.469' W	3	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	189	46º 32.348' S	74º 57.469' W	3	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	190	46º 32.267' S	74º 57.188' W	3	Ventral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	191	46º 32.096' S	74º 57.303' W	4	Unknown	Sandy	
24-Jun-2015	Seno Newman	192	46º 32.07' S	74º 57.254' W	1	Lateral up	Sandy - Rocky	Balaenopteridae

24-Jun-2015	Seno Newman	193	46º 32.068' S	74º 57.247' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	194	46º 32.027' S	74º 57.153' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	195	46º 31.998' S	74º 57.106' W	1 - 2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	196	46º 31.919' S	74º 57.006' W	1 - 2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	197	46º 31.852' S	74º 56.936' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	198	46º 31.829' S	74º 56.922' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	199	46º 31.721' S	74º 56.839' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	200	46º 31.592' S	74º 56.733' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	201	46º 31.461' S	74º 56.568' W	5	Lateral up	Sandy	
24-Jun-2015	Seno Newman	202	46º 31.311' S	74º 56.537' W	3	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	203	46º 31.304' S	74º 56.525' W	3	Lateral up	Sandy - Rocky	Balaenopteridae

24-Jun-2015	Seno Newman	204	46º 31.265' S	74º 56.489' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	205	46º 31.055' S	74º 56.197' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	206	46º 30.974' S	74º 56.093' W	3	Ventral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	207	46º 30.948' S	74º 56.065' W	4	Lateral up	Sandy - Rocky	
24-Jun-2015	Seno Newman	208	46º 30.866' S	74º 55.959' W	3	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	209	46º 30.859' S	74º 55.953' W	3	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	210	46º 30.824' S	74º 55.907' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	211	46º 30.757' S	74º 55.817' W	3	Ventral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	212	46º 30.702' S	74º 55.734' W	2	Ventral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	213	46º 30.709' S	74º 55.689' W	1 - 2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	214	46º 30.707' S	74º 55.674' W	1 - 2	Lateral up	Sandy	Balaenopteridae

24-Jun-2015	Seno Newman	215	46º 30.662' S	74º 55.593' W	3	Ventral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	216	46º 30.624' S	74º 55.439' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	217	46º 30.627' S	74º 55.432' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	218	46º 30.62' S	74º 55.425' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	219	46º 30.632' S	74º 55.419' W	3	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	220	46º 30.63' S	74º 55.411' W	1 - 2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	221	46º 30.627' S	74º 55.368' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	222	46º 30.618' S	74º 55.338' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	223	46º 30.191' S	74º 55.327' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	224	46º 30.093' S	74º 55.297' W	1 - 2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	225	46º 30.054' S	74º 55.243' W	1 - 2	Lateral up	Rocky	Balaenopteridae

24-Jun-2015	Seno Newman	226	46º 29.992' S	74º 55.167' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	227	46º 29.984' S	74º 55.165' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	228	46º 29.975' S	74º 55.164' W	1 - 2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	229	46º 29.925' S	74º 55.167' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	230	46º 29.895' S	74º 55.166' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	231	46º 29.742' S	74º 55.164' W	1 - 2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	232	46º 29.329' S	74º 55.094' W	7	Lateral up	Floating	
24-Jun-2015	Seno Newman	233	46º 29.385' S	74º 54.993' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	234	46º 29.32' S	74º 54.924' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	235	46º 29.218' S	74º 54.888' W	3	Ventral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	236	46º 29.137' S	74º 54.821' W	2	Lateral up	Sandy - Rocky	Balaenopteridae

24-Jun-2015	Seno Newman	237	46º 29.131' S	74º 54.818' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	238	46º 29.124' S	74º 54.813' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	239	46º 29.106' S	74º 54.809' W	2	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	240	46º 29.086' S	74º 54.803' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	241	46º 29.066' S	74º 54.813' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	242	46º 28.991' S	74º 54.825' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	243	46º 28.911' S	74º 54.822' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	244	46º 28.887' S	74º 54.826' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	245	46º 28.812' S	74º 54.831' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	246	46º 28.761' S	74º 54.83' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	247	46º 28.705' S	74º 54.828' W	2	Lateral up	Rocky	Balaenopteridae

24-Jun-2015	Seno Newman	248	46º 28.658' S	74º 54.828' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	249	46º 28.654' S	74º 54.831' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	250	46º 28.645' S	74º 54.83' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	251	46º 28.637' S	74º 54.831' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	252	46º 28.521' S	74º 54.913' W	3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	253	46º 27.411' S	74º 54.979' W	4	Ventral up	Rocky	
24-Jun-2015	Seno Newman	254	46º 27.365' S	74º 54.984' W	2	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	255	46º 27.314' S	74º 54.988' W	3	Lateral up	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	256	46º 27.214' S	74º 54.829' W	3	Unknown	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	257	46º 26.271' S	74º 53.366' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	258	46º 26.119' S	74º 53.609' W	7	Unknown	Sandy	

24-Jun-2015	Seno Newman	259	46º 26.111' S	74º 53.714' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	260	46º 26.123' S	74º 53.747' W	2	Lateral up	Floating	Balaenopteridae
24-Jun-2015	Seno Newman	261	46º 26.116' S	74º 53.771' W	2	Lateral up	Floating	Balaenopteridae
24-Jun-2015	Seno Newman	262	46º 26.264' S	74º 54.143' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	263	46º 26.336' S	74º 54.127' W	1	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	264	46º 26.352' S	74º 54.148' W	1 - 2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	265	46º 26.34' S	74º 54.321' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	266	46º 26.335' S	74º 54.394' W	3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	267	46º 26.656' S	74º 55.481' W	6	Unknown	Rocky	
24-Jun-2015	Seno Newman	268	46º 26.797' S	74º 55.902' W	Unknown	Unknown	Rocky	
24-Jun-2015	Seno Newman	269	46º 27.022' S	74º 56.047' W	3	Unknown	Rocky	Balaenopteridae

24-Jun-2015	Seno Newman	270	46º 27.248' S	74º 56.114' W	Unknown	Unknown	Rocky	
24-Jun-2015	Seno Newman	271	46º 27.959' S	74º 56.175' W	Unknown	Unknown	Sandy - Rocky	
24-Jun-2015	Seno Newman	272	46º 28.193' S	74º 56.104' W	2	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	273	46º 28.253' S	74º 56.094' W	2	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	274	46º 28.385' S	74º 56.166' W	2 - 3	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	275	46º 28.405' S	74º 56.161' W	3	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	276	46º 28.461' S	74º 56.144' W	Unknown	Unknown	Sandy - Rocky	
24-Jun-2015	Seno Newman	277	46º 29.752' S	74º 57.068' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	278	46º 30.896' S	74º 58.426' W	3	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	279	46º 30.918' S	74º 58.439' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	280	46º 31.016' S	74º 58.904' W	5	Unknown	Rocky	

24-Jun-2015	Seno Newman	281	46º 31.284' S	74º 59.402' W	2 - 3	Unknown	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	282	46º 31.967' S	74º 59.824' W	3	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	283	46º 31.979' S	74º 59.845' W	3	Lateral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	284	46º 32.007' S	74º 59.867' W	3	Ventral up	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	285	46º 31.638'' S	75º 0.132' W	Unknown	Unknown	Rocky	
24-Jun-2015	Seno Newman	286	46º 31.532' S	75º 0.959' W	Unknown	Unknown	Rocky	
24-Jun-2015	Seno Newman	287	46º 31.767' S	75º 0.989' W	Unknown	Unknown	Rocky	
24-Jun-2015	Seno Newman	288	46º 31.798' S	75º 1.062' W	Unknown	Unknown	Rocky	
24-Jun-2015	Seno Newman	289	46º 32.125' S	75º 0.925' W	2 - 3	Unknown	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	290	46º 32.493' S	75º 1.119' W	2 - 3	Unknown	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	291	46º 32.689' S	75º 1.12' W	2 - 3	Lateral up	Sandy	Balaenopteridae

24-Jun-2015	Seno Newman	292	46º 33.363' S	75º 1.351' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	293	46º 33.372' S	75º 1.344' W	2	Lateral up	Sandy	Balaenopteridae
24-Jun-2015	Seno Newman	294	46º 33.428' S	75º 1.334' W	3	Unknown	Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	295	46º 33.958' S	75º 1.688' W	3	Unknown	Sandy - Rocky	Balaenopteridae
24-Jun-2015	Seno Newman	296	46º 33.966' S	75º 1.732' W	4	Unknown	Sandy - Rocky	
24-Jun-2015	Seno Newman	297	46º 33.977' S	75º 1.746' W	7	Unknown	Floating	
24-Jun-2015	Seno Newman	298	46º 34.271' S	75º 1.855' W	4	Unknown	Rocky	
24-Jun-2015	Seno Newman	299	46º 34.429' S	75º 2.047' W	5	Unknown	Rocky	
24-Jun-2015	Seno Newman	300	46º 34.463' S	75º 2.194' W	9	Unknown	Sandy - Rocky	
24-Jun-2015	Seno Newman	301	46º 38.102' S	75º 8.96' W	Unknown	Unknown	Sandy	
24-Jun-2015	Seno Newman	302	46º 38.089' S	75º 9.632' W	4	Unknown	Sandy - Rocky	

24-Jun-2015	Seno Newman	303	46º 39.046' S	75º 12.857' W	2 - 3	Unknown	Sandy - Rocky	Balaenopteridae	
24-Jun-2015	Seno Newman	304	46º 39.4' S	75º 15.631' W	7	Unknown	Rocky		
24-Jun-2015	Seno Newman	305	46º 42.092' S	75º 14.267' W	2	Unknown	Sandy - Rocky	Balaenopteridae	

Other Sources

Date	Locality	Whale ID	Latitude	Longitude	State of decomposition	Carcass position	Beach type	Species	Sex
Date	Locality	Whale ID	Latitude	Longitude	State of decomposition	Carcass position	Beach type	Species	Sex
Middle of March	Bahía Conos	306	46º 36.2' S	75º 28.7' W	8 - 9	Unknown	Unknown		
Middle of March	Bahía Conos	307	46º 36.2' S	75º 28.7' W	8 - 9	Unknown	Unknown		
21-Feb-2015	Isla Crosslet	308	46º 43.494' S	75º 10.521' W	8 - 9	Unknown	Unknown		
22-Feb-2015	Isla Crosslet	309	46º 45.32' S	75º 11.175' W	1 - 2	Unknown	Unknown	Balaenopteridae	
End of February 2015	Fiordo San Pablo	310	46º 36.677' S	75º 9.685' W	1 - 2	Unknown	Unknown	Balaenopteridae	

End of February 2015	Fiordo San Pablo	311	46º 36.271' S	75º 9.471' W	8 - 9	Unknown	Unknown		
End of February 2015	Estero Slight	312	46º 43.26' S	75º 9.37' W	1	Lateral up	Floating	*Balaenoptera borealis*	F
End of February 2015	Estero Slight	313	46º 43.26' S	75º 9.37' W	1 - 2	Unknown	Unknown	Balaenopteridae	
End of February 2015	Estero Slight	314	46º 43.26' S	75º 9.37' W	8 - 9	Unknown	Unknown		
End of February 2015	Estero Slight	315	46º 47.18' S	75º 32.417' W	8 - 9	Unknown	Unknown		
Middle of March 2015	Bahía Conos	316	-	-	1 - 2	Unknown	Unknown	Balaenopteridae	
Middle of March 2015	Bahía Conos	317	-	-	1 - 2	Unknown	Unknown	Balaenopteridae	
Middle of March 2015	Bahía Conos	318	-	-	1 - 2	Unknown	Unknown	Balaenopteridae	
Middle of March 2015	Bahía Conos	319	-	-	1 - 2	Unknown	Unknown	Balaenopteridae	
Middle of March 2015	Bahía Conos	320	-	-	1 - 2	Unknown	Unknown	Balaenopteridae	
Middle of March 2015	Canal Barros Luco	321	-	-	1 - 2	Unknown	Unknown	Balaenopteridae	

Middle of March 2015	Canal Ladrillero	322	-	-	1 - 2	Unknown	Unknown	Balaenopteridae	
Middle of March 2015	South from Isla Solar	323	-	-	1 - 2	Unknown	Unknown	Balaenopteridae	
23-Mar-2015	near Cape Stokes	324	46º 54.558' S	75º 14.109' W	1 - 2	Unknown	Rocky	Balaenopteridae	
23-Mar-2015	near Cape Stokes	325	46º 55.76' S	75º 16.796' W	1 - 2	Unknown	Sandy	Balaenopteridae	
23-Mar-2015	Brazo Oeste - Barroso	326	46º 50.91' S	75º 15.332' W	1 - 2	Unknown	Sandy	Balaenopteridae	
25-Mar-2015	Brazo Este - Barroso	327	46º 51.761' S	75º 15.577' W	1 - 2	Unknown	Unknown	Balaenopteridae	
5-Mar-2015	Isla Hereford	328	46º 43.26' S	75º 9.37' W	1 - 2	Unknown	Unknown	Balaenopteridae	
5-Mar-2015	Isla Hereford	329	46º 43.26' S	75º 9.37' W	1 - 2	Unknown	Unknown	Balaenopteridae	
5-Mar-2015	Isla Hereford	330	46º 43.26' S	75º 9.37' W	9	Unknown	Unknown		
5-Mar-2015	Isla Hereford	331	46º 35.925' S	75º 11.636' W	4	Unknown	Unknown		
14-May-2015	Paso Isaza	332	50º 53.983' S	74º 18.133' W	1	Lateral up	Floating	*Balaenoptera borealis*	M

5-Jul-2015	north of Puerto Natales	333	49º 35.733' S	74º 26.083' W	1	Lateral up	Floating	*Balaenoptera borealis*	F
Middle of May 2015	near Puerto Natales	334	51º 28.567' S	73º 44.95' W	8 - 9	Unknown	Unknown		
Middle of May 2015	near Puerto Natales	335	51º 28.567' S	73º 44.95' W	8 - 9	Unknown	Unknown		
Middle of May 2015	near Puerto Natales	336	51º 28.567' S	73º 44.95' W	8 - 9	Unknown	Unknown		
Middle of May 2015	near Puerto Natales	337	51º 28.567' S	73º 44.95' W	8 - 9	Unknown	Unknown		