A note on the southern distribution range of inshore and offshore common bottlenose dolphins *Tursiops truncatus* in the Southeast Pacific

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ABSTRACT

Both inshore and offshore forms of *T. truncatus* occur off Peru and Chile. The inshore form in Chile is best documented from a single community resident around 29°S, while there is genetic evidence for a large, wide-ranging Peru-Chile offshore population. Oliver (1946) indicated *T. truncatus* for the Gulf of Arauco (at 37°06'S,73°20'W) and despite there was no authentication for half a century it has been the accepted southernmost range in the SE Pacific. However five recent records shift the focus further south to Región de Aisén. In August 2004 two common bottlenose dolphins stranded at Isla Quenu (41°49'.41S,73°9'.01W); next a mother-calf pair was reported inside a fjord at *ca.* 42°22'S,72°24'W. From habitat and small group size an inshore form was suspected. However, three new sightings of large group size (40-120 individuals) between 43°-45°S in January and December 2007 compelled us to reevaluate the southern distribution range of the species and of each form/ecotype. The bottlenose dolphins were morphologically (very large, stocky bodies with short snout) and behaviourally (large group size) attributable to an offshore form, despite being encountered deep inside fjords of Chilean Patagonia, one at *ca.* 50 nmiles from open water. All groups were actively attracted to a large RIB and both video and still photographs were collected as voucher material. Our records extend the summer range of *T. truncatus* in the SE Pacific south to 45°05'.597S,73°19'.996W, Magdalena Island, however we expect that additional survey effort may extend this even farther. The population will need to be identified with precision to allow management recommendations.

Key words: bottlenose dolphins, *Tursiops*, Distribution Range, Southeast Pacific, Chile

INTRODUCTION

In the Southeast Pacific Ocean, common bottlenose dolphins *Tursiops truncatus* [further: 'bottlenose dolphins'] are reported from the Galápagos Archipelago, continental Ecuador, Peru, and Chile south to about Concepción (reviewed below). Van Waerebeek *et al.* (1990) first described inshore and offshore forms for western South America on morphological and ecological evidence, later backed by mt-DNA analysis (Sanino *et al.*, 2005). The forms or 'ecotypes' are distinct, reproductively isolated populations.

Yañez (1948) and Mann (1958) did not even list *T. truncatus* among the marine mammals of Chile and until 1983 no specimens existed in Chilean collections (Sielfeld, 1980, 1983). Indicative, none are available in Santiago's Museo Nacional de Historia Natural (J. Yañez, MNHN, curator of mammals, *pers.comm.* to GPS) despite housing an important historical cetacean collection. Only a few specimens are identified today, most from the Antofagasta area. Strandings are indeed very rare. In more than 15 years CMMR members collected a single specimen.

In Chile, bottlenose dolphins have been studied mostly in the central-north around 29°S, where a unique, small inshore community occurs with a high site fidelity (see below). There are no other known sites in Chile with a similar inshore community of *T. truncatus*. The southern distribution range of the offshore population in the SE Pacific is unknown, given that the study of small cetaceans in much of Patagonia is incipient. We here succinctly review the distribution of *T. truncatus* in the Southeast Pacific and discuss its southern limits in view of five recent records in the fjords of Chilean Patagonia.

MATERIAL AND METHODS

Offshore bottlenose dolphin sightings are fairly common in Chilean waters. Published and some unpublished sightings which have associated geographical location data are plotted in Figure 2. Recently three large bottlenose dolphin groups were observed by the senior author in Patagonia (Table 2), while guiding commercial whalewatching for *Nomads of the Seas* (NOTS) in the austral summers of 2006-07 and 2007-08. These records are farther south than any reported till date. NOTS offers *i.a.* high-end nature tourism, including inshore and offshore whale and dolphin watching in remote parts of the fjord region east of Chiloé Island, from 41°-47°S. A 45.7m mothership carries a variety of observation platforms including jetboats, RIBs, kayaks and a helicopter. Its main whalewatching platform is a powerful 10m RIB (Zodiac Hurricane 920OB) with two ultra-low emission Yamaha 250HP outboard engines and fully equipped with a NAVNET VX2 navigation system,

forward looking sounder, hydrophone, high definition camcorder and photocamera, and VR lenses linked to an underwater camera.

SUMMARY OF DISTRIBUTIONAL DATA

Ecuador

The behavioural ecology of an inshore population in the Gulf of Guayaquil has been researched in some detail (Félix, 1994a,b, 1997, 2001). Specimens collected, *i.a.* by Chiluiza *et al.* (1998), are currently under study by Santillan *et al.* (2008). Bottlenose dolphins are common around the Galápagos Islands and believed to be an offshore form (e.g. Lévêque, 1963; K. Van Waerebeek, pers. observations; Palacios *et al.*, 2004).

Peru

Bottlenose dolphins occur off the entire Peruvian coast (e.g. Grimwood, 1969; Donovan, 1984; Van Waerebeek *et al.*,1988, 1990; Sánchez *et al.*, 1998; Reyes *et al.*, 2002; CEPEC, unpublished data). Van Waerebeek *et al.*(1988, 1990) first indicated the existence of Peruvian inshore and offshore forms and described their morphological and ecological characteristics. Additional evidence arose from recent cranial variation studies (Santillan, 2003; Santillan *et al.*, 2008) and an analysis of mt-DNA variation (Sanino *et al.*, 2005).

Chile Inshore form

A single community of 30-35 individuals is resident at least since 1984 around Islas Chañaral, Damas, Choros and Gaviota (29°02'S) (González *et al.*,1989; Gibbons, 1992; Capella *et al.*, 1999; Sanino and Yañez, 2000, 2001; Sanino *et al.*, 2005; Canepa *et al.*, 2006). This so-called 'pod-R' was found to be more related to the Chilean offshore form than to the Peruvian inshore population, i.e. 0.87% and 3.41% net interpopulational distance, respectively (Sanino *et al.*, 2005). The northern range of the Chile inshore form is unclear. KVW has searched beaches and visited the area around the ports of Arica and Iquique many times over two decades (1985-2007) without encountering any evidence of inshore *T. truncatus*. The four specimens (Table 1) collected in the Antofagasta-Mejillones area (Guerra *et al.*, 1987) are thought to be offshore specimens.

Since Oliver (1946) mentioned *T. truncatus* for the Gulf of Arauco (centred at 37°06'S,73°20'W) it has been, by default of better data, the species' accepted southernmost range in the SE Pacific for half a century (Aguayo, 1975; Van Waerebeek *et al.*, 1990) although no authenticated records were available then, nor to our knowledge, were documented later.

Specimen N°	Material	Origin	Comments	Reference
AMM-14	foetus	Mejillones (23°06'S)	Captured female/mother butchered in port of Mejillones (probably offshore)	Guerra *et al.*, 1987
AMM-17	complete skeleton	Coloso (23°43'S)	harpooned reportedly close to the coast, but may be an offshore specimen	Guerra *et al.*, 1987
AMM-26	calvaria	Coloso (23°43'S)	n.a.	Guerra *et al.*, 1987
AMM-28	calvaria	Paso Malo (21°58'S)	n.a.	Guerra *et al.*, 1987
IRD 001	skull, some teeth, photos	S. of Bahía Inglesa (27°10'S, 70°55'W); Offshore skull morphology.	Stranded with multiple cut marks and flukes severed, coll. by Ignacio Rubilar on 2 Feb 1999.	This paper

Table 1. Preliminary list of common bottlenose dolphin specimens curated in Chilean collections. The Isla Quenu individual (see text) is thought to have been sampled, but its whereabouts are unknown.

Chile Offshore form

The offshore form is common and abundant in Chilean waters (Figure 2). The IWC/SOWER 97/98 Blue Whale Cruise off Chile, in which both authors participated, recorded 49 sightings of bottlenose dolphins in offshore waters, 46 as single species and three mixed with *Grampus griseus* or *Globicephala* sp., from 18°S-40°S (Findlay *et al.*, 1998; and Figure 2). School sizes ranged 2 – 2,000 individuals (average 107.23). Offshore insular habitat includes Islas San Ambrosio and San Félix (Gilmore, 1971; Aguayo, 1975) and Archipelago de Juan Fernández (Aguayo, 1975; Sielfeld, 1983). We are unaware of records from Easter Island (Isla de Pascua or Rapa nui). Although Sala y Gómez Island has been named, no specific records are identified.

Large transient groups of the offshore form are known to approach the coast occasionally, at least in the Isla Chañaral area (Capella *et al.*, 1999; G.P. Sanino, unpublished data), possibly also at Coloso (Guerra *et al.*, 1987) and in Patagonia (see below). The net genetic distance (mt-DNA) between the Peruvian and Chilean offshore forms was estimated as 0.024, and no significant differences were found in haplotype frequencies, suggesting a single, wide-ranging 'Peru-Chile offshore stock' (Sanino *et al.*, 2005).

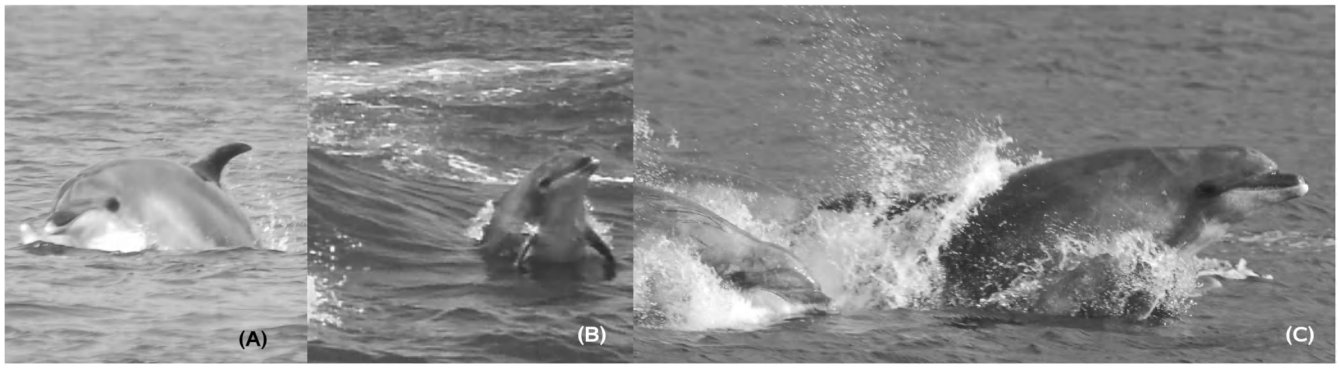

Figure 1. Common bottlenose dolphins in (A) Temuan Channel, 44°45'.058S, 73°42'.871W, on 12 January 2007; (B) Daye Point, 43°08'.570S, 72°54'.86W, on 20 December 2007 and (C) Vera Sound, 45°05'.597S, 73°19'.996W, on 13 January 2007.

Patagonian bottlenose dolphins

A mother-calf pair was reported inside a fjord at *ca.* 42°22'S in the Región de los Lagos or X Región (Table 2), of which the mother suffered extensive vesicular lesions (Viddi *et al.*, 2005; Van Bressem *et al.*, 2007). From habitat, small group size and the skin disease, an inshore form was suspected, but this remains uncertain.

Three unusual sightings by GPS of large groups of *T. truncatus* farther south, between 43°-45°S in January and December 2007 (Figure 1; Table 2), compel us to remain cautious about form assignation where coastal sightings are involved. These sightings extend the southern distribution range of *T. truncatus* another 2°30' further south in the SE Pacific. All three were morphologically (very large, stocky bodies with short, stubby snout; obscured cape pattern in some) and behaviourally (large group size; fast, high-energy swimmers) attributable to an offshore form, despite being encountered deep inside fjords. One was almost 50 nmiles from open water. The use of this 'coastal' environment however is explainable because waters in these fjords are deep, typically reach several hundreds of meters in the main channels and several tens of meters even in the smaller channels. The fjords provide shelter from the, at these latitudes, very rough waters of the South Pacific Ocean, as well as provide prey as fish associated with the numerous rivers reaching the sea. Estimated group sizes ranged from 40-120 individuals, consistent with the Chilean offshore form, and bigger than inshore group sizes in the SE Pacific (Van Waerebeek *et al.*, 1990; CEPEC, unpublished data). All groups were actively attracted to the large rigid-hull inflatable and engaged with swimming at high speed and frequent jumps. Both video and still photographs were collected as voucher material. Variation in colouration patterns was unusually high and will be discussed elsewhere.

Date	Position	Location	N	Notes	Reference or Source
02Aug2004	41°49'41S, 73° 9'01W	inshore	2	stranded, trapped by a fast receding tide in a sound at Isla Quenu, Los Lagos region. One died one successfully re-floated.	Sanino *et al.* (2005)
Dec2003	42°22'S, 72°24'W	Fjords of Comau or Reñihué	2	A female bottlenose dolphin, observed with its calf, presented 'ring lesions', thought to be an early symptom of tattoo disease. Seen near Palena.	Viddi *et al.*, 2005; Van Bressem *et al.*, 2007
20Dec2007	43°08'.570S, 72°54'.86W	Northern limit of Corcovado Bay, Daye Point	100	Large school composed by smaller groups, feeding in the site for longer than three hours. Video.	GPS sighting; this paper
12Jan2007	44°45'.058S, 73°42'.871W	Northwestern limit of Tránsito Island, Temuan Channel	40	Slow traveling in east-west direction. High definition photos.	GPS sighting; this paper
13Jan2007	45°05'.597S, 73°19'.996W	Southern Magdalena Island, Vera Sound	120	Large school composed by smaller groups, inside a small sound, swimming in SW direction. High-definition video and photos.	GPS sighting; this paper

Table 2. Recent, documented sighting records of *Tursiops truncatus* in waters of Chilean Patagonia.

Also in the area around the northern Chañaral/Choros (near shore) Islands (triangle in Figure 2) have morphological and behavioural differences been documented between offshore and inshore forms. Inshore animals showed extensive skin marks, tooth rakes and other scars, as well as longer, more slender rostra and tended to move around in small, slow-travelling formations (Sanino and Yáñez, 2000, 2001; Sanino *et al*., 2005; Canepa *et al.*, 2006).

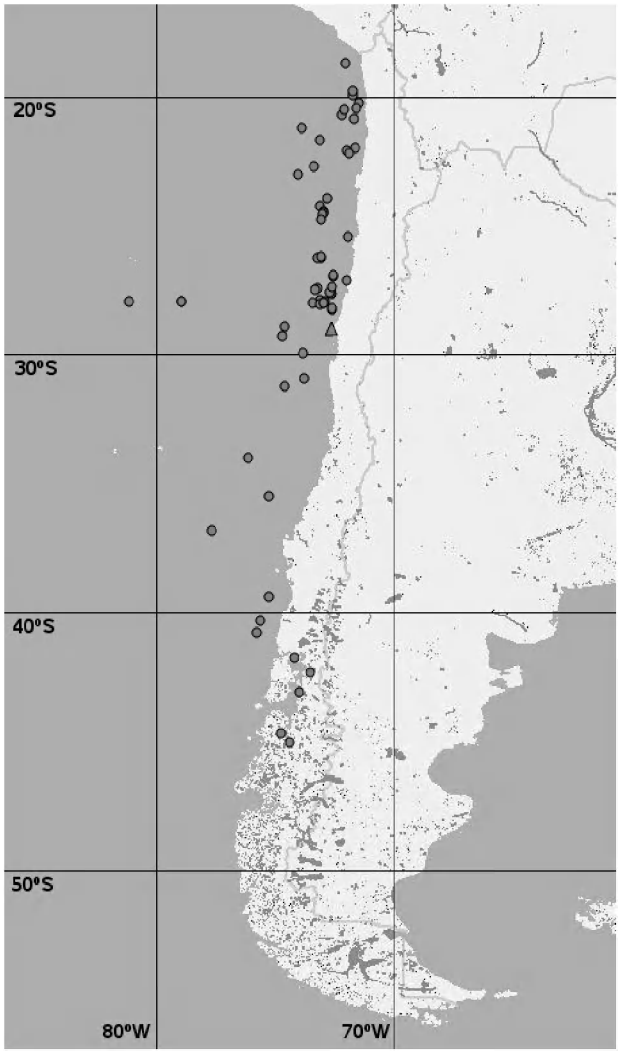

Figure 2. Geographic distribution of confirmed sighting records (dots) of common bottlenose dolphins in Chile. Sources include Aguayo (1975), Clarke *et al.* (1978); Findlay *et al.* (1998), Viddi *et al.* (2005), Sanino *et al.* (2005), unpublished data (this paper). The multiple sightings in the Chañaral/Choros area are represented by a single triangle.

CONCLUSIONS

The new sightings presented here show that the distribution of *T. truncatus* in the SE Pacific extends farther south in Patagonia than expected. Specifically they extend the summer range south to at least Magdalena Island, Vera Sound, at 45°05'.597S, 73°19'.996W. Continued survey effort in the XI Región may push this range even more austral, however *T. truncatus* has not been encountered in southern Aisén and Magallanes, from 49°S-53°S, where search effort has been considerable (*e.g.* Sielfeld and Venegas, 1978; Lescrauwaet and Gibbons, 1994). Morphological and behavioural characteristics indicate offshore form bottlenose dolphins, their presence explained by the fjords' deep-water channels. We suggest they seek both prey and shelter from the prevailing westerly winds ('roaring forties'). Nonetheless, the Patagonian common bottlenose dolphins will need to be identified to stock with certainty and their abundance and precise distribution evaluated as to allow appropriate management recommendations. The species was declared "vulnerable" in Chile by Yáñez (1997).

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