

RESEARCH NOTE

First records of the pantropical spotted dolphin *Stenella attenuata*, within groups of common dolphins *Delphinus delphis* in northern Peru

Primeros registros del delfín moteado pantropical *Stenella attenuata*, dentro de grupos del delfín común *Delphinus delphis* en el norte de Perú

Lara Martínez¹, Sebastián Silva¹, Belén Alcorta¹ and Aldo S. Pacheco¹ ^{2*}

¹Pacífico Adventures-Manejo Integral del Ambiente Marino, S.A.C., Av. Rivera del Mar s/n, Los Órganos, Piura, Perú

²Facultad de Ciencias Biológicas, Universidad Nacional Mayor de San Marcos, Av. Venezuela Cdra 34 S/N, Ciudad Universitaria, Lima, Perú

*Corresponding author: babuchapv@yahoo.com, apachecov@unmsm.edu.pe

Abstract. Although dolphins are mostly known to form single species groups of varying size, occasionally they aggregate in mixed-species groups. The presence of mixed-species delphinid groups along the Peruvian coast is unknown. Herein, we report the presence of a single pantropical spotted dolphin (*Stenella attenuata*) within large groups of the long-beaked common dolphin (*Delphinus delphis*) at Los Organos in the northern coast of Peru. Sightings occurred on October 10th, 2016, January 7th, 2018 and September 21st, 2019. In one sighting the mixed group was feeding, while during the other two sightings the group was travelling. These records add new evidence about mixed-species delphinid groups in coastal waters of Peru.

Key words: Mixed species groups, neritic waters, whale-watching, distribution

INTRODUCTION

The pantropical spotted dolphin *Stenella attenuata* (Gray, 1846) is a medium sized dolphin of dark grey dorsal coloration with light grey ventral color. The body is notably covered with spots (Perrin 2018). This species is widely distributed in all ocean basins from tropical and subtropical latitudes including the Red Sea and the Persian Gulf (Hammond *et al.* 2012). Two subspecies have been distinguished in the Tropical Eastern Pacific: the neritic *S. attenuata graffmani*, and the oceanic *S. attenuata attenuata*. The distribution of the neritic form ranges from Mexico to northern Peru. Overall, pantropical spotted dolphin seems to prefer warm waters over 25 °C and groups sizes may range from hundreds to thousands of individuals (Dizon *et al.* 1994, Jefferson *et al.* 2015).

The long-beaked common dolphin *Delphinus capensis* (Gray, 1828), which is commonly sighted in waters of northern Peru (Pacheco *et al.* 2019), is distributed from central California to southern Mexico, also throughout the east coast of South America, western and southern Africa, southern Japan and Korea, including northern

China (Jefferson *et al.* 2015). However, a review of the taxonomy of the *Delphinus* genus (Cunha *et al.* 2015) has proposed the recognition of three subspecies: *Delphinus delphis delphis*, *D. delphis tropicalis* and *D. delphis bairdii* as synonymous of *D. capensis*. For the purpose of this study, this recommendation is followed; thus, referring to common dolphins as a single species, *Delphinus delphis*. Although differences in habitat distribution and prey preferences using past nomenclature (*D. capensis* and *D. delphis*) have been described (Llapasasca *et al.* 2018), further studies are needed to resolve the taxonomic status of *Delphinus* spp. populations in the southeast Pacific. The information regarding the distribution of the pantropical spotted dolphin throughout coastal waters off Peru is scarce. Reyes (2009) suggests its presence in the northern part of the coast, but no specific locations or ranges are provided. Some individuals have been reported as by-catch landed at Cerro Azul and Pucusana, in the central coast (ca., 13°S) and there have been sightings of large groups in oceanic waters at the same latitude (Van Waerebeek *et al.* 1988). No further records are available for this species. The common dolphin is widely distributed in neritic waters of the coast of Peru from 4° to 18°S (Llapasasca *et al.* 2018).

Dolphin species form interspecific associations known as mixed groups with other delphinids, but also with pinnipeds and baleen whales (Frantzis & Herzing 2002, Bacon *et al.* 2017). Associations among delphinids can occur between two or more species, particularly in those with sympatric distributions (Bearzi 2005). Some reasons have been suggested to explain the functionality of such mixed groups, such as facilitating the search for prey or antipredator strategies including vigilance and mobbing behavior, but conclusive evidence is not available yet (see review in Cords & Würsing 2014). Other studies have reported harassment behaviour as a result of interspecific competition (Cords & Würsing 2014) and interspecific mating (Psarakos *et al.* 2003), which may consequently lead to species hybridization (Antoniou *et al.* 2018). Overall, associations among delphinids seems to be complex, thus, reporting the occurrence of mixed groups of delphinid species, their behaviour and their context is important in understanding their biological meaning.

Bearzi (2005) summarized a large data-set of associations and interactions among delphinids, indicating that pantropical spotted dolphins have been observed in mixed species groups with spinner dolphins (*Stenella longirostris*), common bottlenose dolphins (*Tursiops truncatus*), dusky dolphins (*Lagenorhynchus obscurus*), and short-finned pilot whales (*Globicephala macrorhynchus*). Long-beaked common dolphins (*Delphinus delphis bairdii*) have been recorded with dusky dolphins, bottlenose dolphins and Risso's dolphins (*Grampus griseus*), short-beaked common dolphins (*Delphinus delphis delphis*), and long-finned pilot whales (*Globicephala melas*).

In this paper, the presence of pantropical spotted dolphins within groups of common dolphins is reported for the first time in waters off Peru. This information adds new insights about the dynamics of the composition of delphinids assemblages in the northern coastal region of the Southeast Pacific.

MATERIALS AND METHODS

Sightings of pantropical spotted dolphins within common dolphins groups occurred during whale-watching excursions off the coast of Los Organos (04°20'08"S; 81°27'21"W) (Fig. 1), during the humpback whale (*Megaptera novaeangliae*) breeding season from 15th July to the 30th October. Four excursions outside of this season were conducted in January 2016 and 2017 respectively, departing from Los Organos at 0600 h and would typically last 4 hours. During the humpback whale breeding season, boats departure at 0730 h from Los Organos and navigated the area searching for humpback whales, which is the target species of the whale-watching (Pacheco *et al.* 2011).

During the excursions boats also looked for other species and the identification was made by trained biologists onboard. Excursions ended at 1030 h. During sightings, GPS positions were recorded (Garmin Etrex 10x and version 20x with WGS 84 system), group sizes were estimated for delphinid species (*e.g.*, between 50 to 100 individuals). Also, the following behaviours was recorded: traveling, feeding, milling and a mix category feeding/traveling. Two or three different boats (8.8 m length and 3 m width with twin 200 HP engines) were used during whale-watching.

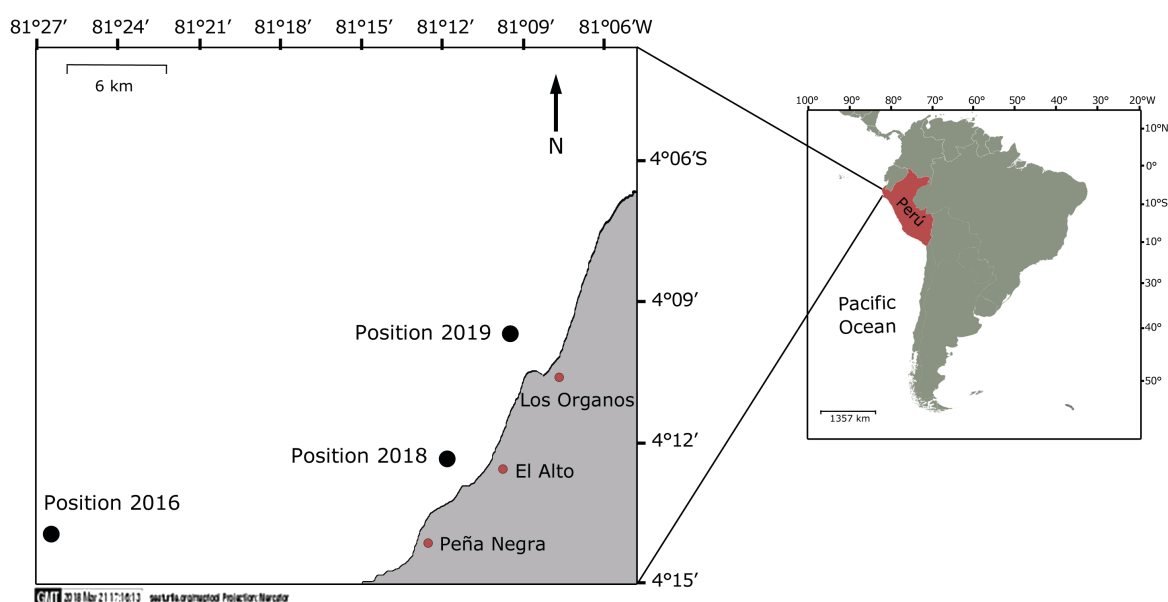


Figure 1. Map of northern Peru showing the GPS position of sightings of the mixed group per year / Mapa del norte de Perú mostrando las posiciones GPS de los avistamientos de los grupos mixtos por año

If two or three boats were observing the same group, only the information collected by the first boat was considered to avoid data duplication. When a pod of dolphins was sighted, boats approached them carefully and navigated in the same direction and speed as the group. If groups of dolphins split away or were observed bow riding, then boats followed a constant direction and speed avoiding abrupt changes until dolphins were out of sight.

RESULTS AND DISCUSSION

The first sighting of a pantropical spotted dolphin within a pod of common dolphins occurred on October 10th, 2016, off Peña Negra (04°20'08"S; 81°27'21"W) a location (*ca.*, 23 km south of the Los Organos) (Fig. 1). After sighting a group of humpback whales at 0920 h, a group of common dolphins was travelling in a northeast direction. The size of the groups was estimated between 500 to 1000 individuals. Within the common dolphin pod a darker, larger dolphin was noted alone. Photographs were taken for further close examination of the individual which was later confirmed as an adult pantropical spotted dolphin (Fig. 2). The group was followed for 10 minutes.

The second record occurred on January 7th 2018, off El Alto (04°15'26"S; 81°15'44"W), a location (*ca.*, 17 km south of Los Organos) (Fig. 1). At 2.5 km away, at 0714 h after sighting 4 Bryde's whales (*Balaenoptera brydei*), a group of common dolphins was observed a short distance away. The size of the pod was estimated (*ca.*, 1000 individuals). The common dolphins were feeding. Within this group an adult pantropical spotted dolphin showing the same behaviour was sighted. The group were observed for 8 minutes before the boat left. The third encounter occurred on September 21st 2019. At the beginning of the encounter the boat headed towards a humpback whale mother-calf pair and escort. In the middle of the encounter at 0816 h a large (*ca.*, 1500 individuals) travelling common dolphin group was sighted, further north of Los Organos. When approaching the group was approached, and as on the previous two occasions, an adult pantropical spotted dolphin was observed within the group. Unfortunately, no photos of the pantropical spotted dolphin were taken during these two other sightings.



Figure 2. Sighting of the pantropical spotted dolphin (white arrow) swimming within a group of common dolphins / Avistamiento del delfín moteado pantropical (flecha blanca) nadando dentro de un grupo de delfines comunes

To our knowledge these are the first records of mixed groups of pantropical spotted dolphin and common dolphin in the coast of northern Peru. Both species were positively identified after careful examination of digital photographs (Fig. 2). The presence of pantropical spotted dolphins in our survey region in northern Peru is not recorded very often (Pacheco *et al.* 2019), which could be due to thermal constraints (Henderson *et al.* 2014). Sea surface temperatures during sightings dates were below the lower thermal limit (25 °C) preferred by this species; 21 °C (October 10th, 2016), 23 °C (January 7th, 2018) and 21 °C (September 12th, 2019) (IMARPE)¹. Although the study area is close to Ecuador, sea surface temperatures are relatively cold due to the presence of the northern branch of the Humboldt current, which is characterized by sub-Antarctic upwelled waters (Ibanez-Erquiaga *et al.* 2018). Cold waters may therefore prevent pantropical spotted dolphins extending their distribution range southwards into neritic waters of Peru.

It is worth noting that during all three sightings, only a single pantropical spotted dolphin was present in large pods of common dolphins. These observations of a single individual contrast with most of the studies on dolphin associations that indicate the presence of multiple individuals of each species involved in the mixed group (e.g., Frantzi & Herzing 2002, Psarakos *et al.* 2003, Bearzi 2005, Bacon *et al.* 2017). Mixed groups may occur when species are intentionally interacting, whereas other times they may just be feeding or transiting in the same region and not necessarily interacting. However, it is difficult to interpret why a single pantropical spotted dolphin would join a large group of common dolphin. One can only speculate that it was a perhaps vagrant individual, who joined a group of common dolphins in order to obtain some benefits from that association such as protection against predators or, since one encounter involved feeding dolphins, facilitating the search for prey. Nevertheless, it was not possible to confirm whether the sighted pantropical spotted dolphin was the same individual, or that the large pods of common dolphins encountered was the same for all three observations. However, since these were large groups of dolphins spread over a wide area and encounter durations were relatively short it is possible that many other individuals of this species were present in the groups but were not detected during sightings.

Pantropical spotted dolphins are often reported to form large groups of mixed species. The best example is the frequent association of groups of this species together with spinner dolphins and tuna (*Thunnus albacares*) in the Tropical Eastern Pacific (Balance *et al.* 2006). Since this species tend to form large groups, our observation of a vagrant individual (or individuals, if more of this species were present during encounters but undetected by observers) joining a large group of other species seems to be a plausible explanation. Considering the morphology and the neritic distribution we suggest that the pantropical spotted dolphin resembles the coastal form *Stenella attenuata graffmani*. However, further observations are necessary to confirm this species identification.

ACKNOWLEDGEMENTS

We would like to thank all the Pacífico Adventures crew; D. Villagra, J. Apalategui, D. Cortés, C. Gutierrez, J. F. Espinoza, N. Amarti and V. Marin. Special thanks to the skippers; C. Gutierrez, A. Muñoz, L. Chapas and B. Guillen who played a paramount role collecting data for this study. Two anonymous reviewers help us to improve an early version of this manuscript. Thanks to SEATURTLE.ORG Maptool for helping to create Fig. 1.

LITERATURE CITED

- Antoniou A, A Frantzi, P Alexiadou, N Paschou & N Poulakakis. 2018. Evidence of introgressive hybridization between *Stenella coeruleoalba* and *Delphinus delphis* in the Greek Seas. *Molecular Phylogenetics and Evolution* 129: 325-337.
- Bacon CE, MA Smultea, D Fertl, B Würsig, EA Burgess & S Hawks-Johnson. 2017. Mixed species associations of marine mammals in the Southern California Bight, with emphasis on Risso's dolphins (*Grampus griseus*). *Aquatic Mammals* 43(2): 177-184.
- Balance LT, RL Pitman, & PC Fiedler. 2006. Oceanographic influences on seabirds and cetaceans of the eastern tropical Pacific: A review. *Progress in Oceanography* 69(2-4): 360-390.
- Bearzi M. 2005. Dolphin sympatric ecology. *Marine Biology Research* 1(3): 165-175.

¹Sea surface temperature data freely available at: <http://satellite.imarpe.gob.pe/uprsig/sst_prov.html>

- Cords M & B Würsig. 2014.** A mix of species: associations of heterospecifics among primates and dolphins. In: Yamagiwa J & L Karczmarski (eds). *Primates and cetaceans: field research and conservation of complex mammalian societies*, pp. 409-431. *Primate Monographs*, Springer, Tokyo. <doi:10.1007/978-4-431-54523-1_21>
- Cunha HA, RL de Castro, ER Secchi, EA Crespo, J Lailson-Brito, AF Azevedo, C Lazoski & AM Solé-Cava. 2015.** Molecular and morphological differentiation of common Dolphins (*Delphinus* sp.) in the Southwestern Atlantic: testing the two species hypothesis in sympatry. *PLoS ONE* 10(11): e0140251. <doi:10.1371/journal.pone.0140251>
- Dizon AE, WF Perrin & PA Akin. 1994.** Stocks of dolphins (*Stenella* spp. and *Delphinus delphis*) in the eastern tropical Pacific: A phylogeographic classification. *NOAA Technical Report NMFS* 119: 1-20.
- Frantzis A & DL Herzing. 2002.** Mixed-species associations of striped dolphins (*Stenella coeruleoalba*), short-beaked common dolphins (*Delphinus delphis*), and Risso's dolphins (*Grampus griseus*) in the Gulf of Corinth (Greece, Mediterranean Sea). *Aquatic Mammals* 28(2): 188-197.
- Hammond PS, G Bearzi, A Bjørge, KA Forney, L Karczmarski, T Kasuya, WF Perrin, MD Scott, JY Wang, RS Wells & B Wilson. 2012.** *Stenella attenuata*. The IUCN Red List of Threatened Species 2012: e.T20729A17821189. <doi:10.2305/IUCN.UK.2012.RLTS.T20729A17821189.en>
- Henderson EE, KA Forney, JP Barlow, JA Hildebrand, AB Douglas, J Calambokidis & WJ Sydeman. 2014.** Effects of fluctuations in sea-surface temperature on the occurrence of small cetaceans off Southern California. *Fishery Bulletin* 112(2/3): 159-177.
- Ibanez-Erquiaga B, AS Pacheco, MM Rivadeneira & CL Tejada. 2018.** Biogeographical zonation of rocky intertidal communities along the coast of Peru (3.5-13.5°S) Southeast Pacific). *PLoS ONE* 13(11): e0208244. <doi:10.1371/journal.pone.0208244>
- Jefferson TA, MA Webber & RL Pitman. 2015.** *Marine mammals of the world, comprehensive guide to their identification*, 608 pp. Academic Press / Elsevier, San Diego.
- Llapapasca MA, AS Pacheco, P Fiedler, E Goya, J Ledesma, C Peña & L Vásquez. 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.
- Pacheco AS, S Silva & B Alcorta. 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.
- Pacheco AS, S Silva, B Alcorta, S Gubbins, C Guidino, F Sanchez-Salazar, A Petit, MA Llapapasca, N Balducci, E Larrañaga, MA Zapata, E Grados, C Valdivia, G Pinasco, AM García-Cegarra, D Cáceres, D Biffi, L Silva, A Auger, D Borda, AB Reyes, R Carnero-Huamán, D Villagra, E Duque, S Pinilla, N Ransome, AP Suarez, & V Jaramillo-Calle. 2019.** Cetaceans diversity revealed from whale-watching observations in northern Peru. *Aquatic Mammals* 45(1): 116-122.
- Perrin WF. 2018.** Pantropical spotted dolphin, *Stenella attenuata*. In: B Würsig, JGM Thewissen & KM Kovacs (eds). *Encyclopedia of marine mammals*, pp. 676-678. Academic, San Diego.
- Psarakos S, DL Herzing & K Marten. 2003.** Mixed-species associations between Pantropical spotted dolphins (*Stenella attenuata*) and Hawaiian spinner dolphins (*Stenella longirostris*) off Oahu, Hawaii. *Aquatic Mammals* 29(3): 390-395.
- Reyes J. 2009.** Ballenas, delfines y otros cetáceos del Perú. Una fuente de información, 160 pp. Squema-Ediciones, Lima.
- Van Waerebeek K, J Reyes & BA Luscombe. 1988.** Revisión de la distribución de pequeños cetáceos frente al Perú. In: Salzwedel H & A Landa (eds). *Recursos y dinámica del ecosistema de afloramiento peruano*. Boletín Instituto del Mar del Perú, Volumen Extraordinario: 345-352.

Received 20 June de 2020 and accepted 23 March 2021