Aquatic Mammals 2019, *45*(1), 116-122, DOI 10.1578/AM.45.1.2019.116

Short Note

Cetacean Diversity Revealed from Whale-Watching Observations in Northern Peru

Aldo S. Pacheco,[1,2] Sebastián Silva,[2] Belén Alcorta,[2] Salvador Gubbins,[2] Chiara Guidino,[3,4] Fiorella Sanchez-Salazar,[2] Andrea Petit,[2] Miguel A. Llapapasca,[5] Nadia Balducci,[6] Eduardo Larrañaga,[2] María A. Zapata,[2] Estefanía Grados,[2] Camila Valdivia,[2] Giancarlo Pinasco,[2] Ana M. García-Cegarra,[7] Daniel Cáceres,[3] Daniella Biffi,[8] Lorena Silva,[2] Andrea Auger,[2] Daniella Borda,[3] Ana Belen Reyes,[3] Romina Carnero-Huamán,[2,13] Damian Villagra,[2] Esteban Duque,[9] Santiago Pinilla,[9] Nicola Ransome,[11] Ana Paula Suarez,[10] and Vannesa Jaramillo-Calle[12]

[1]*Instituto de Ciencias Naturales Alexander von Humboldt, CENSOR Laboratory, Universidad de Antofagasta, Antofagasta, Chile*
E-mail: babuchapv@yahoo.com
[2]*Pacifico Adventures–Manejo Integral del Ambiente Marino S.A.C., Los Organos, Perú*
[3]*Facultad de Biología Marina, Universidad Científica del Sur, Lima, Perú*
[4]*Prodelphinus, Jose Galvez 780, Lima 18, Perú*
[5]*Oficina de Investigaciones de Depredadores Superiores, Instituto de Mar del Perú, Callao, Perú*
[6]*Life Out of Plastic, Lima, Perú*
[7]*Doctorado en Ciencias Aplicadas Mención Sistemas Marinos Costeros, Universidad de Antofagasta, Antofagasta, Chile*
[8]*Texas Christian University, Ft. Worth, TX 76129, USA*
[9]*Madre Agua Ecoturismo e Investigación, Chocó, Colombia*
[10]*Colegio de Ciencias Biológicas y Ambientales, Universidad San Francisco de Quito, Ecuador*
[11]*Cetacean Research Unit, Murdoch University, Australia*
[12]*Grupo Ecología y Evolución de Vertebrados, Instituto de Biología, Facultad de Ciencias Exactas y Naturales, Universidad de Antioquia, Medellín, Colombia*
[13]*Department of Biology, University of Louisiana at Lafayette, Lafayette, LA 70504, USA*

The marine ecosystem of Peru is one of the regions with the highest species richness of cetaceans worldwide (Pompa et al., 2011). Upwelling fuels high levels of primary and secondary productivity (Chavez et al., 2008), thus creating niche conditions that support diverse and abundant mysticete and odontocete species of the Southeast Pacific, particularly in neritic waters (Majluf & Reyes, 1989). Although the species richness is known, the information has been gathered from distinct sources with different spatial and temporal effort. Sources include records from stranding, bycatch, and whaling reports (Van Waerebeek et al., 1988; Reyes, 2009), but less effort has been made on *in situ* observations. Cruise surveys along Peruvian neritic and oceanic waters are conducted once or twice per year to monitor oceanographic conditions and stocks of small pelagic fish (e.g., Bertrand et al., 2014). Sightings of cetaceans are conducted during those cruises, but records are available in just a handful of reports (e.g., Ontón et al., 1997; Bello et al., 1998; Sánchez et al., 1998; García-Godos, 2006). Only recently, Llapapasca et al. (2018) have provided a comprehensive description of the habitat of bottlenose (*Tursiops truncatus*), dusky (*Lagenorhynchus obscurus*), and common (*Delphinus delphis* and *D. capensis*) dolphins from data coming from those surveys. To increase our understanding of the diversity of cetaceans in this region and elsewhere, it is important to consider alternative sources of data that complement and update the information. This is relevant seeing that an important number of cetaceans are in threatened conditions due to the impact of anthropogenic activities. For example, baleen and sperm whale populations are mostly in a delicate status due to the intense whaling of the 17th to 20th centuries (e.g., Ramírez, 1990). In addition, there is an important mortality of dolphins and porpoises due to bycatch and direct hunting in Peruvian waters (Read et al., 1988;

Van Waerebeek et al., 1997; Mangel et al., 2010). Integrating several sources of information about spatial and temporal patterns of cetacean diversity may help researchers to understand their distribution as well as the consequences for the mitigation of negative anthropogenic impacts.

Whale-watching excursions can constitute an alternative source of information regarding cetaceans in localized regions. Whale-watching has the advantage that effort can be intensive since trips are conducted daily or weekly during some seasons of the year, although they are covering areas at a local or regional scale. However, localized effort may reveal a high diversity of cetaceans in regions where few surveys are conducted (e.g., De Boer, 2015). Thus, this source of data could integrate information covering major spatial scales coming from cruise surveys (Di Tullio et al., 2016) with considerably less seasonal effort.

The northern region of Peru is an interesting area due to the convergence of two marine ecosystems: (1) the cold and nutrient-rich Humboldt system and (2) the warm, less productive equatorial system (Guidino et al., 2014; Ibanez-Erquiaga et al., 2018). The continental shelf is rather narrow in this region, so it is possible to have sightings of neritic and oceanic species not far away from the coast. From 2009 to the present, whale-watchers have been focusing on humpback whales (*Megaptera novaeangliae*) in this region, specifically during their breeding migration in the austral winter and spring (e.g., Pacheco et al., 2009, 2011, 2013; Valdivia et al., 2017). These navigation efforts, together with some excursions during summer months, allowed us to record an important number of cetaceans in northern Peru. The objective of this note is to report the species richness of cetaceans in neritic and oceanic waters gathered from whale-watching observations.

Whale-watching surveys were conducted every year from 2010 to 2017 from late July to late October, covering an approximate area of 168 km^2 along the coast of Los Organos (4° 10' 38.23" S, 81° 8.27' 4.83" W). During this period, a total of 651 d of navigation were conducted encompassing a total of 847.2 effective hours observing cetaceans (Table 1).

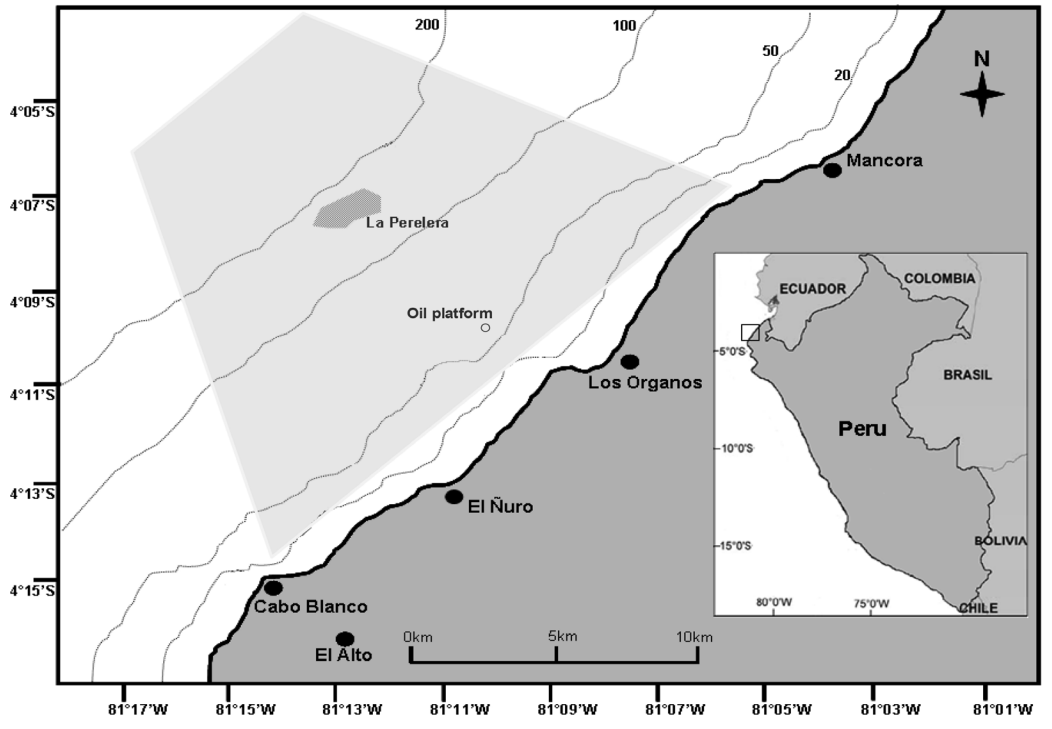
Navigation started at 0740 h and finished at 1030 h. Since the target species of these trips were humpback whales, boats navigated randomly through the area looking for this species with the assistance of one observer located on land. Even though this type of navigation may bias the ability of exploring the habitat of non-target species of the whale-watching trip, the navigation effort covered an important extension of neritic and oceanic waters (Figure 1). Navigation was also conducted during the austral summer for sighting of cetaceans but with considerable less effort. Navigation started at 0600 h and finished at 1200 h, heading into oceanic waters off the coast of Cabo Blanco, with distances to the shore ranging between 27 to 46.3 km (Figure 1).

When cetaceans were sighted, the boat carefully approached the individual or pod keeping prudent distances and speed according to local whale-watching conduct codes (Pacheco et al., 2011; García-Cegarra & Pacheco, 2017). GPS positions were recorded to distinguish the habitat (i.e., neritic or oceanic), and digital photographs were taken. Photographs were carefully analyzed after navigation for further confirmation of species identity.

A total of 13 cetacean species were recorded *in situ* and alive during the study period, including four mysticete and nine odontocete species (Table 2). The humpback whale was the most frequently observed species as this was the target of the whale-watching excursion, followed by

Table 1. Observation effort during the humpback whale (*Megaptera novaeangliae*) season (July to October) for eight consecutive years in northern Peru

Year	Days	Hours	Minutes	Mean	SD
2010	71	70.2	4,209	33.4	25.139
2011	49	51.3	3,080	38.5	20.997
2012	80	92.9	5,572	44.9	27.233
2013	83	121.0	7,259	39.9	26.905
2014	103	115.6	6,935	40.8	19.597
2015	59	79.9	4,793	39.3	22.062
2016	99	148.1	8,886	32.9	22.088
2017	107	168.2	10,091	39.3	24.926
Total	651	847.2	50,825		



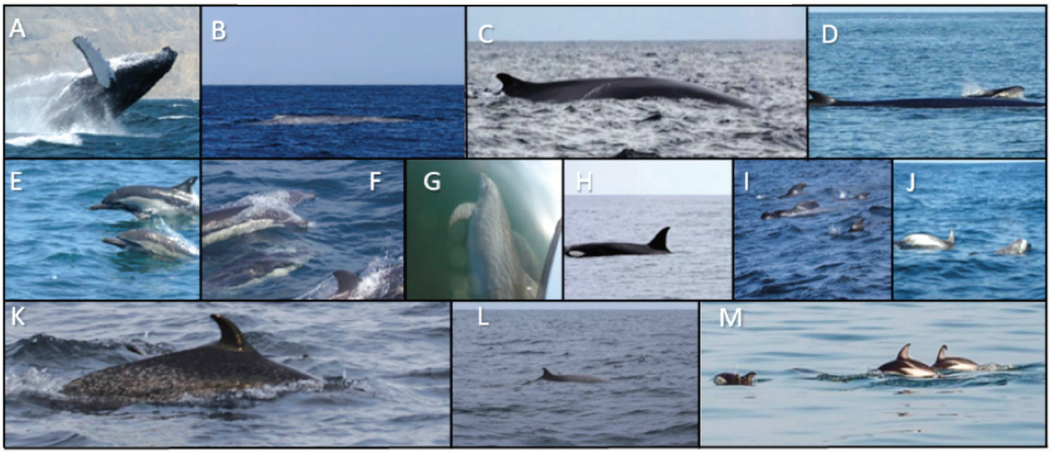


Figure 1. Map indicating the survey area during whale-watching excursion in northern Peru; the grey trapeze represents *ca*. 168 km^2 of the covered surface area during trips. Species identified during this study: (A) humpback whale (*Megaptera novaeangliae*), (B) blue whale (*Balaenoptera musculus*), (C) fin whale (*B. physalus*), (D) Bryde's whale (*B. edeni*), (E) long-beaked common dolphin (*Delphinus capensis*), (F) short-beaked common dolphin (*D. delphis*), (G) bottlenose dolphin (*Tursiops truncatus*), (H) killer whale (*Orcinus orca*), (I) short-finned pilot whale (*Globicephala macrorhynchus*), (J) Risso's dolphin (*Grampus griseus*), (K) pantropical spotted dolphin (*Stenella attenuata*), (L) unidentified beaked whale, and (M) dusky dolphin (*Lagenorhynchus obscurus*).

Table 2. List of species recorded during the humpback whale season: (A) Number of sightings of the species during the humpback whale season. Type of habitat: N = neritic, O = oceanic, and both (N/O); N.E. = no effort was recorded and Fr. = frequency estimated from the total of sightings divided by the total of days of observation (T = S/D). (B) Species sighted and effort during summer excursions.

A

Species	2010	2011	2012	2013	2014	2015	2016	2017	T = S/D	Fr.
Megaptera novaeangliae (N)	121	80	124	224	165	221	288	257	1,480/651	2.27
Delphinus capensis (N)	50	N.E.	N.E.	112	N.E.	30	94	66	352/419	0.84
Delphinus delphis (O)	0	N.E.	N.E.	2	N.E.	0	2	N.E.	4/312	0.013
Tursiops truncatus (N/O)	0	0	1	2	1	0	0	0	4/651	0.006
Grampus griseus (O)	0	0	1	0	0	0	0	0	1/651	0.002
Lagenorhynchus obscurus (N)	0	0	0	0	0	0	0	1	1/651	0.002
Globicephala macrorhynchus (O)	0	0	1	0	1	1	0	1	4/651	0.006
Balaenoptera edeni (N)	0	0	1	1	0	0	12	0	14/651	0.022
Balaenoptera musculus (O)	0	0	0	0	0	1	1	0	2/651	0.003
Orcinus orca (N)	0	0	0	0	0	0	0	1	1/651	0.002

B

	Date of sighting	Number of summer excursions per year/hours of observation
Orcinus orca (O)	1 March 2013	10/60 h
Unidentified beaked whale (O)	30 January 2015	2/12 h
Stenella attenuata (N)	7 January 2017	4/24 h
Balaenoptera physalus (O)	15 May 2017	4/24 h

long-beaked common dolphin which often occurred in neritic waters. The fin whale (*Balaenoptera physalus*), an unidentified beaked whale (most likely *Ziphius* or *Mesoplodon* spp.), dusky dolphin, and pantropical spotted dolphin (*Stenella attenuata*) were sighted once. In neritic waters, species such as bottlenose dolphin and Bryde's whale (*Balaenoptera brydei*) were sighted; while at the oceanic realm, the blue whale (*Balaenoptera musculus*), short-beaked common dolphin, Risso's dophin (*Grampus griseus*), short-finned pilot whale (*Globicephala macrorhynchus*), and killer whale (*Orcinus orca*) were recorded (Table 2).

In this study, we report a total of 13 cetacean species sighted at the regional scale but encompassing eight years of observation. This number constitutes 39.3% of the 33 species reported to occur in Peruvian waters (Reyes, 2009). However, the difference between this study and other reports is the fact that we observed these species alive, while previous compilations of species throughout the Peruvian marine ecosystem included several stranded individuals, which may bias the habitat origin of the species. Whale-watching research has tended to focus on the impacts on the observed species (Scarpaci et al., 2008), regulation and management (Parsons & Woods-Ballard, 2003), and social–conservation-oriented outcomes (Orams, 2000; García-Cegarra & Pacheco, 2017). Our results highlight the importance of commercial whale-watching as a source of information regarding the presence of cetaceans in northern Peru. Even though whale-watching surveys may not cover the total spatial extent of most cetaceans' distribution, it does provide an intense and localized effort (although seasonal) that may reveal an important representation of the diversity of species. Whale-watching represents an alternative endeavor to diversify the set of economic activities for coastal communities (Pacheco et al., 2011) but, as demonstrated herein, it represents a complementary platform for important data

collection. Alternative platforms of observation are important, particularly in regions where cetacean research is poorly conducted. For example, De Boer (2015) reported 13 cetacean species off Suriname from seismic survey vessels; 11 of these species were newly documented for the area.

The number of species recorded herein is similar to that in temperate waters of southern Australia (n = 15; Gill et al., 2015), Suriname (n = 13; De Boer, 2015), and Ecuador, including the Galapagos Islands (n = 12; O'Hern et al., 2017), but less in comparison to the subtropical Southwestern Atlantic off Brazil (n = 21; Di Tullio et al., 2016), the California Current system (n = 21; Barlow & Forney, 2007), the tropical waters of the Gulf of Mexico (n = 28; Davis et al., 2002), the Eastern Tropical Pacific (n = 30; Balance et al., 2006), and the cold waters in the Pacific Subarctic gyres (n = 24; Springer et al., 1999). However, studies reporting nearly twofold the number recorded in our whale-watching surveys covered considerably larger areas, over 1,000 km (e.g., Di Tullio et al., 2016), and several years of cruise surveys.

Some of the sighted species constitute remarkable new records for the region. Dusky dolphins were never reported northwards of the 7° S (Reyes, 2009). Edwards et al. (2015) points to the existence of an equatorial hiatus in the distribution of fin whales, stating that this species is very rare at latitudes lower than 20° at both hemispheres. Our record of fin whales provides evidence that the species could be present closer to the equator. The sighting of an unidentified beaked whale *in situ* also highlights the importance of our type of surveys. So far, only stranded or bycatch beaked whales have been reported in Peru (e.g., Reyes, 1990; Reyes et al., 1991). Our records also confirm the presence of killer whales in the oceanic waters off Peru (García-Godos, 2004) but also add evidence of its presence in neritic waters. Two of the most frequent sighted species brings to attention the issue of interactions with fisheries. Humpback whales hold the record of entanglements with fishing gear, and long-beaked common dolphins are regularly captured as bycatch throughout Peruvian waters (Thiel et al., 2018). The assemblage of cetaceans reported herein is very similar to that of Ecuador and the Galapagos Islands (10 species shared, 76.2%; Denkinger et al., 2013; O'Hern et al., 2017), likely resembling a similar biogeographical affinity among regions. However, species present off Ecuador, such as sperm whales (*Physeter macrocephalus*) and dwarf sperm whale (*Kogia* spp.), are likely to be present in northern Peru but undetected during our surveys. To better understand the diversity of cetaceans in northern Peru (and elsewhere where little research is conducted), it is necessary to further increase our observation effort by conducting monthly and year-round systematic surveys. This is important now that anthropogenic activities, such as oil exploration and pollution, are threatening cetaceans in the region (Flórez-González et al., 1998).

Acknowledgments

We thank the Pacifico Adventures crew, in particular the skippers Segundo Pizarro, Luis Chapas, Alex Marchan, and Aldo Muñoz. This study was supported by the participation of thousands of enthusiastic whale-watchers who visit northern Peru every year.

Literature Cited

Balance, L. T., Pitman, R. L., & Fiedler, P. C. (2006). Oceanographic influences on seabirds and cetaceans of the eastern tropical Pacific: A review. *Progress in Oceanography*, *69*(2-4), 360-390. https://doi.org/10.1016/j.pocean.2006.03.013

Barlow, J., & Forney, K. A. (2007). Abundance and population density of cetaceans in the California Current ecosystem. *Fishery Bulletin*, *105*(4), 509-526.

Bello, R., Arias-Schreiber, M., & Sánchez, R. (1998). Distribución y abundancia relativa de cetáceos durante el crucero de *BIC Humboldt 9709-10*, de Matarani a Paita [Distribution and relative abundance of cetaceans during the cruise *BIC Humboldt 9709-10* from Matarani to Paita]. *Instituto del Mar del Perú, Informe*, *130*, 78-85.

Bertrand, A., Grados, D., Colas, F., Bertrand, S., Capet, X., Chaigneau, A., . . . Fablet, R. (2014). Broad impacts of fine-scale dynamics on seascape structure from zooplankton to seabirds. *Nature Communications*, *5*, 5239. https://doi.org/10.1038/ncomms6239

Chavez, F. P., Bertrand, A., Guevara-Carrasco, R., Soler, P., & Csirke, J. (2008). The northern Humboldt Current System: Brief history, present status and a view towards the future. *Progress in Oceanography*, *79*(2-4), 95-105. https://doi.org/10.1016/j.pocean.2008.10.012

Davis, R. W., Ortega-Ortiz, J. G., Ribic, C. A., Evans, W. E., Biggs, D. C., Ressler, P. H., . . . Würsig, B. (2002). Cetacean habitat in the northern oceanic Gulf of Mexico. *Deep Sea Research Part 1*, *49*(1), 121-142. https://doi.org/10.1016/S0967-0637(01)00035-8

De Boer, M. N. (2015). Cetaceans observed in Suriname and adjacent waters. *Latin American Journal of Aquatic Mammals*, *10*(1), 2-19. https://doi.org/10.5597/lajam00189

Denkinger, J., Oña, J., Alarcón, D., Merlen, G., Salazar, S., & Palacios, D. M. (2013). From whaling to whale watching: Cetacean presence and species diversity in the Galapagos marine reserve. In S. J. Walsh & C. F. Mena (Eds.), *Science and conservation in the Galapagos Islands: Frameworks & perspectives. Vol. 1: Social and ecological interactions in the Galapagos Islands* (pp.

217-235). Berlin: Springer Science+Business Media, LLC. https://doi.org/10.1007/978-1-4614-5794-7_13

Di Tullio, J. C., Gandra, T. B. R., Zerbini, A. N., & Secchi, E. R. (2016). Diversity and distribution patterns of cetaceans in the subtropical southwestern Atlantic outer continental shelf and slope. *PLOS ONE*, *11*(5), e0155841. https://doi.org/10.1371/journal.pone.0155841

Edwards, E. F., Hall, C., Moore, T. J., Sheredy, C., & Redfern, J. V. (2015). Global distribution of fin whales *Balaenoptera physalus* in the post-whaling era (1980-2012). *Mammal Review*, *45*(4), 197-214. https://doi.org/10.1111/mam.12048

Flórez-González, L., Ávila, I. C., Alzueta, J. C., Falk, P., Félix, F., Gibbons, J., . . . Van Waerebeek, K. (2007). *Estrategia para la conservación de la ballena jorobada del Pacífico sudeste: Lineamientos para un plan de acción regional e iniciativas nacionales* [Conservation strategy for Southeast Pacific humpback whales: Guidelines for a regional action plan and national initiatives]. Cali, Colombia: Fundación Yubarta. 106 pp.

García-Cegarra, A. M., & Pacheco, A. S. (2017). Whale-watching trips in Peru lead to increases in tourist knowledge, pro-conservation intentions and tourist concern for the impacts of whale-watching on humpback whales. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *27*(5), 1011-1020. https://doi.org/10.1002/aqc.2754

García-Godos, I. (2004). Killer whale (*Orcinus orca*) occurrence off Peru, 1995-2003. *Latin American Journal of Aquatic Mammals*, *3*(2), 177-180. https://doi.org/10.5597/lajam00064

García-Godos, I. (2006). A note on the occurrence of sperm whales (*Physeter macrocephalus*) off Peru, 1995-2002. *Journal of Cetacean Research and Management*, *8*(1), 113-119.

Gill, P., Pirzl, R., Morrice, M. G., & Lawton, K. (2015). Cetacean diversity of the continental shelf and slope off southern Australia. *The Journal of Wildlife Management*, *79*(4), 672-681. https://doi.org/10.1002/jwmg.867

Guidino, C., Llapapasca, M. A., Silva, S., Alcorta, B., & Pacheco, A. S. (2014). Patterns of spatial and temporal distribution of humpback whales at the southern limit of the Southeast Pacific breeding area. *PLOS ONE*, *9*(11), e112627. https://doi.org/10.1371/journal.pone.0112627

Ibanez-Erquiaga, B., Pacheco, A. S., Rivadeneira, M. M., & Tejada, C. L. (2018). Biogeographical zonation of rocky intertidal communities along the coast of Peru (3.5–13.5˚ S Southeast Pacific). *PLOS ONE*, *13*(11), e0208244. https://doi.org/10.1371/journal.pone.0208244

Llapapasca, M. A., Pacheco, A. S., Fiedler, P., Goya, E., Ledesma, J., Peña, C., & Vásquez, L. (2018). Modeling the potential habitats of dusky, commons, and bottlenose dolphins in the Humboldt Current System off Peru: The influence of non-El Niño vs. El Niño 1997-98 conditions and potential prey availability. *Progress in Oceanography*, *168*, 169-181. https://doi.org/10.1016/j.pocean.2018.09.003

Majluf, P., & Reyes, J. (1989). The marine mammals of Peru: A review. In D. Pauly, P. Muck, J. Mendo, & I. Tsukayama (Eds.), *The Peruvian upwelling ecosystem: Dynamics and interactions* (ICLARM Conference Proceedings, *18*, 344-363).

Mangel, J. C., Alfaro-Shigueto, J., Van Waerebeek, K., Cáceres, C., Bearhop, S., Witt, M. J., & Godley, B. J. (2010). Small cetacean captures in Peruvian artisanal fisheries: High despite protective legislation. *Biological Conservation*, *143*(1), 136-143. https://doi.org/10.1016/j.biocon.2009.09.017

O'Hern, J. E., Sculley, M., Jean-Smith, K., Biggs, D., Slowey, N., Alarcon Ruales, D., & Duncan, R. (2017). Marine mammal distribution in Ecuador: Surveys aboard a ship of opportunity as a means of monitoring relative abundance. *Latin American Journal of Aquatic Mammals*, *12*(1-2), 28-39. https://doi.org/10.5597/lajam00235

Ontón, K., Soto, K., & Arias-Schreiber, M. (1997). Distribución y abundancia relativa de cetáceos en el mar peruano durante el crucero de evaluación del stock de merluza, *BIC Humboldt 9705-06* [Distribution and relative abundance of cetaceans at the Peruvian sea during cruise surveys of the hake stock *BIC Humboldt 9705-06*]. *Instituto del Mar del Perú*, *Informe*, *128*, 122-127.

Orams, M. B. (2000). Tourists getting close to the whales: Is it what whale-watching is all about? *Tourism Management*, *21*(6), 561-569. https://doi.org/10.1016/S0261-5177(00)00006-6

Pacheco, A. S., Silva, S., & Alcorta, B. (2009). Winter distribution and group composition of humpback whales (*Megaptera novaeangliae*) off northern Peru. *Latin American Journal of Aquatic Mammals*, *7*(1-2), 33-38. https://doi.org/10.5597/lajam00131

Pacheco, A. S., Silva, S., & Alcorta, B. (2011). Is it possible to go whale watching off the coast of Peru? A case study of humpback whales. *Latin American Journal of Aquatic Research*, *39*(1), 189-196. https://doi.org/10.3856/vol39-issue1-fulltext-20

Pacheco, A. S., Silva, S., Alcorta, B., Balducci, N., Guidino, C., Llapapasca, M. A., & Sanchez-Salazar, F. (2013). Aerial behavior of humpback whales *Megaptera novaeangliae* at the southern limit of the Southeast Pacific breeding area. *Revista de Biología Marina y Oceanografia*, *48*(1), 185-191. https://doi.org/10.4067/S0718-19572013000100016

Parsons, E. C. M., & Woods-Ballard, A. (2003). Acceptance of voluntary whalewatching codes of conduct in west Scotland: The effectiveness of governmental versus industry-led guidelines. *Current Issues in Tourism*, *6*(2), 172-182. https://doi.org/10.1080/13683500308667950

Pompa, S., Ehrlich, P. R., & Ceballos, G. (2011). Global distribution and conservation of marine mammals. *Proceedings of the National Academy of Sciences of the USA*, *108*(33), 13600-13605. https://doi.org/10.1073/pnas.1101525108

Ramírez, P. (1990). Distribución de los cetáceos mayores después del fenómeno "El Niño" 1982-83 [Distribution of large cetaceans after the "El Niño" 1982-83 phenomenon]. *Boletín de Lima*, *70*, 85-90.

Read, A. J., Van Waerebeek, K., Reyes, J. C., McKinnon, J. S., & Lehman, L. C. (1988). The exploitation of small cetaceans in coastal Peru. *Biological Conservation*, *46*(1), 53-70. https://doi.org/10.1016/0006-3207(88)90108-5

Reyes, J. C. (1990). Gray's beaked whale *Mesoplodon grayi* in the South East Pacific. *Zeitschrift für Säugetierkunde*, *55*, 139-141.

Reyes, J. C. (2009). *Ballenas, delfines y otros cetáceos del Perú: Una fuente de información* [Whales, dolphins and other cetaceans of Peru: A source of information]. Lima, Peru: Squema Ediciones. 159 pp.

Reyes, J. C., Mead, J. G., & Van Waerebeek, K. (1991). A new species of beaked whale *Mesoplodon peruvianus* sp. n. (Cetacea: Ziphiidae) from Peru. *Marine Mammal Science*, *7*(1), 1-24. https://doi.org/10.1111/j.1748-7692.1991.tb00546.x

Sánchez, R., Arias-Schreiber, M., & Ontón, K. (1998). *Avistamientos de cetáceos en el mar peruano y su relación con los principales recursos pelágicos: Crucero* BIC Humboldt 9803-05 *de Tumbes a Tacna* [Sightings of cetaceans in the Peruvian sea and its relationship with the principal pelagic resources: Cruise *BIC Humboldt 9803-05* from Tumbes to Tacna]. *Instituto del Mar del Perú, Informe*, *135*, 163-179.

Scarpaci, C., Parsons, E. C. M., & Lück, M. (2008). Recent advances in whale-watching research: 2006-2007. *Tourism in Marine Environments*, *5*(1), 55-66. https://doi.org/10.3727/154427308785855288

Springer, A. M., Piatt, J. F., Shuntov, V. P., Van Vliet, G. B., Vladimirov, V. L., Kuzin, A. E., & Perlov, A. S. (1999). Marine birds and mammals of the Pacific Subarctic gyres. *Progress in Oceanography*, *43*(2-4), 443-487. https://doi.org/10.1016/S0079-6611(99)00014-2

Thiel, M., Luna-Jorquera, G., Álvarez-Varas, R., Gallardo, C., Hinojosa, I. A., Luna, N, . . . Zavalaga, C. (2018). Impacts of marine plastic pollution from continental coasts to subtropical gyres—fish, seabirds, and other vertebrates in the SE Pacific. *Frontiers in Marine Science*, *5*, 238. https://doi.org/10.3389/fmars.2018.00238

Valdivia, C., Pacheco, A. S., Félix, F., Haase, B., Rasmussen, K., Santillán, L., . . . Silva, S. (2017). Movements and timing of humpback whales (*Megaptera novaeangliae*) within the breeding region of the eastern South Pacific. *Aquatic Mammals*, *43*(3), 324-330. https://doi.org/10.1578/AM.43.3.2017.324

Van Waerebeek, K., Reyes, J., & Luscombe, B. A. (1988). *Revisión de la distribución de pequeños cetáceos frente al Perú* [Review of the distribution of small cetaceans off the coast of Peru]. In H. Salzwedel & A. Landa (Eds.), *Recursos y dinámica del ecosistema de afloramiento peruano* [Resources and dynamics of the Peruvian upwelling ecosystem]. *Boletín Instituto del Mar del Perú* (Volumen extraordinario), 345-351.

Van Waerebeek, K., Van Bressem, M. F., Félix, F., Alfaro-Shigueto, J., García-Godos, A., Chávez-Lisambart, L., . . . Bello, R. (1997). Mortality of dolphins and porpoises in coastal fisheries off Peru and southern Ecuador in 1994. *Biological Conservation*, *81*(1-2), 43-49. https://doi.org/10.1016/S0006-3207(96)00152-8