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The Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) in Tañon Strait, central Philippines

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Abstract

Previous sightings of bottlenose dolphins in Tañon Strait, central Philippines, in the late 1980's to early 1990's were limited to the southern section of the strait, in waters <500 m deep, and the species was formerly identified as *Tursiops truncatus*. Photo-identification surveys ($n = 117$) conducted in 2014 and 2015 in Tañon Strait resulted in 50 encounters of Indo-Pacific bottlenose dolphins *Tursiops aduncus*. No common bottlenose dolphin *T. truncatus* was seen. The Indo-Pacific bottlenose dolphin has only recently been confirmed to occur in coastal waters in the Philippines and thus very little is known of its local distribution and ecology. In Tañon Strait, the species was seen across a wide range of water depth (4–668 m, $\bar{x} = 309$ m) in groups ranging from 1 to ~60 individuals. We provide a photographic verification of this species and first evidence of a seemingly small population in a tropical protected seascape in the Philippines.

Keywords: Indo-Pacific bottlenose dolphin, *Tursiops aduncus*, Tañon Strait, Philippines

Introduction

The Indo-Pacific bottlenose dolphin (*Tursiops aduncus*, Ehrenberg 1833) occurs throughout warm temperate and tropical coastal waters, usually less than 100 m deep, in the Indian Ocean and western Pacific (Wang and Yang 2009). In the Philippines, the species was first confirmed only recently from a stranding in Luzon (Aragones et al. 2010). Opportunistic sightings by Wang and Yang (2009) suggested that this species may be distributed throughout the Philippine seas in discrete populations in coastal areas. However, actual sighting records remain sparse.

In the Philippines, first studies of marine mammals date back to the late 1980's and focused primarily on species diversity and distribution (Leatherwood et al. 1992). Tañon Strait, located between the islands of Negros and Cebu in the central Philippines (Fig. 1) was found to have a considerably high diversity of cetaceans, given its relatively small area (Leatherwood et al. 1992; Dolar et al. 1994, 2006), which has led to the establishment of a nationally protected seascape, Tañon Strait

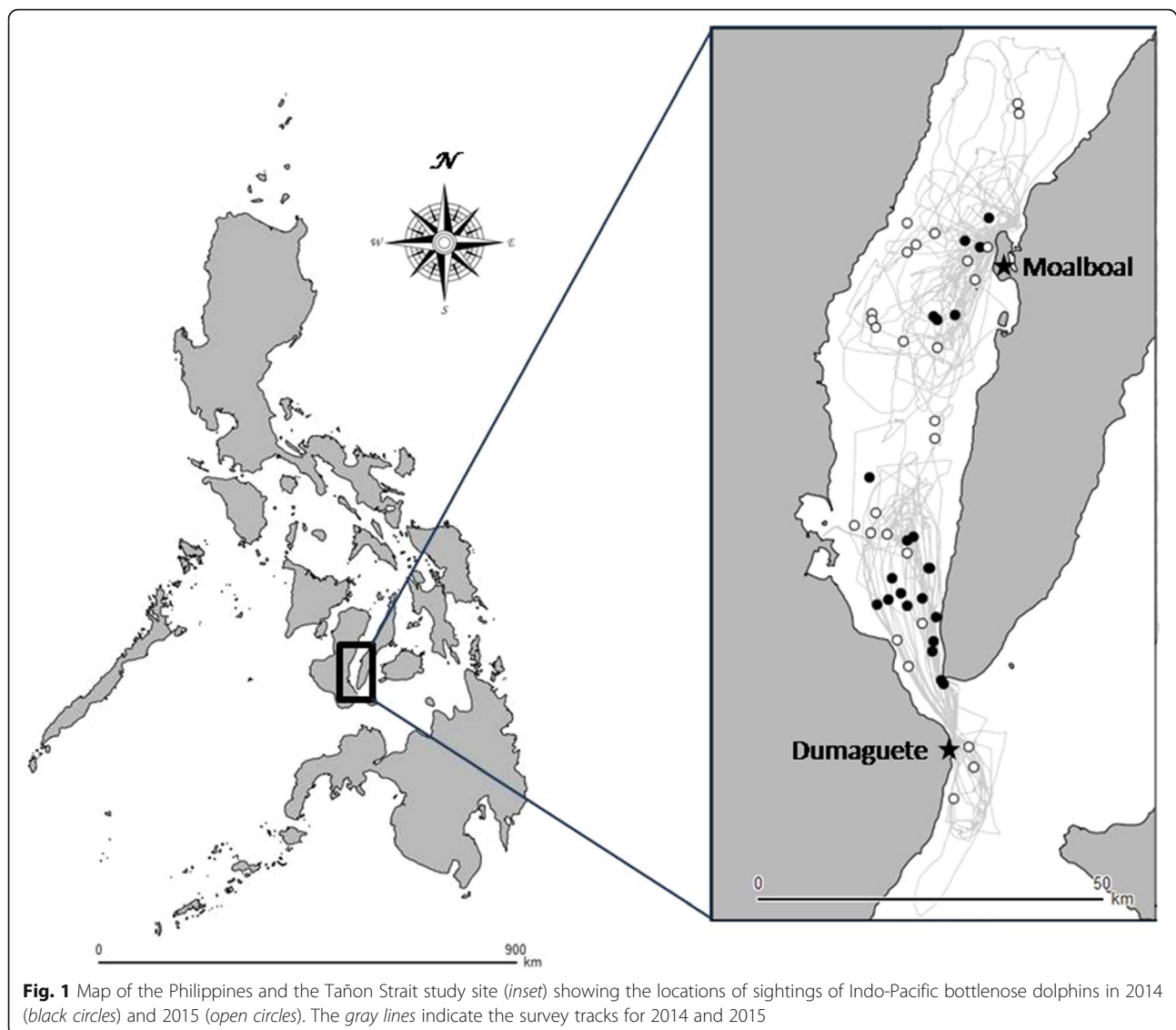
Protected Seascape (TSPS), in 1998. The strait is 220 km long and 27 km at its widest, with steep slopes on both sides that rapidly descend to >500 m deep in the middle section (Hayasaka et al. 1982). The shallow bathymetric sill in the southern opening of the strait (125 m deep) and the many small islands (Bantayan group of islands) in the shallow northern opening separate the strait from Bohol Sea and Visayan Sea.

Bottlenose dolphins have previously been sighted in the southern section of Tañon Strait, but the species identity remained unclear. Leatherwood et al. (1821) identified them as *Tursiops truncatus* (Montagu 1821) based on the formerly monospecific genus *Tursiops*. Dolar et al. (2006) identified them only up to the genus level, but subsequently recognised that they were most likely *T. aduncus* (M.L.L. Dolar *pers. comm.*). Although both Leatherwood et al. (1992) and Dolar et al. (2006) surveyed the entire Tañon Strait, their sightings of bottlenose dolphins were limited only to the southern section of the strait, near the opening. A short-term follow-up study by Callanta (2009) reported a similar pattern. Our recent work (L. Karczmarski and A.J.C. Tiongson, study in progress) confirms the identity of the species and indicates its considerably wider distribution.

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Materials and methods

Boat-based photo-identification surveys ($n = 117$) were conducted from April through July of both 2014 and 2015 with start off points at Dumaguete City on Negros Island and Moalboal on Cebu Island (Fig. 1). Four small boats of similar size were used (8.5–9.8 m, powered with 40 and 75 HP outboard engines), ranging from one to three boats at a time, during every good-weather day (no precipitation and sea state ≤ 3 in Beaufort scale) and following a commonly accepted field protocol (similarly as in Karczmarski et al. 2005). The northernmost range of surveys were at Barili (10.2310°N, 123.5487°E) on Cebu Island and Vallehermoso (10.3102°N, 123.3326°E) on Negros Island, while the southernmost range were at Apo Island (9.0607°N, 123.2551°E) off Negros Island and Santander (9.4103°N, 123.3443°E) on Cebu Island (Fig. 1).

Each time a dolphin group was sighted, the animals were slowly approached and their speed and general direction were matched with that of a research vessel to minimise any potential impact caused by the boat presence. Once the dolphins were in a range sufficiently close for species identification, the start time and location of the encounter was recorded using a handheld Garmin 78 s GPS. Group size estimates were made at the beginning and the end of an encounter, and in regular intervals throughout the encounter. Dolphins' dorsal fins and their upper body were photographed using high-speed digital cameras fitted with 100–400 mm image stabilized lenses. At each encounter, a conscious attempt was made to photograph all individuals in the group and, whenever possible, capture both sides of the dorsal fin. The unique body marks and notches on dorsal fins were used for individual identification (e.g.

Table 1 Water depth associated with sightings of Indo-Pacific bottlenose dolphins in Tañon Strait in 1995 and 2014–2015

Source	Survey year	<i>n</i>	Depth range (m)	Mean depth (m)	SD
Dolar et al. 2006	1995	3	24–328	141	133
~this study	2014–2015	50	4–668	309	172

Karczmarski and Cockcroft 1998) and, subsequently, the software program DISCOVERY (Gailey and Karczmarski 2012) was used for photo-ID database management.

Results and discussion

A total of 669 h were spent at sea, during 92 survey days across two field seasons. Indo-Pacific bottlenose dolphins *Tursiops aduncus* were seen throughout the study period, at all times of the day from dusk to late afternoon, in varying distance from shore ranging from 20 m to 11 km offshore, and throughout a wide range of water depth (Table 1). Photo-ID data were obtained during 50 encounters. Individual sighting frequencies ranged from one ($n = 21$) to ten ($n = 1$), with the majority of the 121

catalogued individuals (82 %, $n = 99$) seen more than once. Group sizes ranged from a solitary individual to ~60 dolphins, with a mean of 11 and median of 10 dolphins per group (± 10.5 SD). Groups frequently consisted of all age classes, including calves and neonates, although adult-only groups were also seen.

Although bottlenose dolphins were known to occur in Philippine waters (Leatherwood et al. 1992; Dolar et al. 1994, 2002, 2006), they were usually identified as *T. truncatus*. The similarities between *Tursiops truncatus* and *T. aduncus* (Rice 1998) make their identification in the field challenging, especially in areas where they occur sympatrically. Our photographic data confirms the species of *Tursiops* seen at each of our encounters as *T. aduncus* (Fig. 2).

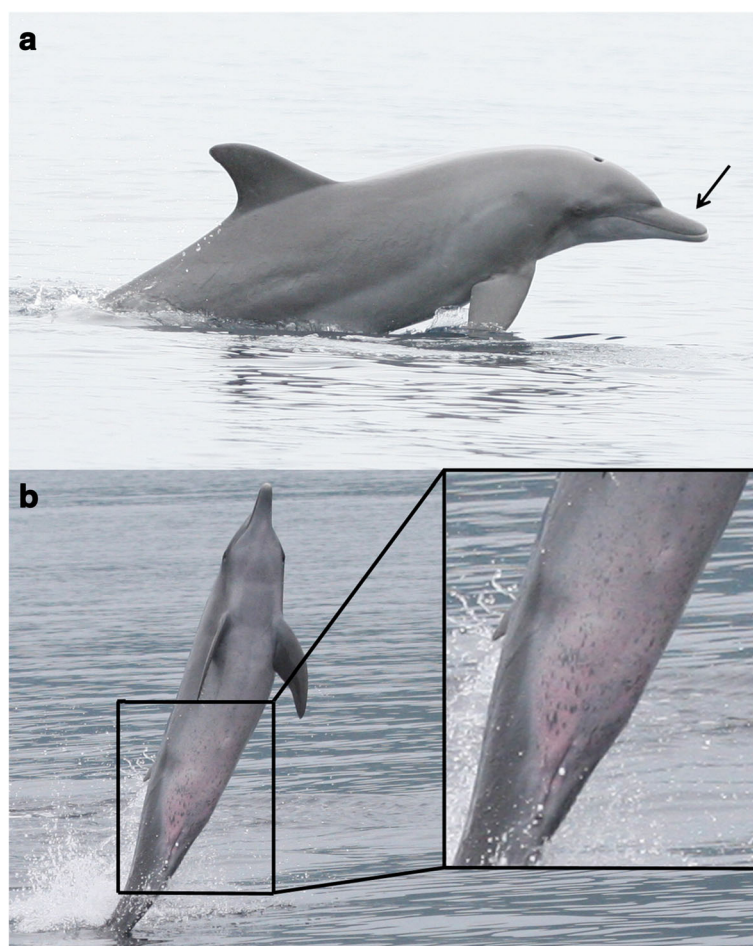


Fig. 2 The Indo-Pacific bottlenose dolphin in Tañon Strait, showing (a) the relatively long snout (indicated with arrow) characteristic of the species, and (b) ventral spots around the genital area of a mature female

At present, the Indo-Pacific bottlenose dolphin is not listed in the Philippines' Fisheries Administrative Order 208 (FAO 208) of 2001 which sets out the protection of aquatic species, and it is classified as Data Deficient by the regional Red List assessment (Dolar et al. 2012) and the IUCN Red List of Threatened Species (Hammond et al. 2012). An amendment to the Philippines' Fisheries Administrative Order 208 that includes *T. aduncus* is pertinent and urgently needed for the consistency with other protective measures in the Philippines (e.g. Republic Act 8550, 9147, FAO 185/185-1). An appropriate recognition of the species is important as it remains little known not only in the Philippines but across most of its range. Their discontinuous distribution in tropical Philippine waters and apparently small population sizes warrants conservation concern, especially in the face of climate change in the region (Dolar and Sabater 2011). Furthermore, lobomycosis-like disease and other skin disorders have recently been observed in Tañon Strait (A.J.C. Tiongson and L. Karczmarski, unpublished data), likely indicative of the deteriorating habitat quality.

Our preliminary results indicate that the population of Indo-Pacific bottlenose dolphins in TSPS is not large, with considerable site fidelity in the area, although ranging further north and into deeper waters than previously thought. Although the species is known to generally prefer coastal shallow waters, sightings in deeper waters of Tañon Strait are not surprising because the strait's bathymetry limits the coastal shallow waters to a narrow strip and brings deep waters close to shore. The presence of calves and neonates indicate that the dolphins are reproducing in the strait. The Tañon Strait Protected Seascape (TSPS) is under the National Integrated Protected Area Systems (NIPAS) Act, with a purpose to conserve the biodiversity of the area and implement sustainable development. This provision makes the strait excellently suited for research investigating the bottlenose dolphin population under a rapidly changing environment and such study should be encouraged.

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Authors' contributions

Both authors contributed equally to this study. AJCT performed this study as part of his ongoing postgraduate research. LK designed the project, secured funding, and supervised the study. Both authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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