Aquatic Mammals 2019, *45*(3), 266-273, DOI 10.1578/AM.45.3.2019.266

Short Note

Occurrence of the Commerson's Dolphin (*Cephalorhynchus commersonii*) in Fitz Roy Channel, Pacific Coast of Chilean Patagonia

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Genus *Cephalorhynchus* includes four geographically distinct species ranging from the cold-temperate to sub-Antarctic waters of the Southern Hemisphere. Of the four, two species are found in South America: the Chilean dolphin (*C. eutropia*; Gray, 1846) and the Commerson's dolphin (*C. commersonii*; Lacépède, 1804) (Rice, 1998). The South American subspecies of Commerson's dolphin (*C. c. commersonii*) is found in shallow waters along the Atlantic coast of South America, from Gulf of San José (41° 26' S) to the southern tip of Tierra del Fuego (55° S) of Argentina, including the Falkland (Malvinas) Islands (Goodall et al., 1988; Goodall, 1994).

In Chilean waters, Commerson's dolphins occur frequently in the eastern area of the Magellan Strait (Venegas & Atalah, 1987; Goodall et al., 1988; Leatherwood et al., 1988), although small groups have also been observed occasionally inside the channels system (Goodall et al., 1988; Aguayo-Lobo et al., 1998), with the northernmost record near Chiloe Island (42° 45' S; Capella & Gibbons, 1991) and the southernmost in the Drake Passage to the Pacific (Aguayo-Lobo & Torres, 1967). With the exception of the eastern area of the Magellan Strait, the paucity of records of Commerson's dolphins inside of fjords and channels to south of 40° S in the Pacific suggests that its occurrence is unusual. In fact, Commerson's dolphins are relatively easy to identify, but there are fewer than 60 reports (Goodall et al., 1988; Aguayo-Lobo et al., 1998) from hundreds of ships, including wildlife observation-oriented cruise ships—birders or naturalists traversing these fjords and channels. Herein, we provide information on the occurrence of Commerson's dolphins in Fitz Roy Channel located between Otway and Skyring Sounds, 60 km northwest of Punta Arenas, Chile, and discuss whether this subspecies can be regarded as resident to this particular area of the Chilean Pacific coast.

Fitz Roy Channel (52° 43' 17" S, 71° 23' 19" W; Figure 1) is a narrow passage that connects Otway and Skyring Sounds, two bodies of water with different oceanographic features and regimes (Valdenegro & Silva, 2003). The channel is 21.3 km long with a maximum width of 1,870 m in the south section, a minimum of 441 m in the central part, and a maximum depth of 30 m. The current speed averages 7 km/h, although it can reach 9.3 km/h during tidal changes; and the swell is dictated by the wind. This area does not constitute a maritime traffic route, and maritime access is through the Jeronimo Channel that connects Otway Sound with the western section of the Magellan Strait, and the Gajardo Channel that connects the Xaultegua Gulf with Skyring Sound 86 km to the northwest of Jeronimo Channel.

Non-systematic and systematic surveys were conducted in different years. Non-systematic surveys were undertaken onboard a local tourist vessel M/V *Forrest* in December 2009 and 2015, January 2011 and 2014, and May 2011 along the entire channel. Here, off-effort sightings of dolphins were made when traveling to and from the vessel's base port. Systematic surveys were carried out monthly (two to four surveys per month) between 28 September 2011 and 10 May 2012. Boat- and land-based stations were used (Figure 1). Boat-based surveys

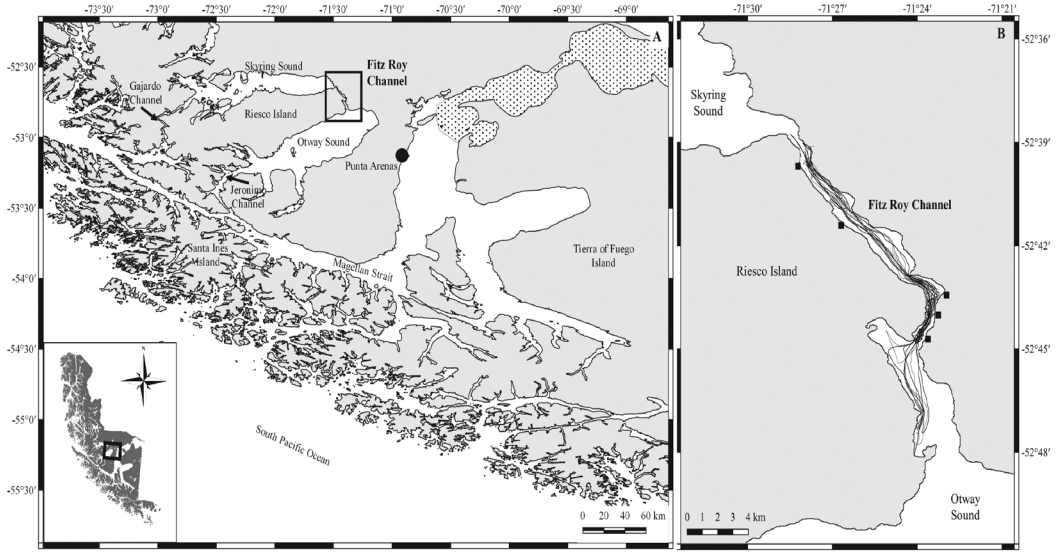

Figure 1. (A) Location of the study area in the southern region of Chile (open square) and normal occurrence of Commerson's dolphins (*Cephalorhynchus commersonii*) in the Magellan Strait (dotted area); and (B) tracks of the inflatable boat (lines) and land-based stations (square filled)

were carried out across the entire channel using an inflatable boat (MK-V Zodiac) powered by a 75-hp outboard engine. Boat surveys were limited to Beaufort Sea State ≤ 2. For each sighting, information about the number of individuals per group, presence of calves, and geographic position (hand-held GPS) was recorded. Additional information included date, initial and final time of the sighting(s), weather conditions (e.g., wind, cloudiness, and air temperature), and general behaviors (e.g., traveling, feeding, and resting).

When boat surveys were not possible, land-based stations were set up in five locations according to accessibility and height. Two of these land-based stations were public access (north of channel), and the other three land-based stations were private access through Olga Teresa Ranch. Each land-based station was ~15 m above sea level allowing a visual field between 70° and 300° over a complete portion of the channel. The lack of terrestrial accessibility in the southern portion of the channel did not allow monitoring from land. Visual monitoring was conducted at each land-based station (not at the same time) and when weather conditions were favorable (e.g., good visibility with a sea state below or equal to 4 on the Beaufort scale). At each land-based station, the area was scanned by two observers with the aid of 7x50 Celestron Oceana binoculars. When a Commerson's dolphin group was sighted, a third observer recorded the compass bearing and read graduated reticles (vertical angles) from another Celestron Oceana binocular, as well as the height and coordinates of a reference point (hand-held GPS) of the land-based station. From this information, the distance between the observer and the animals was estimated following Kinzey & Gerrodette (2003) and projected on Open Source Geographic Information System QGIS to provide a position in WGM-84, datum 18. The data collected from different survey types were combined to assess the occurrence of Commerson's dolphins in Fitz Roy Channel.

Once the observations were collected, the dolphins were photographed for individual identification. During boat surveys, photographs of the dorsal fin and right side of the body were collected using Nikon D-200 and D-300 digital cameras with a 70-200-mm lens. From the land-station, a D-300 digital camera with a 300-mm or 600-mm lens was used. Just like the boat surveys, images were preferably taken from the dolphins' right sides. All images were assessed for clarity, contrast, and angle, with images of poor quality discarded. Identification of individuals was determined based on the distinctiveness of nicks and notches on the trailing edge of the dolphin's dorsal fin and secondarily on the black pigmentation extensions from the margin of the black dorsal region (Hammond et al., 1990; Iñíguez & Tossenberger, 2007). For dolphins with a lack of distinguishing marks on their dorsal fin, black pigmentation comparisons were restricted to photographs of the right side. Each

photo-identified individual was assigned a unique code, and subsequent identifications of the same individual were coded as "resighted." The images of the dorsal fin and black pigmentation extensions collected from different survey types were combined to assess the resident status of Commerson's dolphins in Fitz Roy Channel.

A group of resident dolphins can be defined as those individuals that spend more than 50% of their time in an area during a given year (Rosel et al., 2011; Mason et al., 2016). Because our surveys cover less than a year, we use the concept of "seasonal resident" for those dolphins that were resighted more than 50% of the time within the channel across all systematic surveys (Balmer et al., 2008). We used austral seasons of spring (28 September to 20 December), summer (21 December to 20 March), and early autumn (21 March to mid-May). No surveys were available for winter.

Thirty surveys, including both non-systematic (n = 7) and systematic surveys (n = 23), were undertaken in the Fitz Roy Channel between December 2009 and December 2015. The systematic surveys between 22 April and 10 May 2012 (n = 3) were suspended shortly after starting due to weather conditions and, thus, excluded from the analysis. The effort for each type and season during systematic surveys from September 2011 to April 2012 are presented in Table 1.

Commerson's dolphins were encountered during 26 (96.2%) of the 27 surveys (Figure 2), covering 9 mo from late September to mid-May; and 62 sightings of Commerson's dolphin's groups were recorded across all surveys. The number of individuals sighted in the area fluctuated throughout the study period, ranging from one to 22 individuals per survey (Figure 2), with a mean group size of 3.0 ± 1.6 (range: 1 to 8 dolphins per group). There were also three small calves sighted in January 2011 and two other calves sighted in eight occasions from January to March 2012.

Commerson's dolphins were generally seen in the middle part of the channel (97% of total sightings), with depths ranging from 20 to 30 m (Figure 3). This was not an artifact of sightability because for all surveys completed during which the whole channel was covered, the dolphins were almost always found in this area of the channel.

Six Commerson's dolphins were identified from 68 images taken during non-systematic surveys, and 16 other individuals were identified from 321 frames during the systematic surveys. Dorsal fin markings were used to identify

Table 1. Effort (in hours) for each type and season during systematic surveys from September 2011 to April 2012 in Fitz Roy Channel

Survey type	Season			
	Spring	Summer	Autumn	Total
Boat survey	11:58	08:00	--	19:58
Land survey	21:22	43:56	10:35	75:53
Total	33:20	51:56	10:35	95:51

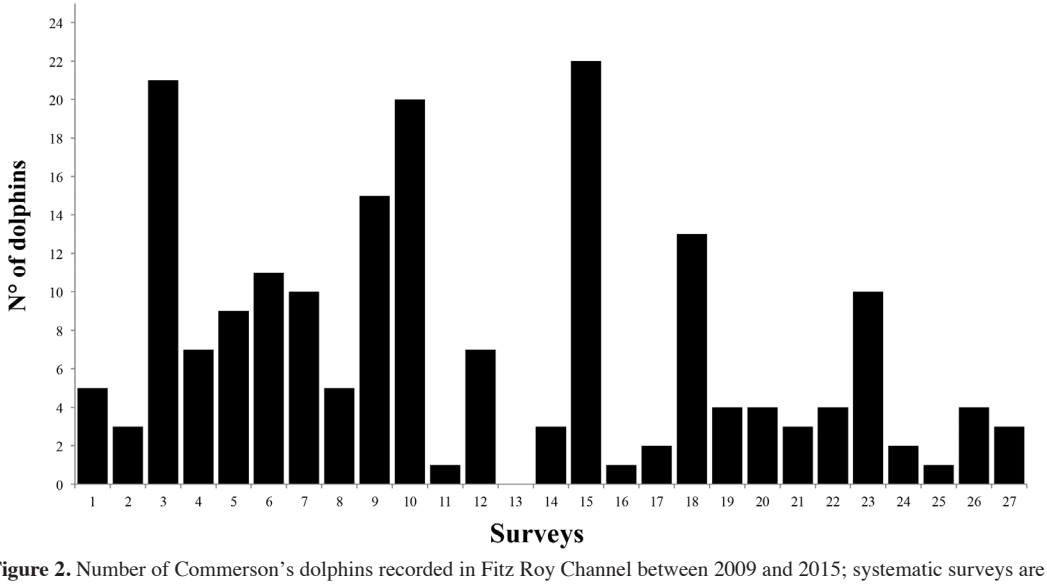

Figure 2. Number of Commerson's dolphins recorded in Fitz Roy Channel between 2009 and 2015; systematic surveys are represented between the numbers 6 and 25.

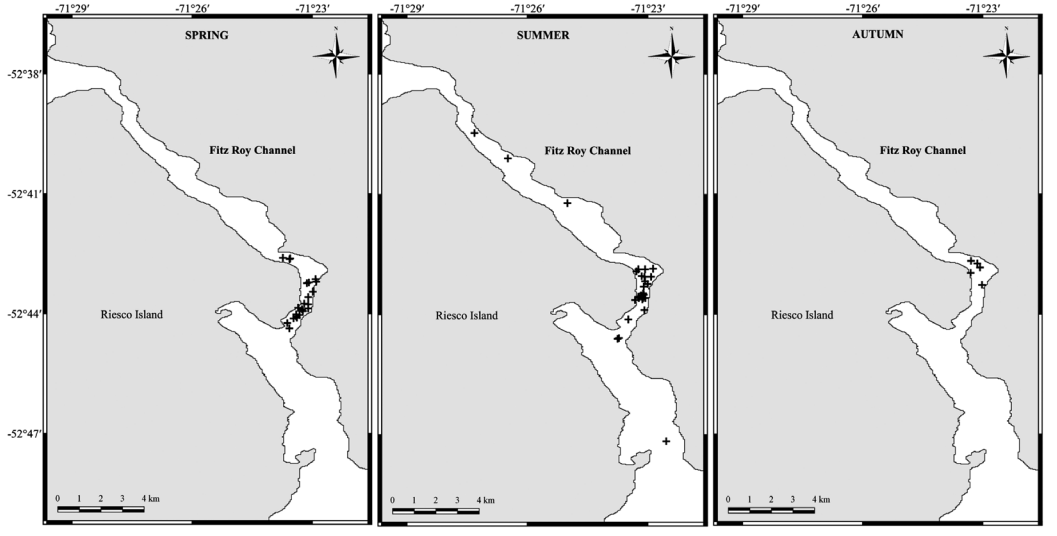

Figure 3. Seasonal distribution of Commerson's dolphin sightings (crosses) in Fitz Roy Channel in both non-systematic and systematic surveys combined

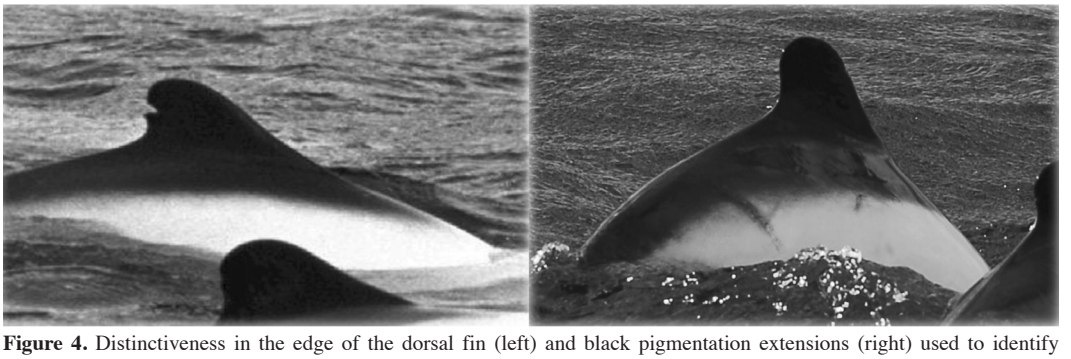

Figure 4. Distinctiveness in the edge of the dorsal fin (left) and black pigmentation extensions (right) used to identify Commerson's dolphins (*Photo credit:* Jorge Acevedo)

15 animals, and black pigmentation extensions were used to identify seven other individuals (Figure 4). Considering only systematic surveys, eight Commerson's dolphins had sighting rates of more than 50% (range: 50 to 87%), which is suggestive of seasonal residence (Table 2). The remaining animals had sighting rates of 12 to 37%. Interestingly, there were also three Commerson's dolphins previously photographed in December 2009 in the Fitz Roy Channel and resighted in the 2011 and 2012 surveys in the study area, suggesting some degree of site fidelity over multiple years (Table 3).

This study focused on a small and restricted area, with surveys and photo-identification of Commerson's dolphins facilitating a minimization of biases caused by failing to see animals or to

Table 2. Sighting rates of Commerson's dolphins (*Cephalorhynchus commersonii*) observed in Fitz Roy Channel during systematic surveys; only individuals with a sighting rate of ≥ 50% are presented.

ID no.	No. months observed	Seasons observed	Percentage of months sighted
#002	7	Spr, Sum, Aut	87.5
#003	5	Spr, Sum, Aut	62.5
#005	5	Spr, Sum	62.5
#010	6	Spr, Sum	75.0
#012	5	Spr, Sum	62.5
#013	4	Spr, Sum	50.0
#014	6	Spr, Sum, Aut	75.0
#015	5	Spr, Sum	62.5

correctly identify individuals. Until this study, the paucity of records of Commerson's dolphins in the fjords and channels of Chilean Patagonia suggests that its occurrence is unusual (e.g., Gibbons et al., 2000). For our study area, the only previously published information of Commerson's dolphin were two opportunistic sightings in the 1990s, supporting the notion that it is not common to observe this species on the Pacific side (Gibbons et al., 2000); however, the frequency and effort of surveys conducted then is unknown. This study showed that small Commerson's dolphin groups were regularly observed, at least in Fitz Roy Channel, during 9 mo across early spring to mid-autumn seasons, representing the first likely seasonal recurrence of this species in Chilean Patagonia. Group size of dolphins recorded in the channel (mean group size: 3 ± 1.6) were similar to that reported for this species in other areas of Patagonia (e.g., Goodall et al., 1988; Iñiguez & Tossenberger, 2007; Righi et al., 2013).

On the other hand, and despite our temporal limitations and absence of surveys in winter, our results also revealed that at least eight dolphins showed a sighting rate > 50% and might be considered to be seasonal residents in the channel. In addition, three of these dolphins were resighted from previous years suggesting site philopatry over multiple years. This concept of a resident group of Commerson's dolphins is supported by the fact that this species has shown residencies at both the small scale and small community size to estuaries or bays along the Atlantic coast of South America (e.g., Iñíguez & Tossenberger, 2007; Castro et al., 2013; Righi et al., 2013). Additionally, the fact that some individuals were observed repeatedly during this study, but others were sighted only occasionally, suggests the presence of a stable core of dolphins that is probably visited by individuals from other areas. This model of a small resident population that is visited by other individuals has been discussed for Hector's dolphins (*Cephalorhynchus hectori*; Bejder & Dawson, 2001); and it might also be the case for Commerson's dolphins inhabiting the Deseado Estuary in Argentina (Righi et al., 2013).

Residency of dolphins is primarily related to resources spatially available and temporally predictable but also is linked with the absence of predators and suitable breeding and/or nursing areas (Ballance, 1990, 1992; Weller, 1991; Wells, 1991; Gowans et al., 2007). In this way, Commerson's dolphins were mostly congregated in a particular area of the channel which has a distinct coastline and bottom topography, and where eddies and highest current speeds are produced during tidal cycles. These distinct features likely allow the area to be productive enough to sustain a small aggregation of Commerson's dolphins and to facilitate residency. This preference of shallow water with tidal cycles and high current speeds has been shown to influence the distribution pattern of this species (Castro et al., 2013; Righi et al., 2013). Commerson's dolphins are opportunistic coastal feeders, feeding on schooling fish and a variety of invertebrates such as squid, mysid, and shrimp (Bastida et al., 1988; Goodall et al., 1988; Koen-Alonso, 1999). Along the Atlantic coast of South America, post-larval hake (*Merluccius hubbsi*) appear as important prey in central Patagonia (Crespo et al., 1997), while silverside-like fishes such as *Sorgentinia incise*, *Odonthestes* spp. (Atherinidae), and Argentine anchovy have been reported in northern Patagonia (Coscarella et al., 2010). According to Bastida et al. (1988) and Iñiguez et al. (2000), silverside and Fueguian sprat (*Sprattus fueguensis*) are important food items for this dolphin in Santa Cruz and Tierra del Fuego in southern Patagonia on the Atlantic side of South America. This may be the case for the Commerson's dolphins inhabiting the Fitz Roy Channel because during some surveys, the dolphins were seen feeding on Fueguian sprat in association with South American terns (*Sterna hirundinacea*). Other prey species such as squat lobster (*Munida gregaria*) are widespread and abundant throughout the year in the area and cannot be discarded as prey during low tide.

In the *Cephalorhynchus* genus, it appears that populations show limited movements (Bräger et al., 2002; Dawson, 2002; Elwen et al., 2006; Heinrich, 2006; Rayment et al., 2009). For Commerson's dolphins, photo-identification studies have documented movements ranging from 24 to 250 km

Table 3. Resighting dates of three Commerson's dolphins in Fitz Roy Channel over multiple years (2009, 2011, and 2012) in the present study

ID	Date first sighted	Resighting dates (month/year)						
#002	12/2009	9/2011	11/2011	12/2011	1/2012	2/2012	3/2012	4/2012
#003	12/2009	1/2011	9/2011	11/2011	1/2012	3/2012	4/2012	--
#005	12/2009	1/2011	10/2011	11/2011	1/2012	2/2012	3/2012	--

(Coscarella, 2005; Iñíguez & Tossenberger, 2007; Coscarella et al., 2011). Although we do not know the movements of Commerson's dolphins in the Fitz Roy Channel and home range, the current occurrence of this species in the study area might extend their movement range by at least 480 km from their nearest distribution in the eastern section of the Magellan Strait. To date, this is the first report of a stable occurrence of Commerson's dolphins on the Pacific side of South America. More research must be done to understand their presence throughout the year (in all seasons), and the ecology of this small community of dolphins in this particular area, to support future conservation efforts of these small dolphins in the Chilean Patagonia.

Acknowledgments

We thank the Fundación CEQUA and Instituto Antártico Chileno for the facilities provided for the preparation of this manuscript. We especially thank Rodolfo Concha for allowing access to the coast of the Fitz Roy Channel through Olga Teresa Ranch; Juan Jose Salas, Fitz Roy Expeditions Manager, and the crew of the tourist vessel *Forrest* for providing maritime logistical support; and Francisco Martinez, tourist guide of the *Forrest*, for providing the data of January 2014 and December 2015. We also thank Miwako Yokoo for improving the English throughout the manuscript, as well as the reviewers who were helpful in improving it. This small project was funded by the Fondo de Innovación para la Competitividad FIC-R Magallanes 2010 BIP 30106946-0, and time for the preparation of this manuscript by the first author was provided by Conicyt Regional R13A1002.

Literature Cited

Aguayo-Lobo, A., & Torres, D. (1967). Observaciones sobre mamíferos marinos durante la Vigésima Comisión Antártica Chilena [Marine mammal sightings during the Twentieth Chilean Antarctic Commission]. *Revista de Biología Marina*, *13*, 1-57.

Aguayo-Lobo, A., Torres, D., & Acevedo, J. (1998). Los mamíferos marinos de Chile: I. Cetacea [Marine mammals of Chile: I. Cetacea]. *Serie Científica INACH*, *48*, 19-159.

Ballance, L. T. (1990). Residence patterns, group organization and surface association of bottlenose dolphins in Kino Bay, Gulf of California, Mexico. In S. Leatherwood & R. R. Reeves (Eds.), *The bottlenose dolphin* (pp. 267-284). San Diego, CA: Academic Press. https://doi.org/10.1016/B978-0-12-440280-5.50017-2

Ballance, L. T. (1992). Habitat use patterns and ranges of the bottlenose dolphin in the Gulf of California, Mexico. *Marine Mammal Science*, *8*(3), 262-274. https://doi.org/10.1111/j.1748-7692.1992.tb00408.x

Balmer, B. C., Wells, R. S., Nowacek, S. M., Nowacek, D. P., Schwacke, L. H., McLellan, W. A., . . . Pabst, D. A. (2008). Seasonal abundance and distribution patterns of common bottlenose dolphins (*Tursiops truncatus*) near St. Joseph Bay, Florida, USA. *Journal of Cetacean Research and Management*, *10*, 157-167.

Bastida, R., Lichtschein, V., & Goodall, R. N. P. (1988). Food habits of *Cephalorhynchus commersonii* off Tierra del Fuego. In R. L. Brownell, Jr. & G. P. Donovan (Eds.), *Biology of the genus* Cephalorhynchus (pp. 143-160). Cambridge, UK: International Whaling Commission.

Bejder, L., & Dawson, S. (2001). Abundance, residency, and habitat utilization of Hector's dolphins (*Cephalorhynchus hectori*) in Porpoise Bay, New Zealand. *New Zealand Journal of Marine and Freshwater*, *35*(2), 277-287. https://doi.org/10.1080/00288330.2001.9516998

Bräger, S., Dawson, S. M., Slooten, E., Smith, S., Stone, G. S., & Yoshinaga, A. (2002). Site fidelity and alongshore range in Hector's dolphin, an endangered marine dolphin from New Zealand. *Biology Conservation*, *108*(3), 281-287. https://doi.org/10.1016/S0006-3207(02)00124-6

Capella, J., & Gibbons, J. (1991). Presencia de tonina overa, *Cephalorhynchus commersonii* (Lacépède 1804), en aguas de Chiloé Continental [Presence of Commerson's dolphin, *Cephalorhynchus commersonii* (Lacépède 1804), in the waters of Chiloé Continental]. *Estudios Oceanológicos*, *10*, 127-130.

Castro, R. L., Dans, S. L., Coscarella, M. A., & Crespo, E. A. (2013). Living in an estuary: Commerson's dolphin (*Cephalorhynchus commersonii* [Lacépède, 1804]), habitat use and behavioural pattern at the Santa Cruz River, Patagonia, Argentina. *Latin American Journal of Aquatic Research*, *41*(5), 985-991. https://doi.org/10.3856/vol41-issue5-fulltext-17

Coscarella, M. A. (2005). Ecología, comportamiento y evaluación del impacto de embarcaciones sobre manadas de tonina overa *Cephalorhynchus commersonii* en Bahía Engaño, Chubut [Ecology, behavior and evaluation of the impact of boats on schools of Commerson's dolphin *Cephalorhynchus commersonii* in Bahía Engaño, Chubut] (Doctoral thesis). Universidad de Buenos Aires, Buenos Aires, Argentina.

Coscarella, M. A., Pedraza, S. N., & Crespo, E. A. (2010). Behavior and seasonal variation in the relative abundance of Commerson's dolphin *Cephalorhynchus commersonii* in northern Patagonia, Argentina. *Journal of Ethology*, *28*(3), 463-470. https://doi.org/10.1007/s10164-010-0206-4

Coscarella, M. A., Gowans, S., Pedraza, S. N., & Crespo, E. A. (2011). Influence of body size and ranging patterns on delphinid sociality: Associations among Commerson's dolphins. *Journal of Mammalogy*, *92*(3), 544-551. https://doi.org/10.1644/10-MAMM-A-029.1

Crespo, E. A., Pedraza, S. N., Dans, S. L., Koen Alonso, M., Reyes, L. M., García, N. A., . . . Schiavini, A. C. M. (1997). Direct and indirect effects of the highseas fisheries on the

marine mammal populations in the northern and central Patagonian coast. *Journal of Northwest Atlantic Fishery Science*, *22*, 189-207. https://doi.org/10.2960/J.v22.a15

Dawson, S. M. (2002). *Cephalorhynchus* dolphins: *C. heavisidii*, *C. eutropia*, *C. hectori* and *C. commersonii*. In W. F. Perrin, B. Würsig, & J. G. M. Thewissen (Eds.), *Encyclopedia of marine mammals* (pp. 200-203). San Diego, CA: Academic Press.

Elwen, S., Mëyer, M. A., Best, P. B., Kotze, P. G. H., Thornton, M., & Swanson, S. (2006). Range and movements of female Heaviside's dolphins (*Cephalorhynchus heavisidii*), as determined by satellite-linked telemetry. *Journal of Mammalogy*, *87*(5), 866-877. https://doi.org/10.1644/05-MAMM-A-307R2.1

Gibbons, J., Gazitúa, F., & Venegas, C. (2000). Cetáceos en el estrecho de Magallanes y senos Otway, Skyring y Almirantazgo [Cetaceans in the Magellan Strait and Otway, Skyring and Admiralty Sounds]. *Anales del Instituto de la Patagonia*, *28*, 107-118.

Goodall, R. N. P. (1994). Commerson's dolphin *Cephalorhynchus commersonii* (Lacépède 1804). In S. H. Ridgway & R. Harrison (Eds.), *Handbook of marine mammals* (pp. 241-267). San Diego, CA: Academic Press.

Goodall, R. N. P., Galeazzi, A. R., Leatherwood, S., Miller, K. W., Cameron, I. S., Kastelein, R. A., & Sobral, A. P. (1988). Studies of Commerson's dolphins, *Cephalorhynchus commersonii*, off Tierra del Fuego, 1976-1984, with a review of information on the species in the South Atlantic. In R. L. Brownell, Jr. & G. P. Donovan (Eds.), *Biology of the genus* Cephalorhynchus (pp. 3-70). Cambridge, UK: International Whaling Commission.

Gowans, S., Würsig, B., & Karczmarski, L. (2007). The social structure and strategies of delphinids: Predictions based on an ecological framework. *Advances in Marine Biology*, *53*, 195-294. https://doi.org/10.1016/S0065-2881(07)53003-8

Hammond, P. S., Mizroch, S. A., & Donovan, G. P. (1990). Individual recognition of cetaceans: Use of photo-identification and other techniques to estimate population parameters. *Reports of the International Whaling Commission*, *Special Issue 12*, 3-17.

Heinrich, S. (2006). *Ecology of Chilean dolphins and Peale's dolphin at Isla Chiloé, southern Chile* (Doctoral thesis). University of St Andrews, Scotland. Retrieved from www.yaqupacha.org/fileadmin/user_upload/pdf/heinrich_2006_phdthesis.pdf

Iñíguez, M. A., & Tossenberger, V. P. (2007). Commerson's dolphins (*Cephalorhynchus commersonii*) of Ría Deseado, Patagonia, Argentina. *Aquatic Mammals*, *33*(3), 276-285. https://doi.org/10.1578/AM.33.3.2007.276

Iñiguez, M. A., Tossenberger, V. P., & Tomsin, A. L. (2000). Comportamiento y biología de toninas overas (*Cephalorhynchus commersonii*) en la Bahía San Julián, Pcia. de Santa Cruz, Argentina [Behavior and biology of Commerson's dolphin (*Cephalorhynchus commersonii*) in San Julián Bay, Pcia. of Santa Cruz, Argentina]. *9° RT y 3° Congreso SOLAMAC*, Buenos Aires, Argentina. 62 pp.

Kinzey, D., & Gerrodette, T. (2003). Distance measurements using binoculars from ship at sea: Accuracy, precision and effects of refraction. *Journal of Cetacean Research and Management*, *5*(2), 159-171.

Koen-Alonso, M. (1999). Estudio comparado de la alimentación entre algunos predadores de alto nivel trófico de la comunidad marina del norte y centro de Patagonia [Comparative studies of feeding among some high-level trophic predators of the marine community in North and Central Patagonia] (Ph.D. thesis). Ciencias Biológicas, Universidad Nacional de Buenos Aires, Buenos Aires, Argentina. 182 pp.

Leatherwood, S., Kastelein, R. A., & Hammond, P. S. (1988). Estimate of numbers of Commerson's dolphins in a portion of the northeastern Strait of Magellan, January-February 1984. In R. L. Brownell, Jr. & G. P. Donovan (Eds.), *Biology of the genus* Cephalorhynchus (pp. 93-102). Cambridge, UK: International Whaling Commission.

Mason, S., Salgadom, K. C., Donnelly, D., Weir, J., & Bilgmann, K. (2016). Atypical residency of short-beaked common dolphins (*Delphinus delphis*) to a shallow, urbanized embayment in south-eastern Australia. *Royal Society Open Science*, *3*, 160478. https://doi.org/10.1098/rsos.160478

Rayment, W., Dawson, S., Slooten, E., Bräger, S., Du Fresne, S., & Webster, T. (2009). Kernel density estimates of alongshore home range of Hector's dolphins at Banks Peninsula, New Zealand. *Marine Mammal Science*, *25*(3), 537-556. https://doi.org/10.1111/j.1748-7692.2008.00271.x

Rice, D. W. (1998). *Marine mammals of the world: Systematics and distribution* (Special Publication 4). Lawrence, KS: The Society for Marine Mammalogy.

Righi, C. F., Blanco, G. S., & Frere, E. (2013). Abundance and spatial distribution of Commerson's dolphin (*Cephalorhynchus commersonii*) at a breeding site: Ría Deseado, Patagonia, Argentina. *Aquatic Mammals*, *39*(1), 1-9. https://doi.org/10.1578/AM.39.1.2013.1

Rosel, P. E., Mullin, K. D., Garrison, L., Schwacke, L., Adams, J., Balmer, B., . . . Zolman, E. (2011). *Photo-identification capture-mark-recapture techniques for estimating abundance of bay, sound and estuary populations of bottlenose dolphins along the U.S. East Coast and Gulf of Mexico: A workshop report* (NOAA Technical Memo NMFS-SEFSC 621). Lafayette, LA: National Oceanic and Atmospheric Administration. 30 pp.

Valdenegro, A., & Silva, N. (2003). Caracterización oceanográfica física y química de la zona de canales y fiordos australes de Chile entre el estrecho de Magallanes y cabo de Hornos (Cimar 3 Fiordos) [Physical and chemical oceanographic characterization of the southern channels and fjords of Chile between the Magellan Strait and Cape Horn (Cimar 3 Fjords)]. *Ciencia y Tecnología del Mar*, *26*, 19-60.

Venegas, C., & Atalah, A. (1987). Prospección aérea otoñal de toninas overas (*Cephalorhynchus commersonii*) en el estrecho de Magallanes [Autumn aerial prospection of

Commerson's dolphins (*Cephalorhynchus commersonii*) in the Magellan Strait]. *Anales del Instituto de la Patagonia*, *17*, 69-75.

Weller, D. W. (1991). *The social ecology of Pacific coast bottlenose dolphins* (Master's thesis). San Diego State University, San Diego, CA.

Wells, R. S. (1991). The role of long-term study in understanding the social structure of a bottlenose community. In K. Pryor & K. S. Norris (Eds.), *Dolphin societies: Discoveries and puzzles* (pp. 199-225). Los Angeles: University of California Press.