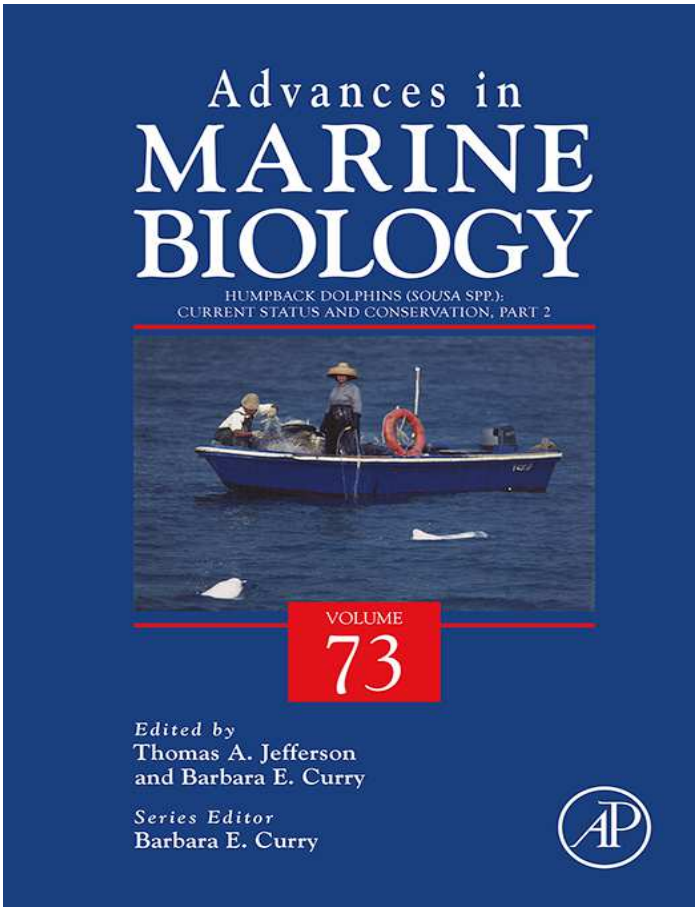

From Isabel Beasley, Maria Jedensjö, Gede Mahendra Wijaya, Jim Anamiato, Benjamin Kahn and Danielle Kreb, Observations on Australian Humpback Dolphins (*Sousa sahulensis*) in Waters of the Pacific Islands and New Guinea. In: Thomas A. Jefferson and Barbara E. Curry, editors, *Advances in Marine Biology, Vol. 73*, Oxford: Academic Press, 2016, pp. 219-271.
ISBN: 978-0-12-803602-0

Academic Press

CHAPTER NINE

Observations on Australian Humpback Dolphins (*Sousa sahulensis*) in Waters of the Pacific Islands and New Guinea

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Advances in Marine Biology, Volume 73
ISSN 0065-2881
http://dx.doi.org/10.1016/bs.amb.2015.08.003

Abstract

The Australian humpback dolphin, *Sousa sahulensis*, has recently been described to occur in northern Australian coastal waters. However, its distribution in adjacent waters of the Pacific Islands and New Guinea remains largely unknown. Although there have been few studies conducted on inshore dolphins in these regions, the available information records humpback dolphins primarily from the Kikori Delta in Papua New Guinea, and Bird's Head Seascape in West Papua. Research in southern Papua New Guinea indicates that humpback dolphins are indeed *S. sahulensis*, based on cranial and external morphometrics, external colouration and the preliminary genetic analysis presented here. A similar situation exists for the Australian snubfin dolphin, *Orcaella heinsohni*, where it is assumed that the species also occurs along the Sahul Shelf coastal waters of northern Australia and New Guinea. There are anecdotal reports of direct catch of Australian humpback dolphins for use as shark bait, coastal development is increasing, and anthropogenic impacts will continue to escalate as human populations expand into previously uninhabited regions. Future research and management priorities for the Governments of the Pacific Islands and Indonesia will need to focus on inshore dolphins in known regional hotspots, as current bycatch levels appear unsustainable.

1. BACKGROUND

Although numerous records of occurrence exist for oceanic whales and dolphins inhabiting Pacific Island waters and those of neighbouring countries such as Indonesia (Miller, 2007; Reeves et al., 1999; Rudolf et al., 1997), there is very little currently known about the status of inshore dolphins. Probably the most pressing question that has arisen in recent years is whether the newly described Australian humpback dolphin, *Sousa sahulensis,* occurs in the waters of the Pacific Islands and neighbouring countries, or whether it is their Asian relative, the Indo-Pacific humpback dolphin, *Sousa chinensis*, that occurs there.

The distribution of *S. chinensis* is in coastal waters of central China (near the mouth of the Yangtze River), south throughout the waters of southeast Asia to the east coast of Borneo in the southeast (Jefferson and Rosenbaum, 2014). The current distribution of *S. sahulensis* is known to include tropical and sub-tropical coastal shelf waters of northern Australia, from the Queensland/New South Wales border on the east coast, around northern Australia to the North West Cape on the west coast (Hanf et al., 2016; Jefferson and Rosenbaum, 2014; Parra et al., 2004). *Sousa sahulensis* occurrence in New Guinea coastal waters has been assumed, based on their proposed distribution along the Sahul Shelf (Jefferson and Rosenbaum,

2014). A summary of the external colouration, cranial and postcranial morphometric and genetic features distinguishing *S. sahulensis* from *S. chinensis* are shown in Table 1 (as adapted from Jefferson and Rosenbaum, 2014).

This review investigates the status of humpback dolphins from the Pacific Islands and adjacent waters of New Guinea, and provides new evidence, including morphological measurements and a preliminary phylogenetic analysis, that confirms the occurrence of *S. sahulensis* in these waters.

Table 1 Summary of the Distinctive Features of *Sousa chinensis* and *Sousa sahulensis*

Feature	*S. chinensis*	*S. sahulensis*
Range	Eastern Indian Ocean and western Pacific from east India to China and southeast Asia	Western Pacific from northern Australia to New Guinea
Dorsal hump	None	None
Dorsal fin	Low, wide-based	Extremely low, wide-based
External dimorphism	Little or none	Males slightly larger
Skeleton: number vertebrae	50–53 ($n=18$)	50 ($n=2$)
Skull: length of rostrum	277–339 mm	287–350 mm
Tooth counts	32–38	31–35
General colouration	Mostly white as adults	Dark grey back and lighter belly, curved dorsal cape
Spotting/ scarring	Often with dark blotches and/or spotting (some adults pure white)	Often dark or light spotting
Molecular: mtDNA	Three diagnostic loci	Seven diagnostic loci
Molecular: nuDNA	Single diagnostic loci	Single diagnostic loci
Molecular: haplotype	No shared mtDNA	No shared mtDNA

From Jefferson and Rosenbaum (2014, p. 16, table 2).

1.1 Pacific Islands

Recent progress has been made toward assessing the conservation status of marine mammals in the Pacific Islands region through development of the Secretariat of the Pacific Regional Environment Programme (SPREP) Pacific Islands Regional Marine Species Programme, which outlines a regional strategy for the cooperative conservation and management of dugongs, marine turtles, whales and dolphins (SPREP, 2012). The Pacific Islands region stretches over 10,000 km from east to west and 5000 km from north to south, with a combined Economic Exclusion Zone (EEZ) of approximately 30 million km^2 (Miller, 2007; Figure 1). The limited land base of the 22 Pacific Island Countries and Territories (PICTs) as defined by SPREP (2012) (which excludes Australia, New Zealand, Hawaiian Islands and West Papua/Papua Provinces of Indonesia) is distributed among 200 high islands and 2500 low islands and atolls. In general, the islands increase in size from east to west (SPREP, 2012). In total, the land area covers just over 500,000 km^2—of which Papua New Guinea accounts for 83%.

Two comprehensive assessments of marine mammals in the Pacific Islands have been produced (Miller, 2007; Reeves et al., 1999). Based on largely opportunistic records in combination with some detailed studies at the time of writing, at least 30 different whale and dolphin species are known to migrate or reside within the EEZs of the 22 PICTs (Miller, 2007).

Apart from Papua New Guinea (see Section 1.2), humpback dolphins have not yet been recorded from any of the other PICTs. The other Pacific Island nation where records of humpback dolphins are possible from is the Solomon Islands. Interview surveys by Bass (2010) suggested that another inshore dolphin, the Australian snubfin dolphin, *Orcaella heinsohni*, may occur around Malaita, Isabel, Western and Choiseul Provinces of the Solomon Islands; however, these reports remain unconfirmed as no photographs or confirmation evidence were obtained. A comprehensive visual and acoustic survey of cetaceans throughout the waters of the Central and Western Provinces of the Solomon Islands was conducted over 36 field days in 2004 (Kahn, 2006). A total of 11 cetacean species were encountered visually and/or acoustically during 2275 km of surveys, yet no humpback dolphins or Australian snubfin dolphins were sighted (Kahn, 2006). At the time of writing, 13 cetacean species are confirmed to occur in Solomon Island waters, with seven unconfirmed species records (Miller, 2007).

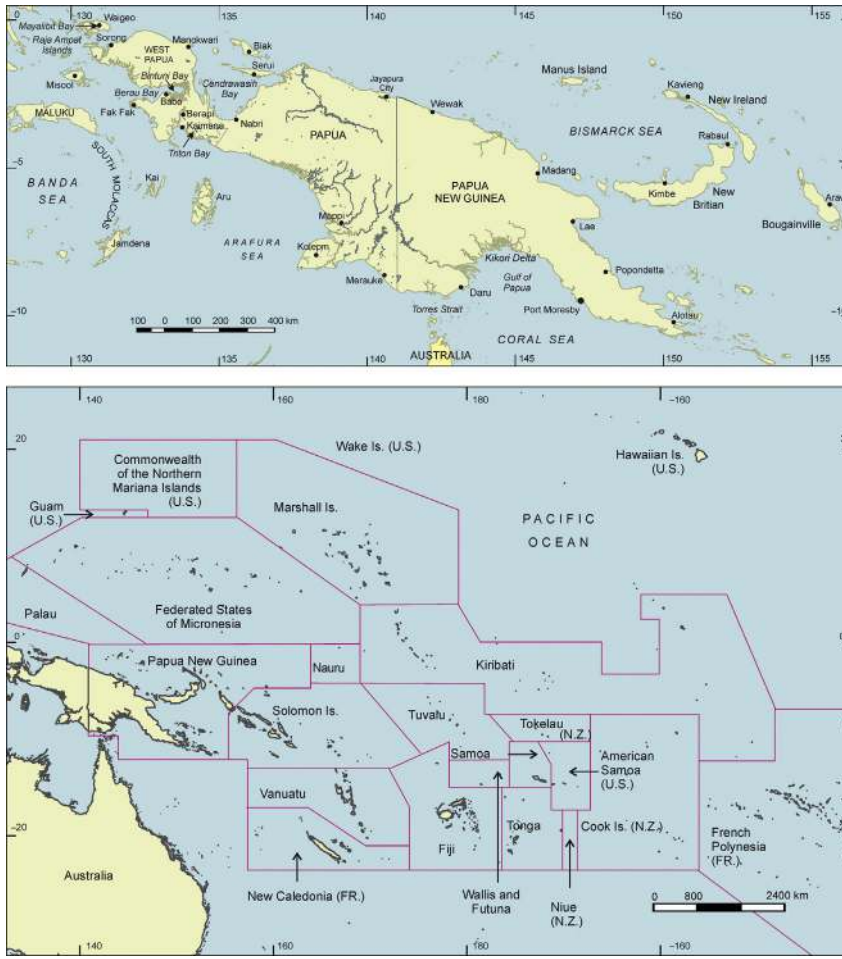

Figure 1 Location map of New Guinea (West Papua, Papua and Papua New Guinea): top image. The Pacific Islands: bottom image.

1.2 New Guinea

New Guinea is the world's second largest island after Greenland, covering a land area of 786,000 km^2. The western portion of New Guinea consists of the Indonesian Provinces of West Papua and Papua. Papua New Guinea comprises the eastern portion of New Guinea, which is encompassed within the Pacific Islands (Figure 1).

Geologically, the island of New Guinea is the northwest extension of the Indo-Australian plate, forming part of a single land mass, which is

Australia–New Guinea (Cloetingh and Wortel, 1986; Weissel et al., 1980). The Indo-Australian plate is a major tectonic plate that includes the continent of Australia and surrounding ocean and extends northwest to include the Indian subcontinent (excluding Indonesia and other southeast Asian countries) (Cloetingh and Wortel, 1986). Papua New Guinea is connected to the Australian segment by a shallow continental shelf across the Torres Strait, which in former ages had lain exposed as a land bridge, particularly during ice ages when sea levels were lower than at present (Lohman et al., 2011). Consequently, many species of birds and mammals found in New Guinea have close genetic links with corresponding species found in Australia.

1.2.1 Papua and West Papua

Located on the western side of New Guinea, are the Indonesian provinces of Papua and West Papua (Figure 1). There have been few marine mammal studies conducted in West Papua, and none in Papua. The most comprehensive cetacean studies in West Papua have been conducted in the coastal and offshore waters of Raja Ampat (Borsa and Nugroho, 2010; Ender et al., 2014; Kahn, 2007), Bintuni and Berau Bays (evaluating the Tangguh LNG Project) (Kahn et al., 2006) and Triton Bay (Kahn, 2009). Although few studies have been conducted, observations indicate that this region, collectively named Bird's Head Seascape, is a cetacean 'hotspot', with 14 of the 31 cetacean species recorded for Indonesia occurring in these waters (Borsa and Nugroho, 2010; Kahn, 2007, 2015; Mangubhai et al., 2012; Rudolf et al., 1997). Humpback dolphins have previously been recorded from Bintuni and Berau Bays, Triton Bay and Mayalibit Bay.

Although Papua and West Papua are Indonesian Provinces, they are included in this review because of their location on the Sahul Shelf with Papua New Guinea and northern Australia. Papua and West Papua are biogeographically more similar to Papua New Guinea than to the other large islands of east Indonesia (i.e. Halmahera, Ceram, Tanimbar, Sulawesi, Timor and the Lesser Sunda Islands) (Lohman et al., 2011). Furthermore, Papua and West Papua also have a continuous shallow-water ecological connection to the Australian continent (see Section 1.3). Hence, West Papua may be the northwesterly most range of *S. sahulensis*.

1.2.2 Papua New Guinea

Papua New Guinea is located on the eastern portion of New Guinea (see Figure 1). With a land mass of 463,000 km^2 (170,000 $miles^2$), Papua

New Guinea is the world's 54th largest country (SPREP, 2012). At the time of writing, 15 cetacean species and the dugong were confirmed to occur in Papua New Guinea waters (including humpback dolphins as described below), with a further six species remaining unconfirmed (Miller, 2007). Dawbin (1972) was the first to report anecdotal observations of cetaceans in Papua New Guinea waters, where he described the Bornean white dolphin *Sotalia borneensis* (Lydekker, 1901), as likely to be recorded in the future based on records in neighbouring waters (i.e. northern Australia and Borneo). The majority of cetacean surveys and recent anecdotal observations from Papua New Guinea are from deep-water coral regions in Kimbe Bay (Munday, 1994; Visser, 2002, 2003), around Manus Island (Convention on Migratory Species, 2009), throughout Astrolabe Bay and northwestern Papua New Guinea (Dawbin, 1972) and based on a review of killer whale sightings from Papua New Guinea waters (Visser and Bonoccorso, 2003). Only one study has been conducted in Papua New Guinea coastal waters, from the Kikori Delta of Gulf Province (Bonaccorso et al., 2000).

1.3 Sahul Shelf

Alfred Russel Wallace's seminal book, *The Malay Archipelago* (Wallace, 1869), included a proposed bio-geographical demarcation of faunal distributions starting at the deep strait between Bali and Lombok and passing down the Makassar Strait, with the 'Indo-Malayan region' to the west and 'Austro-Malayan region' to the east (Wallace, 1860, 1863, 1876), now known as 'Wallace's line', as named by Huxley (1868). Based on further adaptations and debates (Huxley, 1868; Lydekker, 1896; Mayr, 1944; Weber, 1902), usage of the term has become entrenched to refer to the zone of islands between the Asian Sunda Shelf and Australian/New Guinean Sahul Shelf; continental shelves that are traced by Wallace's Line with Huxley's modification (Huxley, 1868) in the west and Lydekker's Line (Lydekker, 1896) in the east (Figure 2). In addition to the Sunda and Sahul shelves, Dickerson (1928) designated a faunal transition zone called Wallacea, which includes the islands of Sulawesi, eastern Indonesia islands of the Lesser Sundas (i.e. Lombok, Flores and Sumba, Ternate and Seram) (see Lohman et al., 2011; Figure 2).

New Guinea lies on the Sahul Shelf, separated from the Sunda Shelf of Indonesia by deep-water trenches (i.e. Timor Trough) between West Papua and Sulawesi (see Figure 2). The name '*Sahull*' or '*Sahoel*' first appeared on seventeenth century Dutch maps applied to a submerged sandbank between

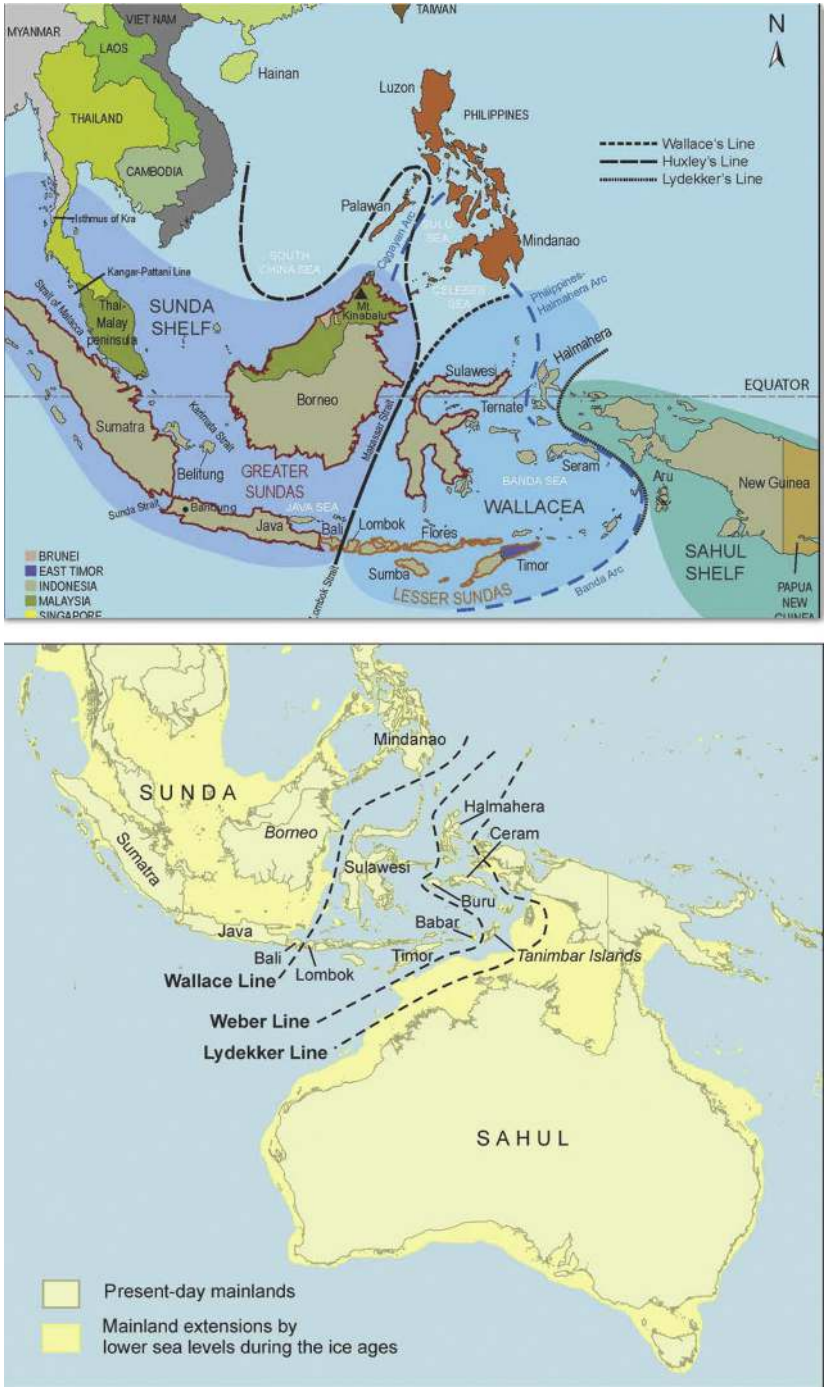

Figure 2 Map of the Indo-Australian Archipelago (IAA) indicating contemporary landmasses, straits, seas, arcs and faunal lines. Major islands are labelled; different countries in the IAA are indicated by colour. Red (dark gray in the print version) or orange (gray in the print version) borders around an island indicate membership in the Greater or Lesser Sundas, respectively. *Map reproduced courtesy of Lohman et al. (2011) and the Annual Review of Ecology, Evolution and Systematics: top image. Location map of the Sunda and Sahul Shelves: bottom image.*

Australia and Timor, with the larger Sahul Shelf being formally described by Molengraaff and Weber (1921). The Sahul Shelf proper stretches northwest from northern Australia, under the Timor Sea towards Timor, ending where the seabed begins descending into the Timor Trough. The other part of the Sahul Shelf is known as the Arafura Shelf, which runs from the northern coast of Australia under the Arafura Sea (including the Tanimbar and Aru Islands), extending to the Raja Ampat region of West Papua, New Guinea (Lohman et al., 2011; Vernon et al., 2009).

When sea levels fell during the Pleistocene ice age, including the last glacial maximum about 18,000 years ago, the Sahul Shelf was exposed as dry land (Vernon et al., 2009). Evidence of the shoreline of this time has been identified in locations that now lie 100–140 m below sea level. The Arafura Shelf formed a land bridge between Australia and New Guinea, and these lands share many terrestrial vertebrates, including mammals, land birds and freshwater fish as a result (Lohman et al., 2011; Vernon et al., 2009).

2. HUMPBACK DOLPHIN RECORDS

Despite studies recording numerous oceanic cetaceans from throughout the Pacific Islands and New Guinea, there are only 138 sighting records (135 confirmed and three unconfirmed) and two stranding/bycatch records of humpback dolphins; all from the New Guinea/Arafura Sea region (Figure 3; Appendix A). Of these records, there are 13 sighting records and one stranding record from Papua New Guinea, 125 sighting records from West Papua, and one bycatch record from the Arafura Sea between northern Australia and Papua New Guinea. No previous cetacean surveys have been conducted around the Papuan coast of New Guinea; therefore, no cetacean records are known from this region, to our knowledge.

2.1 Sightings

Humpback dolphins from West Papua have been recorded primarily from the Bird's Head Seascape within Bintuni and Berau Bays (Kahn et al., 2006; this chapter), Mayalibit Bay (Kahn, 2006; this chapter), Triton Bay (Kahn, 2009; this chapter) and Arguni Bay, Kaimana (Wijaya, 2015; this chapter). In the Pacific Islands, humpback dolphins have only been confirmed to occur in the Kikori Delta of southern Papua New Guinea.

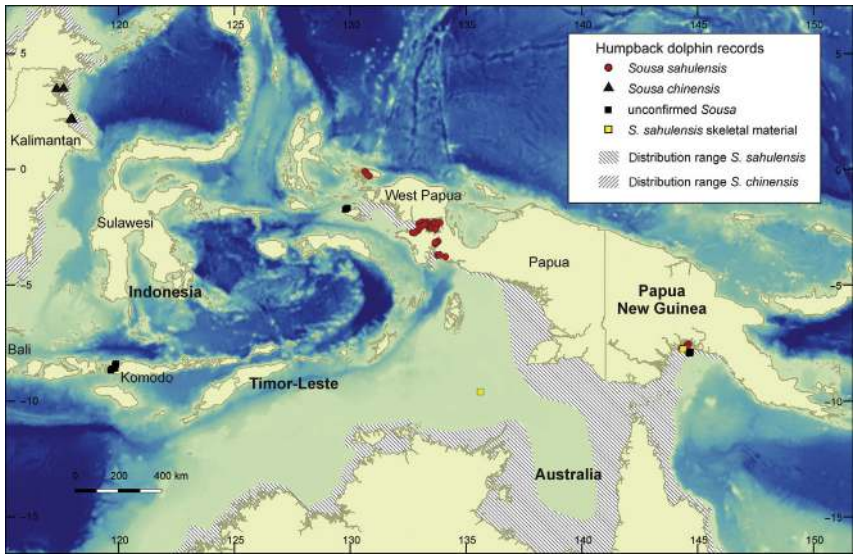

Figure 3 Sighting and stranding records of humpback dolphins in the Pacific Islands and New Guinea, and proposed range of *Sousa sahulensis* in the region. Bathymetry data obtained from Amante and Eakins (2009).

2.1.1 Bintuni and Berau Bays, West Papua

Humpback dolphins were first recorded from West Papua during September and October/November 2005, from boat-based surveys conducted in Bintuni and Berau Bays (Figure 3; Kahn et al., 2006). Forty-seven sightings were observed (comprising 75% of all cetaceans observed), primarily in the east and central sections of Bintuni Bay (Figure 4; Appendix A). Juveniles were commonly sighted; however, no calves were observed. Based on the high encounter rate, the Bintuni and Berau Bay region was considered a regional hotspot for humpback dolphins (Kahn et al., 2006).

Kahn et al. (2006) reported that humpback dolphins had not been recorded from other areas surveyed in eastern Indonesia with comparable methods, such as Komodo National Park, North Sulawesi and the Sangihe–Talaud Islands, Derawan Islands and Bali–Lombok Straits. The lack of sightings was expected, considering that Bintuni and Berau Bays are relatively homogenous inshore habitats (i.e. shallow depth, extremely high turbidity and high variable salinity), as opposed to the steep depth gradients and diverse 'deep-sea, yet near-shore' habitats that are routinely found in east Indonesian waters (Kahn et al., 2006). As described below, humpback dolphins were actually reported by Kahn (2001) and Kahn and Pet (2003) from Komodo

Figure 4 Humpback dolphin images from Bintuni and Berau bays, West Papua. *Photographs: Benjamin Kahn.*

National Park, Indonesia, in April and October 2001 (Figure 3; Appendix A). However, since there were no associated photographs or detailed descriptions, these sightings remain unconfirmed and doubtful.

2.1.2 Mayalibit Bay, West Papua

Mayalibit Bay is located within Waigeo Island, northwest of Sorong, West Papua (see Figure 1). Although no humpback dolphins were sighted during 11 survey days (1315 km of survey effort) around the Raja Ampat Islands during October and November 2006 (Kahn, 2007), B. Kahn confirmed local reports of humpback dolphins in Mayalibit Bay from photographs taken by Conservation International researchers a few days after the field surveys (Kahn, 2007; no additional sighting information or photographs available). Opportunistic nature-based surveys conducted in Mayalibit Bay in 2007 by wildlife photojournalist Mr. Tim Laman, sighted a group of five humpback dolphins on numerous occasions throughout the day (T. Laman, personal communication; Figure 5; Appendix A). Aerial surveys conducted

Figure 5 Humpback dolphin images from Mayalibit Bay, West Papua, obtained during opportunistic nature-based surveys: top and middle images; and aerial surveys: bottom image. *(Top and middle images) Photograph: Tim Laman, Tim Laman Photography, and (bottom image) Photographs: Conservation International/Nur Ismu Hidayat.*

by Conservation International in Mayalibit Bay on 31 May 2010, also sighted numerous groups of humpback dolphins, with photographic confirmation of all groups (Figure 5; Appendix A).

2.1.3 Arguni Bay, West Papua

Arguni Bay is located north of Kaimana, West Papua (Figure 1). Ninety days of visual observations in Arguni Bay were conducted by G. M. Wijaya, from 21 January to 11 April 2015 (Wijaya, 2015). Observations were conducted from a land-based site, as well as some opportunistic boat-based surveys. During these surveys, a total of 64 humpback dolphin groups (Figure 6; Appendix A) and 40 bottlenose dolphin, *Tursiops* sp., groups were sighted. Average group size for humpback dolphins was two individuals (±1.4 SD), with a range of one to seven individuals. No other cetacean species were sighted during these surveys.

2.1.4 Triton Bay, West Papua

The Triton Bay region is located near Kaimana on the southeastern coast of West Papua (Figure 3; Appendix A). Nine days of boat-based surveys covering

Figure 6 Humpback dolphin images from Arguni Bay, Kaimana. *Photographs: Gede Mahendra Wijaya.*

700 km (55 visual hours) were conducted in the Triton Bay region, consisting of coastal, oceanic and straits/corridor habitats. Six marine mammal species were recorded, of which humpback dolphins accounted for 10% of sightings ($n = 5$), often in the vicinity of Bryde's whales, *Balaenoptera edeni/brydei* (Kahn, 2009). No humpback dolphin photographs from Triton Bay are known.

2.1.5 Misool Island, West Papua

Misool Island is located approximately 80 km west of the West Papuan mainland (see Figure 1). Two unconfirmed humpback dolphin records have

been reported from north of Misool Island (Ender et al., 2014). Unfortunately, there are no photographs to accompany these reports, and the identification description is vague, so the species identification remains unconfirmed (Figure 3; Appendix A).

2.1.6 Kikori Delta, Papua New Guinea

Surveys by Bonaccorso et al. (2000) in 1999 in the Kikori Delta reported sighting one group of two humpback dolphins approximately 10 km off Cape Blackwood during aerial surveys (Figure 3; Appendix A). Unfortunately, there were no photographs to accompany the report and the identification description is vague; therefore, the species identification remains unconfirmed, as the individuals could have been confused with bottlenose dolphins, or other cetacean species.

Further field observations of cetaceans in the Kikori Delta were conducted in December 2013 and February 2015 by Beasley et al. (2014, 2015). During these surveys, a total of 2300 km of survey over 230 h were conducted, with 1820 km spent 'on-effort' searching for dolphins. The survey conditions were generally very good while conducting surveys, with the majority of survey time spent in Beaufort 1–2 conditions (Beasley et al., 2014, 2015).

During these surveys, *Orcaella* sp. (probably Australian snubfin dolphins; Beasley et al., 2005) were the most frequently sighted species, while humpback dolphins were the second most frequently sighted species (Figure 7). No bottlenose dolphins, or other marine mammals, were sighted in the delta region. A total of seven humpback dolphin groups were sighted, with a total group size of 23 dolphins. Group composition consisted of 17 adults, two juveniles, two calves and two neonates (Beasley et al., 2014, 2015). Most humpback dolphin groups were difficult to follow and photo-identify, but some groups remained near the boat for a period of time allowing for good photographs. One humpback dolphin leapt clear of the water twice, which provided good images. This sighting obtained on 4 December 2013 was the first confirmed sighting of humpback dolphins in Papua New Guinea waters with associated photographs (Beasley et al., 2014; Figure 7).

The environmental parameters at the location of the humpback dolphin sightings are shown in Table 2. Humpback dolphins were sighted in water depths of less than 15 m (1.6–11.6 m), with low salinities (13–16 ppt) and relatively high turbidities (35–425 NTU) (Table 2).

Figure 7 Images of humpback dolphin adult and newborn: top image, humpback dolphin calf: middle image, and breaching adult: bottom image sighted in the Kikori Delta of Papua New Guinea. *(Top image) Photograph: Isabel Beasley, (middle image) Photograph: Isabel Beasley and (bottom image) Photograph: Mathew Golding, James Cook University.*

Table 2 Humpback Dolphin Environmental Parameters at Sighting Locations in the Kikori Delta of Southern Papua New Guinea

Parameter	Average	SD	Minimum	Maximum	Number of Samples
Depth (m)	6.6	3.36	1.6	11.4	7
Salinity (ppt)	14.4	1.51	13.0	16.0	3
Turbidity (NTU)	169.8	221.10	34.6	425.0	3
Temperature (°C)	29.5	0.25	29.3	29.8	3
pH	7.6	0.27	7.3	8.78	3

2.2 Strandings/Bycatch

2.2.1 West Papua and Papua

No humpback dolphin stranding records, or skeletal material, are known from Papua or West Papua.

2.2.2 Kikori Delta, Papua New Guinea

During 2015 surveys in the Kikori Delta, a humpback dolphin skull was recovered by local villagers and donated to the Papua New Guinea National Museum and Art Gallery (PNGM registration number 27466). The dolphin had apparently been caught accidentally by a large-mesh size gillnet in September 2014, and the body disposed of onto shore (Figure 8). This is the only humpback dolphin skull known from the Pacific Islands. Cranial measurements based on Jefferson and Rosenbaum (2014) are shown in Table 3.

2.2.3 Arafura Sea

Rudolph et al. (1997) described two humpback dolphin records from the Arafura Sea; a specimen, housed at the Northern Territory Museum and Art Gallery (NTM U660; Figure 3, Appendix A; which according to museum records was a male taken by the Taiwanese gillnet fishery on 28 November 1983) and a photograph of an adult male (total length = 2.54 m) taken (from the Taiwanese gillnet fishery) on 14 October 1984 (no associated location data). The latter specimen was also mentioned, with confirmation photographs, in Ross et al. (1996) and recorded as caught in this fishery off the Holothuria Banks of northwestern Australia (Harwood and Hembree, 1987; Hembree, 1986; Hembree and Harwood, 1987). Because of the Banks' close proximity to Darwin, Northern Territory, where *S. sahulensis* are already known to occur (Jefferson and Rosenbaum, 2014), this later record was excluded from Appendix A.

The offshore Taiwanese gillnet fishery operated in the northern waters of the Australian Fishing Zone, between northern Australia and New Guinea/eastern Indonesia islands, from January 1974 to December 1985. Large numbers of several species of small cetacean were taken incidentally in this fishery, with an estimated 14,000 animals caught between June 1981 and December 1985, based on observation of 2.3% of 17,500 sets (Harwood and Hembree, 1987; Hembree, 1986; Hembree and Harwood, 1987; Ross et al., 1996). Based on the records above, at least two *Sousa* sp. are known to have been taken in this fishery, with the likelihood that many more were taken while the fishery was underway.

Figure 8 Humpback dolphin accidentally bycaught in a gillnet in September 2014, and in the Kikori Delta region, Papua New Guinea: top image. Skull housed at the Papua New Guinea National Museum and Art Gallery (PNGM registration number 27466): middle and bottom images. *(Top image) Photograph: Courtesy of Yolarnie Amepou, University of Canberra and (middle and bottom images) Photographs: Isabel Beasley.*

2.3 Colouration and Cranial Morphometrics

2.3.1 Colouration and External Morphology

Although there appears to be extensive variation in colour patterns, based on photographs shown in Figures 4–7, humpback dolphins from West Papua

Table 3 Papua New Guinea Humpback Dolphin, *Sousa* sp. Skull Morphometrics, Compared with Those of *S. chinensis* and *S. sahulensis*

	S. chinensis				*S. sahulensis*				PNG Skull (*S. sahulensis*)
Measurement	**Mean**	**±SD**	**Range**	***n***	**Mean**	**±SD**	**Range**	***n***	**Measurement**
Upper tooth count	35.4	1.62	32–38	39	33.0	1.23	31–35	23	31–33
Lower tooth count	33.0	2.00	29–38	40	32.8	0.80	31–34	26	31–33
Condylobasal length	507.3	18.45	466–536	28	507.9	17.47	482–554	14	501.0
Rostrum length	309.1	16.17	277–339	31	308.6	14.78	287–350	13	305.5
With rostrum at base	109.7	5.30	96–117	39	109.1	5.35	99–118	15	125.8
Width rostrum 1/2 length	46.4	3.20	40–55	32	46.6	2.35	44–52	14	44.8
Width rostrum 3/4 length	32.0	2.35	29–38	30	32.9	2.58	30–38	14	36.2
With premax 1/2 length	28.9	3.03	23–37	32	31.0	2.00	28–37	14	31.8
Greatest width premax	82.7	3.66	73–91	37	76.7	3.05	72–83	15	74.4
Preorbital width	190.3	8.11	170–200	37	184.6	7.54	169–197	14	189.0
Postorbital width	213.0	8.18	192–226	38	210.8	8.33	196–226	14	208.8
Zygomatic width	213.8	8.54	192–224	37	211.7	9.40	195–230	15	215.5
Parietal width	145.7	5.61	136–158	34	145.6	5.00	136–155	15	145.0
Width external nares	54.6	3.21	47–63	37	50.6	1.71	48–54	15	53.1
Width internal nares	66.1	5.45	53–74	37	61.2	3.27	56–68	15	55.2

Length temporal fossa	111.7	4.50	101–121	36	108.5	4.84	100–117	15	109.0
Height temporal fossa	87.2	4.85	75–98	36	90.4	5.41	83–99	15	91.9
Length orbit	56.1	2.23	51–63	37	56.5	2.06	52–61	15	56.5
Length antorbital process	39.1	2.79	34–47	37	40.0	2.50	37–46	15	39.0
Length upper tooth row	273.2	14.80	246–299	33	270.5	13.39	253–309	13	270.5
Length mandible	422.4	41.40	242–457	33	434.9	18.64	407–491	15	–
Height mandible	85.5	3.95	74–91	34	85.5	3.50	77–91	15	–
Length mandibular symphysis	121.2	11.67	92–139	32	129.2	10.97	107–155	15	–

and Papua New Guinea appear to have the diagnostic colouration of *S. sahulensis* (see Jefferson and Rosenbaum, 2014; Ross et al., 1996). Adult body colouration consists of a lighter belly and lower ventral sides, with the separation of the dark back and lighter ventrum bounded by a slightly curved diagonal cape with indistinct margins. The cape margin sweeps above the eye, reaches its highest point on the neck area and then slants downward to meet the urogenital area (as described by Jefferson and Rosenbaum, 2014). As also shown by Figures 4–7, although the larger adults have unpigmented areas, particularly around the head, back, dorsal fin and tailstock, there is no evidence that humpback dolphins from New Guinea become completely white, as at least some specimens of *S. chinensis* do (Jefferson and Rosenbaum, 2014). Humpback dolphins from New Guinea waters have no visible dorsal hump, with the dorsal fin being low and triangular with a wide base (see Figures 4–7), features which are also characteristic of *S. sahulensis* (Jefferson and Rosenbaum, 2014; Ross et al., 1996).

2.3.2 Cranial Morphometrics

Jefferson and Rosenbaum (2014) reported that the skull of *S. sahulensis* is similar in appearance to that of *S. chinensis*, but tooth counts of *S. sahulensis* are significantly lower on average than any other species of *Sousa*, with the exception of *Sousa teuszii* (Jefferson and Van Waerebeek, 2004; see Figures 2 and 3). Upper and lower tooth counts from the Papua New Guinea skull (see Figure 8) were both 31–33, thereby within the range for *S. sahulensis*. The condylobasal length of 501 mm was smaller than average for both *S. sahulensis* and *S. chinensis*, possibly indicating that it was a subadult.

3. PRELIMINARY GENETIC ANALYSIS OF HUMPBACK DOLPHINS FROM PAPUA NEW GUINEA

There is currently only incomplete knowledge about the geographic distribution of *S. sahulensis*. Although recent *Sousa* spp. genetic studies have been constrained by the small number of samples available from the entire range and/or the use of a single genetic marker (e.g. Chen et al., 2008, 2010; Frère et al., 2008, 2011; Lin et al., 2010), their conclusions have consistently indicated a distinction between animals from southeast Asia and Australia. In the most recent comprehensive study, Mendez et al. (2013) provided strong evidence for the new species, *S. sahulensis*, from northern Australia and a strong geographical segregation between some of the current four *Sousa* species. No samples have previously been available from the Pacific Islands or New Guinea regions for these genetic studies, and the geographical separation between *S. chinensis* and *S. sahulensis* in these regions has not yet been confirmed.

Here, we conducted genetic analyses for the first time on *Sousa* sp. from Papua New Guinea waters, to assist in establishing the geographical separation between *S. sahulensis* and *S. chinensis*. One genetic bone sample was collected from the humpback dolphin carcass opportunistically discovered during field surveys in the Kikori Delta of Papua New Guinea (PNGM registration number 27466), along with three *Sousa* sp. tissue samples collected via biospy during surveys in the Northern Territory, Australia (U5149 – stranding, Lee Point Beach, Darwin, Northern Territory, recovered 28 October 2000; U5912 – stranding, Bocaut Bay, Arnhem Land, Northern Territory, recovered 25 June 2002; U660 – bycaught in the Taiwanese gillnet fishery, Arafura Sea, 28 November 1983, that are currently housed at the Museum and Art Galley of the Northern Territory (MAGNT)). Detailed molecular methods are presented in Appendix B.

A 487-base sequence of the mtDNA control region was obtained from the Papua New Guinea sample and three Northern Territory *Sousa* sp. samples. When aligned with other *Sousa* spp. haplotypes from other localities, a 261-base sequence was comparable. Forty-seven diagnostic fixed-base pair differences were found between the sequences compared (Table 4). Nineteen different haplotypes were found (Table 4). Six of those were found in China, nine in Australia and four in Africa, with no haplotype sharing between Chinese, Australian and African waters. The Papua New Guinea sample had the same haplotype (H11) as other samples from the Northern Territory, Australia.

Phylogenetic reconstruction by Neighbour-Joining (NJ), Maximum Likelihood (ML) and Bayesian Interference Analyses (BI) showed that the Papua New Guinea samples clustered with *S. sahulensis*, and that *S. sahulensis* clustered separately from *S. chinensis* from China, *Sousa plumbea* and *S. teuszii* (Figures 9 and 10). All three methods showed similar topologies with high node support between species.

The specimen MAGNT U660, which was caught in the Arafura Sea by the Taiwanese gillnet fishery, was confirmed as *S. sahulensis* (Figures 9 and 10). This individual was caught outside of the proposed range of *S. sahulensis* (see Figure 3), which is based on the 30-m bathymetric contour, thereby indicating that this was either an extralimital record, or that *S. sahulensis* inhabits waters deeper than 30 m, possibly up to 40 m in some areas.

4. PROPOSED DISTRIBUTION OF *S. SAHULENSIS* AROUND NEW GUINEA

Based on colouration, external morphometrics, cranial morphology and genetics, this study confirms that *S. sahulensis* is found in coastal waters of New Guinea. Although only one genetic (from specimen PNGM 27466)

Table 4 Mitochondrial DNA Control Region Diagnostic Sites of *Sousa sahulensis* and *Sousa chinensis* for Each Sequence Included in the Present Analysis

	1 2 2 3 3 3 4 4 4 4 4 5 5 5 6 6 7 8 0 3 3 4 4 5 5 7 8 8 9 9 0 0 0 1 1 2 2 2 2 2 2 2 3 4 4 4 4 4
	0 1 4 0 1 2 1 2 7 8 9 1 5 6 2 6 9 9 8 3 9 5 8 3 8 4 5 8 0 1 2 5 9 2 4 0 2 3 4 8 9 3 1 2 4 6 9
DQ665785 *Sousa chinensis* China (H1)	A A G G C C A G A C A G G C T G A C T G T C T A C T C G T T T A C G C T T T T T T C – T G C –
DQ665786 *Sousa chinensis* China (H2)	. . . A T . . T . T G A A . . . . T C A . . . T T . . . . C . G . . T C C C C C . . T – . A . –
DQ665787 *Sousa chinensis* China (H3)	. . . . . A . . . . . C . . . . . – . . . –
DQ665788 *Sousa chinensis* China (H4)	. . . . . A . . . . . – . . . –
HQ221868 NJNU0216 *Sousa chinensis* China (H1)	. . . . . – . . . –
HQ221869 NJNU0380 *Sousa chinensis* China (H4)	. . . . . A . . . . . – . . . –
HQ221870 NJNU0472 *Sousa chinensis* China (H1)	. . . . . – . . . –
HQ221871 NJNU0474 *Sousa chinensis* China (H1)	. . . . . – . . . –
HQ221872 NJNU0475 *Sousa chinensis* China (H3)	. . . . . A . . . . . C . . . . . – . . . –
HQ221873 NJNU0502 *Sousa chinensis* China (H1)	. . . . . – . . . –
HQ221874 NJNU0503 *Sousa chinensis* China (H3)	. . . . . A . . . . . C . . . . . – . . . –
HQ221875 NJNU0504 *Sousa chinensis* China (H3)	. . . . . A . . . . . C . . . . . – . . . –
HQ221876 NJNU0505 *Sousa chinensis* China (H1)	. . . . . – . . . –
HQ221877 NJNU0553 *Sousa chinensis* China (H1)	. . . . . – . . . –
HQ221878 z8927 *Sousa chinensis* China (H3)	. . . . . A . . . . . C . . . . . – . . . –
HQ221879 z8929 *Sousa chinensis* China (H4)	. . . . . A . . . . . – . . . –
HQ221880 z7890 *Sousa chinensis* China (H1)	. . . . . – . . . –
EF670544 HK015 *Sousa chinensis* Hong Kong (H1)	. . . . . – . . . –
EF670545 HK016 *Sousa chinensis* Hong Kong (H1)	. . . . . – . . . –

EF670546 HK017 *Sousa chinensis* Hong Kong (H5)	. . . . . C . . . . . G C . . –
EF670547 HK020 *Sousa chinensis* Hong Kong (H6)	. . . . . A . . . A . . . . . – . . . C
KJ530728 SCCY28 *Sousa sahulensis* Australia (H7)	. . . A T T G T G T . . . T . . . . . A C . . . . . A . C . G A A . . . A . . . T – C . T –
KJ530729 SCCY36 *Sousa sahulensis* Australia (H8)	G . . A T T . T G T G . . T . . . . . A . . . . . A . C C G A A . . . A . . . T – C . T –
KJ530730 SCCY55 *Sousa sahulensis* Australia (H8)	G . . A T T . T G T G . . T . . . . . A . . . . . A . C C G A A . . . A . . . T – C . T –
KJ530731 SCCY57 *Sousa sahulensis* Australia (H9)	. . T A T T G T G T . . . T . . . . . A C . . . . . A . C . G A A . . . A . . . T – C . T –
KJ530732 SCDA02 *Sousa sahulensis* Australia (H10)	G . . A T T . T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
KJ530733 SCDA03 *Sousa sahulensis* Australia (H11)	. . . A T T G T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
KJ530734 SCDA04 *Sousa sahulensis* Australia (H12)	. G . A T T . T G T . . . T C . . . . A . . . . . A . C . G A A . . . A . . . T – . . T –
EF670552 AU001 *Sousa sahulensis* Australia (H11)	. . . A T T G T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
EF670553 AU002 *Sousa sahulensis* Australia (H11)	. . . A T T G T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
EF670554 AU003 *Sousa sahulensis* Australia (H13)	. . . A T T G T G T . . . T . . . . . A . . . . . A . C . G A A . . C A . . . T – C . T –
EF670555 AU004 *Sousa sahulensis* Australia (H14)	. . . A T T . T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
EF670556 AU005 *Sousa sahulensis* Australia (H15)	. . . A T T . T G T . . . T . . . . . A . T . . . . . A . C . . A A . . C A . . . T – . . T –
U5912 *Sousa sahulensis* NT Australia (H11)	. . . A T T G T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
U660 *Sousa sahulensis* NT Australia (H9)	G . . A T T . T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
U5149 *Sousa sahulensis* NT Australia (H11)	. . . A T T G T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
ILB2 *Sousa sahulensis* PNG (H11)	. . . A T T G T G T . . . T . . . . . A . . . . . A . C . G A A . . . A . . . T – C . T –
EF670548 NA025 *Sousa plumbea* South Africa (H16)	. . . A T . . . . . G . . A . . . . . C . A . C . . . A . . . . . C C T – C A T –
EF670549 NA026 *Sousa plumbea* South Africa (H17)	. . . A T . . . . . G . . A . . . . . A . C . . . A . . . . . C T – C A T –
EF670550 NA005 *Sousa plumbea* South Africa (H18)	. . . A T . . . . . G . . A . . . . . A . C . . . A . . . . . T – C A T –
EF670551 NA002 *Sousa plumbea* South Africa (H18)	. . . A T . . . . . G . . A . . . . . A . C . . . A . . . . . T – C A T –
EU380409 M001 *Sousa teuszii* North Africa (H19)	. . . A T . . . . . A . T . . . . T A . C . . . A . . . C . . . . – . . T –

The haplotype for each sequence is shown, and sample source references available in Appendix Table B1.

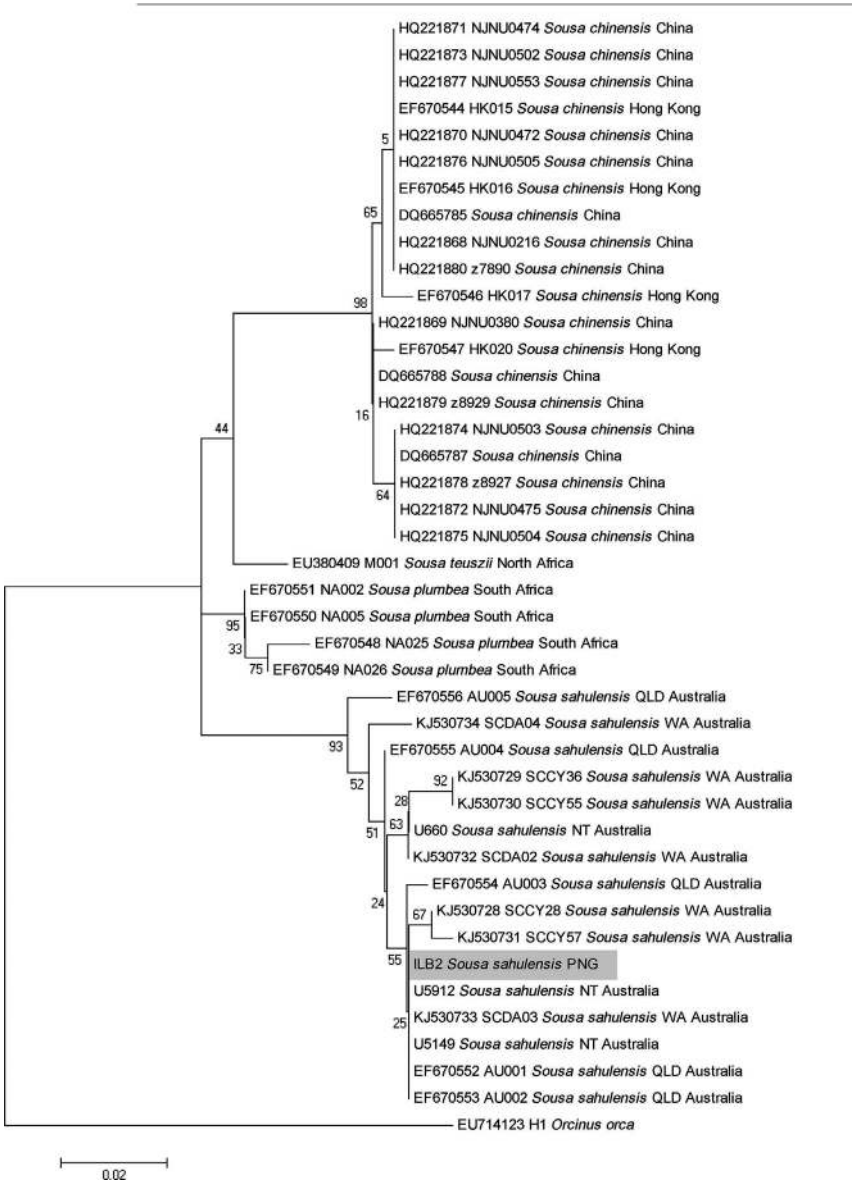

Figure 9 Phylogenetic analysis of the mtDNA control region of *Sousa* spp. Maximum Likelihood (ML) tree resulting from Bayesian reconstruction with posterior probabilities branch support values. *Orcinus orca* was specified as an outgroup. See Appendix B.

was analysed from Papua New Guinea, it had the same haplotype as other *S. sahulensis* samples from the Northern Territory, indicating no major taxonomic differences between Australian and Papua New Guinea *Sousa* populations. Based on the position of the Sahul Shelf with associated

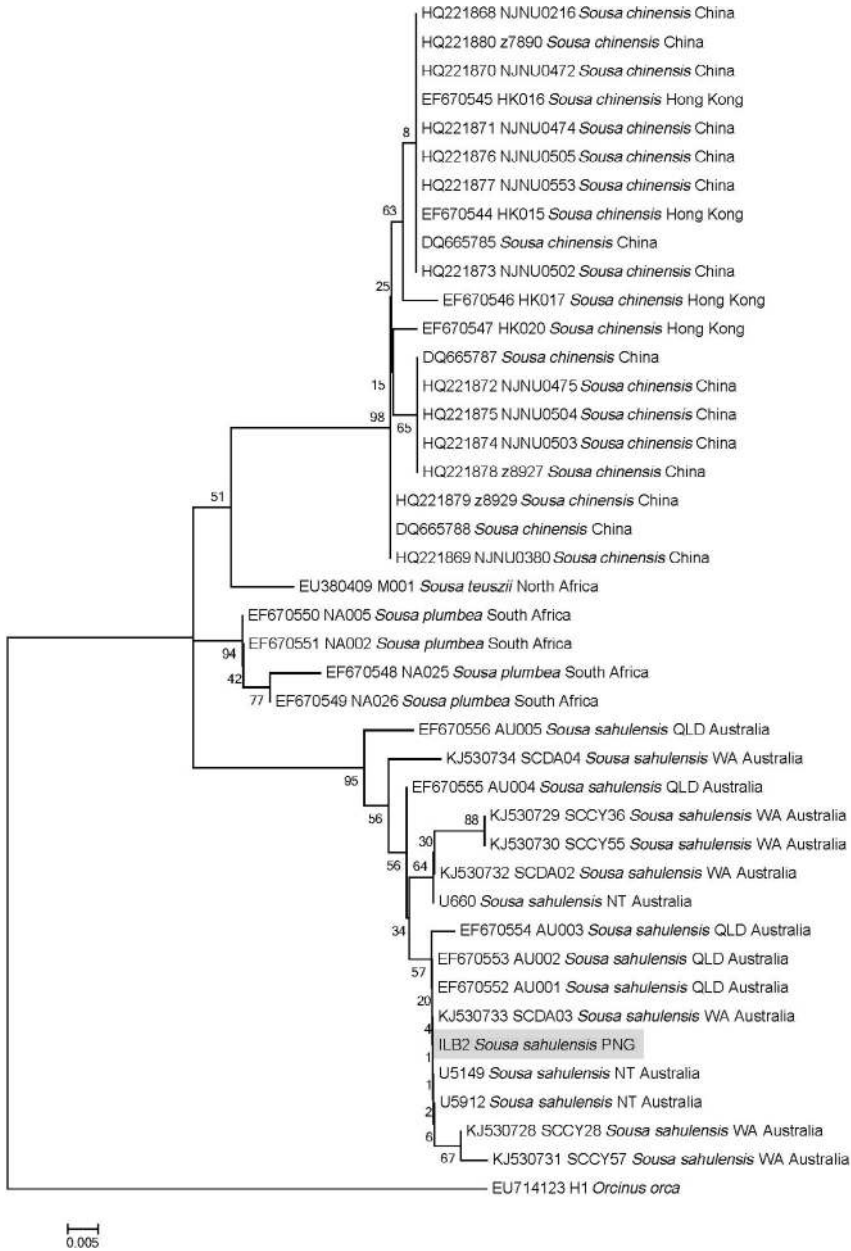

Figure 10 Phylogenetic analysis of the mtDNA control region of *Sousa* spp. Neighbor Joining (NJ) tree obtained from Bayesian reconstruction with posterior probabilities branch support values. *Orcinus orca* was specified as an outgroup. See Appendix B.

bathymetry, it appears that *S. sahulensis* ranges around the coast of southern New Guinea, from approximately 100 km west of Port Moresby (Karaema) northwest to Mayalibit Bay within the Raja Ampat Islands (Figure 3).

It is possible that *S. sahulensis* also occurs north-east of Raja Ampat into Cenderawasih Bay, although the eastern portion of Cenderawasih Bay is likely to be the northeastern extent of *S. sahulensis* around New Guinea. This range is hypothesized since deep water close to shore then extends eastward along the coast of Papua, Papua New Guinea and into the Bismarck Sea, with an associated lack of major river systems along this coastline. East of Papua New Guinea, the deep-water trenches surrounding the Pacific Island countries are a likely barrier preventing *S. sahulensis* dispersal to these countries, although there may still be remnant populations in some coastal parts of the Solomon Islands. The current findings therefore expand the range extent for *S. sahulensis* to include Indonesia, and *S. sahulensis* is now confirmed to occur in three countries: Australia, Papua New Guinea and Indonesia (Papua and West Papua Provinces only).

5. PROPOSED RANGE OF *S. SAHULENSIS* IN THE REGION

The northwesterly extent of *S. sahulensis* remains unknown; however, it appears to be related to the bio-geographic barrier between the Sahul and Sunda shelves, and is likely to follow either Wallace's line, i.e. including Lombok, Sulawesi and Timor-Leste, or Weber's line, i.e. excluding including Lombok, Sulawesi and Timor-Leste.

The closest known humpback dolphin records west of New Guinea are four confirmed *S. chinensis* sighting records from the Berau and Sesayap Deltas, east Kalimantan, obtained during 2008 and 2009 surveys (Kreb et al., 2008; Kreb and Rukman, 2010; see Figure 3, Appendix A). Photographic images show that these individuals are *S. chinensis* (*borneensis*-type: Jefferson and Rosenbaum, 2014), as evidenced by extensive spotting and pink colouration over the body and lack of a distinctive dorsal cape (Figure 11).

Interestingly, no humpback dolphins were sighted during 4500 km of survey effort along the central and southern east Kalimantan coast during 2000–2003 (Kreb and Budiono, 2005), or 985 km of survey effort in Balikpapan Bay (southern east Kalimantan) during 2008 (Kreb, 2008); despite another coastal species, the Irrawaddy dolphin, *Orcaella brevirostris*, being regularly sighted. This was likely because minimal portions of the survey route went north of the Mangkalihat Peninsula, which is located north of the Mahakam Delta and south of the Berau Delta, central east Kalimantan. Humpback dolphins have not been recorded south of the Mangkalihat

Figure 11 Indo-Pacific humpback dolphin, *Sousa chinensis*, images from East Kalimantan. *Photographs: Danielle Kreb.*

Peninsula, presumably because of the very deep waters close to shore, which may act as a barrier for distribution of *S. chinensis* further south along the east Kalimantan coastline; although sightings of *O. brevirostris* south of Mangkalihat Peninsula confound this theory. A minor proportion of the 2003 surveys reported by Kreb and Budiono (2005) were conducted in Berau District (north of Mangkalihat Peninsula). However, these surveys were conducted in deep offshore waters, and not in coastal waters of the Berau Delta, where humpback dolphins were sighted twice during 2008 surveys (Kreb et al., 2008), and twice during 2009 surveys (Kreb and Rukman, 2010).

Humpback dolphins were also reported by Kahn (2001) and Kahn and Pet (2003) from Komodo National Park, Indonesia, in April and October 2001 (see Figure 3, Appendix A). Unfortunately, no images are available from these sightings, thus they remain unconfirmed and in doubt, as discussed by Jefferson and Rosenbaum (2014).

There is a possibility that remnant *S. sahulensis* populations may occur around the Solomon Islands, although if present, populations are likely to be small and highly fragmented, given the large expanse of deep water surrounding these islands. Solomon Island populations would likely be *S. sahulensis*, given the islands' location near the eastern extent of the Sahul Shelf. *Sousa* sp. found within the Wallacea region (i.e. Sulawesi, Timor-Leste, Flores and Lombok) could potentially be either *S. chinensis* or *S. sahulensis*. There are suggestions that humpback dolphins from Bangladesh in the northern Bay of Bengal are more closely related to *S. sahulensis* than to other species of *Sousa* (Amaral et al., 2015). Therefore, the influence of the Indo-Australian plate on *Sousa* spp. phylogenetics (i.e. where the plate extends from New

Guinea/northern Australia northwest to the northern Bay of Bengal) suggests that *Sousa* found in the Wallacea region are most likely *S. chinensis*.

Future studies in the waters of Cenderawasih Bay (West Papua), Sulawesi, Timor-Leste and the southeastern Indonesian islands (Lombok, Komodo, Sumba and Lembata) will be important to determine the range extents of *S. sahulensis* and *S. chinensis*. Further studies within waters of Komodo National Park are also a high priority to confirm, or refute, the existence of *Sousa* in these waters (see Jefferson and Rosenbaum, 2014). Continued dedicated studies in regions where *S. sahulensis* are known to reliably occur around New Guinea will also be important to determine population status. Regions such as the Kikori Delta of Papua New Guinea and Bintuni Bay south to the Kaimana region of West Papua appear to have reasonably sized *Sousa* sp. populations. Detailed studies will assist in understanding the species' conservation status and the development of effective national and regional management strategies.

6. CONSERVATION STATUS IN NEW GUINEA AND MANAGEMENT IMPLICATIONS

There is minimal information available about *S. sahulensis* distribution, abundance or population status throughout its range around New Guinea, although as with other known *Sousa* populations, they are likely to be small, often fragmented and facing numerous anthropogenic threats due to their close proximity to the coast, fisheries and coastal development. The potential impacts of emerging threats, such as unregulated undersea mining and seismic testing are unknown, and have potential to cause significant disruption to small, coastal populations, if unmanaged.

Both Papua New Guinea and Indonesia have legislation to protect cetaceans. However, similar to regions in northern Australia where *S. sahulensis* occurs, its distribution around remote regions of New Guinea ensures the species is logistically challenging to study, and difficult for enforcement agencies to effectively manage in relation to threats such as accidental catch in subsistence fisheries and potential direct catch.

6.1 West Papua and Papua

Papua and West Papua fall under Indonesian law, in which marine mammals are protected under Government Law (Peraturan Pemerintah) no. 7/1999 on the Preservation of Plants and Animals in Indonesia. This legislation prohibits killing of whales, dolphins or dugongs, although live capture for

display is still allowed. There is no known collection of captive marine mammals from the West Papua or Papua Provinces of Indonesia.

Despite having the highest marine diversity, the richest marine fisheries resources, the most extensive intact lowland rainforests, and vast energy reserves in oil and gas sectors, the Bird's Head Seascape of West Papua also has the highest levels of poverty in Indonesia (Resousudarmo and Jotzo, 2009). Over 40% of the 761,000 people living in the Bird's Head Seascape fall below the poverty line (Mangubhai et al., 2012). The low population density and environmental factors have apparently kept the Bird's Head Seascape ecosystems in a relatively healthy condition compared to many other areas of Southeast Asia (Ainsworth et al., 2008). However, unsustainable exploitation of natural resources (both legal and illegal), irresponsible development practices and Bird's Head Seascape's 5.5% per year human population growth threaten the health of these ecosystems and the local communities who depend on them (Mangubhai et al., 2012). Although cetaceans are legally protected from hunting, they face increasing impacts from ship strikes, entanglement in fishing nets, loss of coastal habitat and plastic pollution. In addition, one emerging threat to cetaceans in the Bird's Head Seascape is from undersea mining and seismic testing. Extensive seismic testing occurred in Raja Ampat and Cenderawasih Bay in 2010 (Kahn, 2007; Mangubhai et al., 2012). Following several conflicts between local communities and the offshore oil and gas industry, a comprehensive review was produced on the best operational practices for seismic surveys in regions with high marine biodiversity. This technical report included numerous global case studies, minimal requirements for seismic surveys in sensitive marine areas and also discussed no-go areas and acoustic buffer zones around existing Marine Protected Areas (Kahn, 2010).

Kahn (2006) stated that humpback dolphins in the Bintuni/Berau Bay region are vulnerable to coastal pollution and underwater noise. The introduction of waste, petro-chemicals, heavy metals and other toxins could also impact the food web in complex ways. There are also anecdotal reports of dolphins being caught for use as shark bait in Arguni Bay, West Papua (Wijaya, 2015).

6.2 Papua New Guinea

Cetaceans in Papua New Guinea are protected under the International Trade Integrity Act (2007) and also under the Whaling Protection Act (1980), which is administered through the National Fisheries Authority. Through this legislation, it is illegal to kill or harass a whale or dolphin in Papua New Guinea waters. Since 2007, the Whale and Dolphin Conservation organization has

been involved in organizing workshops, conducting surveys and drafting a legislative review toward implementing a Papua New Guinea Cetacean Management Plan. However, the current status of the Plan is uncertain. The SPREP Whale and Dolphin Action Plan 2013–2017 (2012), is the primary management tool for coordinated cetacean research and management in the Pacific Islands region, of which Papua New Guinea is a member country. Although there is currently minimal direct implementation of the Action Plan, there is great potential for the plan to assist with national and regional research, conservation and management initiatives (SPREP, 2012).

Miller (2007) provided a comprehensive assessment of the threats to cetaceans in the Pacific Island region, which includes climate change and habitat degradation, noise, cetacean tourism, bycatch and entanglement and drive hunts. In the Kikori Delta region of Papua New Guinea, the most pressing threats are accidental entanglement in subsistence fisheries, and water pollution through unregulated logging ports. Although bycatch levels are unknown, initial indications are that numbers could be significant (Beasley et al., 2015).

There are many challenges to developing effective research, conservation and management strategies for marine mammals in New Guinea, particularly given the logistical and financial considerations of conducting research in remote locations. Regardless, future priorities for the Governments of these regions will need to focus efforts on inshore dolphins in known regional hotspots (i.e. Bird's Head Seascape and Kikori Delta), to contribute to the long-term survival of *S. sahulensis* in New Guinea waters.

ACKNOWLEDGEMENTS

Many thanks to Adella Edwards for creating the maps presented throughout this paper. Special thanks to Tim Laman, Max Ammer and Conservation International team members Ismu Hidayat, Matthew Fox, Mark Erdmann and Muhammad Lazuardi for assisting to source *Sousa* images and location data from Mayalibit Bay, West Papua. Thanks also to Sangeeta Mangubhai, Gondan Renosari, Andreas Muljadi and The Nature Conservancy team for *Sousa* position data from their marine mammal surveys in the Raja Ampat region of West Papua. Thanks to Gavin Dally (Museum and Art Galley of the Northern Territory), and Heather Janetzki, Niel Bruce, Robyn Cumming (Museum of Tropical Queensland) for providing *Sousa* samples for genetic analyses. Thanks to Jeremy Austin and Caitlin from the Australian Centre for Ancient DNA, The University of Adelaide, for analysing the humpback dolphin genetic samples. I.B. would like to sincerely thank PNGLNG Community Investment Program for providing funding for the Papua New Guinea fieldwork component of this manuscript, and genetic analysis. I.B. would also like to acknowledge the significant support of the late Peter Arnold who assisted to initiate the Papua New Guinea research project. J.A. would like to thank the National Museum and Art Gallery Director Dr. Andrew Moutu, for allowing J.A.'s participation on the PIDU trips, as well as ensuring housing and curation of the skeletal specimens collected. Many thanks to Thomas Jefferson and Frank Bonaccorso for constructive comments on the manuscript. Fieldwork in Papua New Guinea was conducted under Papua New Guinea Research National Research Institute Visa 10350006555.

APPENDIX A. HUMPBACK DOLPHIN SIGHTING RECORDS FROM WEST PAPUA, PAPUA NEW GUINEA AND THE PACIFIC ISLANDS

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
***S. sahulensis* records from Arafura Sea**								
Unknown	Arafura Sea, 230 km north of Nhulunbuy	Northern Australia	Specimen	'specimen' (NTM U660)	Confirmed (skeletal remains)	−9.6000	135.6167	Rudolf et al. (1997)
***S. sahulensis* records from PNG**								
10-Dec-99	Cape Blackwood, Kikori Delta	Papua New Guinea	Helicopter sighting	2 Individuals sighted. Described as pale grey, dorsal fin well back on body, flattish beak, body not strongly arched while diving, dorsal fin backward sloping	Unconfirmed (no photographs or clear description)	−7.9200	144.6283	Bonaccorso et al. (2000)
04-Dec-13	Cape Blackwood, Kikori Delta	Papua New Guinea	Boat-based surveys	2 Individuals sighted	Confirmed (photographs)	−7.7164	144.2966	Beasley et al. (2014)
04-Dec-13	Cape Blackwood, Kikori Delta	Papua New Guinea	Boat-based surveys	4 Individuals sighted	Confirmed (photographs)	−7.7295	144.3613	Beasley et al. (2014)
07-Dec-13	Cape Blackwood, Kikori Delta	Papua New Guinea	Boat-based surveys	5 Individuals sighted	Confirmed (photographs)	−7.7828	144.4699	Beasley et al. (2014)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
08-Dec-13	Urama Island, Kikori Delta	Papua New Guinea	Boat-based surveys	2 Individuals sighted	Confirmed (photographs)	−7.5249	144.6094	Beasley et al. (2014)
10-Dec-13	Paia Inlet, Kikori Delta	Papua New Guinea	Boat-based surveys	1 Individual sighted	Confirmed (photographs)	−7.8884	144.6686	Beasley et al. (2014)
13-Dec-13	Cape Blackwood, Kikori Delta	Papua New Guinea	Boat-based surveys	4 Individuals sighted	Confirmed (photographs)	−7.7593	144.4020	Beasley et al. (2014)
13-Dec-13	Cape Blackwood, Kikori Delta	Papua New Guinea	Boat-based surveys	4 Individuals sighted	Confirmed (photographs)	−7.7470	144.4241	Beasley et al. (2014)
24-Feb-15	Western tip of Banana Island, Kikori Delta	Papua New Guinea	Boat-based surveys	3 Individuals sighted	Confirmed (photographs)	−7.7233	144.3644	Beasley et al. (2015)
25-Feb-15	Cape Blackwood, Kikori Delta	Papua New Guinea	Boat-based surveys	5 Individuals sighted	Confirmed (photographs)	−7.7989	144.5210	Beasley et al. (2015)
26-Feb-15	Paia Inlet, Kikori Delta	Papua New Guinea	Boat-based surveys	8 Individuals sighted	Confirmed (photographs)	−7.5890	144.5276	Beasley et al. (2015)

26-Feb-15	Paia Inlet, Kikori Delta	Papua New Guinea	Boat-based surveys	8 Individuals sighted	Confirmed (photographs)	−7.6394	144.5376	Beasley et al. (2015)
27-Feb-15	Veraibari Headland, Kikori Delta	Papua New Guinea	Boat-based surveys	5 Individuals sighted	Confirmed (photographs)	−7.6759	144.5577	Beasley et al. (2015)
25-Feb-15	Banana Island, Kikori Delta	Papua New Guinea	Boat-based surveys	Found dead on shore next to Orcaella	Confirmed (skeletal remains)	−7.7598	144.3697	Beasley et al. (2015)
***S. sahulensis* records from West Papua**								
20-Nov-06	Mayalibit Bay, Raja Ampat	West Papua	Boat-based surveys	Photographs taken just after the Raja Ampat assessment were confirmed as being humpback dolphins by Benjamin Kahn (see image f on report cover)	Confirmed (skeletal remains)	−0.2614	130.7789	Kahn (2007)
23-Feb-07	North of Misool Island, Raja Ampat	West Papua	Snorkelling	6 Individuals sighted by Andreas while snorkelling	Unconfirmed (no photographs or clear description)	−1.6794	129.8739	Ender et al. (2014)
24-Feb-07	North of Misool Island, Raja Ampat	West Papua	Snorkelling	4 Individuals sighted by Andreas while snorkelling	Unconfirmed (no photographs or clear description)	−1.7135	129.7962	Ender et al. (2014)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3467	133.6934	Kahn et al. (2006)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.2615	133.6426	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3207	133.7943	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.2988	133.8379	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3015	133.8707	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4732	133.7283	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4646	133.7144	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4081	133.6675	Kahn et al. (2006)

September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3737	133.5480	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.5050	133.5291	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.5971	133.6771	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.5207	133.4527	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4986	133.4092	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.5202	133.3946	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.5421	133.4578	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4426	133.4297	Kahn et al. (2006)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4585	133.4318	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3747	133.3628	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3219	133.3582	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.2707	133.3236	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3746	133.3105	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3636	133.3055	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3384	133.2766	Kahn et al. (2006)

September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3736	133.2464	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3882	133.2239	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.2742	133.1623	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.2991	133.0863	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3569	132.9537	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.3030	133.0203	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4075	133.1379	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4283	133.0940	Kahn et al. (2006)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4396	133.0966	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4212	133.1397	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4710	133.0610	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4804	133.0424	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.6326	132.9167	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.6423	132.9226	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.5910	132.9602	Kahn et al. (2006)

September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.5190	133.0137	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.7482	132.7806	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4263	133.1169	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4435	133.0876	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4549	133.0842	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.7464	132.7011	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.7267	132.6840	Kahn et al. (2006)
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.4030	133.1724	Kahn (2006)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
September/ October 2005	Bintuni Berau Bay, Birds Head Seascape	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−2.7199	132.7611	Kahn et al. (2006)
01-Apr-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	7 Individuals (record 4)	Confirmed (photographs)	−3.1569	133.6821	Wijaya (2015)
01-Apr-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 5)	Confirmed (photographs)	−3.1633	133.6906	Wijaya (2015)
07-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 11)	Confirmed (photographs)	−3.1616	133.6869	Wijaya (2015)
07-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 12)	Confirmed (photographs)	−3.1691	133.6845	Wijaya (2015)
07-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 13)	Confirmed (photographs)	−3.1668	133.6917	Wijaya (2015)
07-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 14)	Confirmed (photographs)	−3.1611	133.6877	Wijaya (2015)
07-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 15)	Confirmed (photographs)	−3.1494	133.6846	Wijaya (2015)
08-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 20)	Confirmed (photographs)	−3.1787	133.6916	Wijaya (2015)
08-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 21)	Confirmed (photographs)	−3.1930	133.6850	Wijaya (2015)

08-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 22)	Confirmed (photographs)	−3.1717	133.6791	Wijaya (2015)
08-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 23)	Confirmed (photographs)	−3.1768	133.6791	Wijaya (2015)
08-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 24)	Confirmed (photographs)	−3.2150	133.6731	Wijaya (2015)
09-Feb-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 29)	Confirmed (photographs)	−3.1621	133.6814	Wijaya (2015)
09-Feb-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	5 Individuals (record 30)	Confirmed (photographs)	−3.1703	133.6891	Wijaya (2015)
09-Feb-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	5 Individuals (record 31)	Confirmed (photographs)	−3.1062	133.7771	Wijaya (2015)
09-Feb-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	4 Individuals (record 32)	Confirmed (photographs)	−3.1446	133.6899	Wijaya (2015)
09-Feb-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 33)	Confirmed (photographs)	−3.1637	133.6831	Wijaya (2015)
09-Feb-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 34)	Confirmed (photographs)	−3.1681	133.6684	Wijaya (2015)
09-Feb-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 35)	Confirmed (photographs)	−3.1584	133.6897	Wijaya (2015)
09-Feb-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 36)	Confirmed (photographs)	−3.1596	133.6909	Wijaya (2015)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
12-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	5 Individuals (record 41)	Confirmed (photographs)	−3.1664	133.6664	Wijaya (2015)
12-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 42)	Confirmed (photographs)	−3.1650	133.6944	Wijaya (2015)
12-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 43)	Confirmed (photographs)	−3.1568	133.6884	Wijaya (2015)
13-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 45)	Confirmed (photographs)	−3.1118	133.7960	Wijaya (2015)
13-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 46)	Confirmed (photographs)	−3.1574	133.6729	Wijaya (2015)
13-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 47)	Confirmed (photographs)	−3.1487	133.6829	Wijaya (2015)
13-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 49)	Confirmed (photographs)	−3.1550	133.6868	Wijaya (2015)
18-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 50)	Confirmed (photographs)	−3.1632	133.6766	Wijaya (2015)
18-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 51)	Confirmed (photographs)	−3.1670	133.6948	Wijaya (2015)
18-Mar-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 52)	Confirmed (photographs)	−3.1607	133.6915	Wijaya (2015)

24-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	6 Individuals (record 59)	Confirmed (photographs)	−3.1598	133.6784	Wijaya (2015)
24-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 60)	Confirmed (photographs)	−3.1646	133.6748	Wijaya (2015)
24-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	4 Individuals (record 61)	Confirmed (photographs)	−3.1532	133.6771	Wijaya (2015)
24-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 62)	Confirmed (photographs)	−3.1416	133.6888	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 67)	Confirmed (photographs)	−3.2038	133.6737	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 68)	Confirmed (photographs)	−3.1926	133.6744	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 69)	Confirmed (photographs)	−3.1703	133.6803	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	5 Individuals (record 70)	Confirmed (photographs)	−3.1668	133.6767	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 71)	Confirmed (photographs)	−3.1575	133.6678	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 72)	Confirmed (photographs)	−3.2128	133.6746	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 73)	Confirmed (photographs)	−3.2134	133.6765	Wijaya (2015)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 74)	Confirmed (photographs)	−3.2118	133.6758	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 75)	Confirmed (photographs)	−3.2164	133.6747	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 76)	Confirmed (photographs)	−3.2200	133.6641	Wijaya (2015)
25-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 77)	Confirmed (photographs)	−3.2176	133.6673	Wijaya (2015)
24-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 78)	Confirmed (photographs)	−3.1660	133.6715	Wijaya (2015)
27-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 81)	Confirmed (photographs)	−3.1655	133.6842	Wijaya (2015)
27-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 82)	Confirmed (photographs)	−3.1600	133.6837	Wijaya (2015)
27-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 83)	Confirmed (photographs)	−3.1608	133.6706	Wijaya (2015)
27-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 84)	Confirmed (photographs)	−3.1732	133.6863	Wijaya (2015)
29-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 88)	Confirmed (photographs)	−3.1637	133.6785	Wijaya (2015)

29-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 89)	Confirmed (photographs)	−3.1869	133.6931	Wijaya (2015)
29-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 90)	Confirmed (photographs)	−3.1914	133.6982	Wijaya (2015)
29-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 91)	Confirmed (photographs)	−3.1857	133.6804	Wijaya (2015)
29-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 92)	Confirmed (photographs)	−3.1438	133.6897	Wijaya (2015)
29-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 93)	Confirmed (photographs)	−3.1662	133.6868	Wijaya (2015)
29-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	3 Individuals (record 94)	Confirmed (photographs)	−3.1614	133.6904	Wijaya (2015)
30-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 99)	Confirmed (photographs)	−3.1609	133.6755	Wijaya (2015)
30-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 100)	Confirmed (photographs)	−3.1553	133.6674	Wijaya (2015)
30-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 101)	Confirmed (photographs)	−3.1531	133.6704	Wijaya (2015)
30-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	1 Individual (record 102)	Confirmed (photographs)	−3.1534	133.6719	Wijaya (2015)
30-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	2 Individuals (record 103)	Confirmed (photographs)	−3.1720	133.6667	Wijaya (2015)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
30-Jan-15	Arguni Bay, Kaimana	West Papua	Boat-based surveys	5 Individuals (record 104)	Confirmed (photographs)	−3.1475	133.6787	Wijaya (2015)
31-May-10	Mayalibit Bay, West Papua, Indonesia	West Papua	Aerial surveys	1 Individual	Confirmed (photographs)	−0.0926	130.6466	Nur Ismu Hidayat, Conservation International (unpublished)
31-May-10	Mayalibit Bay, West Papua, Indonesia	West Papua	Aerial surveys	1 Individual	Confirmed (photographs)	−0.0949	130.6147	Nur Ismu Hidayat, Conservation International (unpublished)
31-May-10	Mayalibit Bay, West Papua, Indonesia	West Papua	Aerial surveys	2 Individuals	Confirmed (photographs)	−0.1145	130.6660	Nur Ismu Hidayat, Conservation International (unpublished)
31-May-10	Mayalibit Bay, West Papua, Indonesia	West Papua	Aerial surveys	2 Individuals	Confirmed (photographs)	−0.1269	130.6565	Nur Ismu Hidayat, Conservation International (unpublished)
31-May-10	Mayalibit Bay, West Papua, Indonesia	West Papua	Aerial surveys	12 Individuals	Confirmed (photographs)	−0.2201	130.7113	Nur Ismu Hidayat, Conservation International (unpublished)
31-May-10	Mayalibit Bay, West Papua, Indonesia	West Papua	Aerial surveys	4 Individuals	Confirmed (photographs)	−0.2866	130.8253	Nur Ismu Hidayat, Conservation International (unpublished)

2007	Mayalibit Bay, West Papua, Indonesia	West Papua	Boat-based surveys	3 Individuals	Confirmed (photographs)	−0.2590	130.7880	Muhammad Lazuardi, Conservation International (unpublished)
2008	Triton Bay, West Papua, Indonesia	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−3.6950	133.7606	Kahn (2009)
2008	Triton Bay, West Papua, Indonesia	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−3.7167	133.7721	Kahn (2009)
2008	Triton Bay, West Papua, Indonesia	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−3.6826	133.8564	Kahn (2009)
2008	Triton Bay, West Papua, Indonesia	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−3.6922	133.8714	Kahn (2009)
2008	Triton Bay, West Papua, Indonesia	West Papua	Boat-based surveys	No information	Confirmed (photographs)	−3.7740	134.1152	Kahn (2009)
***S. sahulensis* records from Indonesia**								
2001	Komodo National Park	Indonesia	Boat-based surveys	No information	Unconfirmed (no photographs or clear description)	−8.5547	119.8148	Kahn (2001) and Kahn and Pet (2003)

Continued

Date	Region	Country	Record Type	Details	Reliability	Latitude	Longitude	Citations
2001	Komodo National Park	Indonesia	Boat-based surveys	No information	Unconfirmed (no photographs or clear description)	−8.4723	119.8573	Kahn (2001) and Kahn and Pet (2003)
2001	Komodo National Park	Indonesia	Boat-based surveys	No information	Unconfirmed (no photographs or clear description)	−8.6584	119.6677	Kahn (2001) and Kahn and Pet (2003)
2001	Komodo National Park	Indonesia	Boat-based surveys	No information	Unconfirmed (no photographs or clear description)	−8.6160	119.7328	Kahn (2001) and Kahn and Pet (2003)
2001	Komodo National Park	Indonesia	Boat-based surveys	No information	Unconfirmed (no photographs or clear description)	−8.4058	119.8833	Kahn (2001) and Kahn and Pet (2003)
12-Apr-08	Berau Delta, Kalimantan, Indonesia	Indonesia	Boat-based surveys	11 Dolphins consisting of 2 calves, 4 juveniles and 5 adults. Depth = 2.5 m	Confirmed (photographs and biopsy)	−2.1716	117.9492	Kreb et al. (2008)
26-Apr-08	Berau Delta, Kalimantan, Indonesia	Indonesia	Boat-based surveys	15 Individuals consisting of 3 juveniles and 12 adults. Depth = 2.5 m	Confirmed (photographs)	−2.1629	117.9534	Kreb et al. (2008)
20-Jul-09	Sesayap Delta, Kalimantan, Indonesia	Indonesia	Boat-based surveys	1 Sousa with 4 Orcaella	Confirmed (photographs)	−3.4786	117.3258	Kreb and Rukman (2010)
21-Jul-09	Sesayap Delta, Kalimantan, Indonesia	Indonesia	Boat-based surveys	6 Adults in group. Depth = 10.7 m	Confirmed (photographs)	−3.5002	117.6172	Kreb and Rukman (2010)

APPENDIX B. METHODS FOR MOLECULAR ANALYSIS

DNA was extracted and PCA amplified from bone (Boessenkool et al., 2009) and tissue samples (Austin et al., 2013) using standard methods. Amplification of approximately 500-base pairs of the mtDNA control region was conducted using polymerase chain reaction (PCR) and primers dlp1.5 (5′-TCA CCC AAA GCT GRA RTT CTA-3′) and dlp5R (5′-CCA TCG WGA TGT CTT ATT TAA GRG GAA-3) (Baker et al., 1993; Pichler et al., 1998). DNA sequencing was performed by the Australian Genome Research Facility. Sequence chromatograms were edited and assembled using Geneious 8.1.5 (Biomatters).

The mtDNA dataset was analysed using Neighbour-Joining (NJ), Maximum Likelihood (ML) (MEGA 5) and Bayesian Interference Analyses (BI) (Mr. Bayes) clustering algorithms to infer phylogenetic relationships. For BI, Monte Carlo Markov Chain was run over 10,000 000 iterations with a sampling frequency of 500 and run over two replicates. All other parameters were set to default in Mr. Bayes. For the NJ and ML trees, 1000 bootstrap replications were used. *Orcinus orca* (EU714123) was used as outgroup for all analyses. No holotype of *S. chinensis* is available (Jefferson and Karczmarski, 2001); therefore, a comparison was not possible. Sequences were downloaded from GeneBank for comparison with *Sousa* spp. from other localities (GeneBank accession numbers Table B1).

Table B1 GeneBank Accession Number, Species Information, Sample Locality and Sequence Reference for Samples Incorporated in Phylogenetic Presented in the Current Study

GeneBank Accession No.	Species	Locality	References
DQ665785–DQ665788	*S. chinensis*	Pearl River Estuary and Xiamen waters, China	Chen et al. (2008)
HQ221868–HQ221880	*S. chinensis*	Pearl River Estuary and Xiamen waters, China	Chen et al. (2010)
KJ530728–KJ530734	*S. sahulensis*	Northwestern Australia	Brown et al. (2014)
EF670544–EF670556 EU380409	*S. sahulensis*	Hong Kong, South Africa, Mauritania, northeastern and northwestern Australia	Frère et al. (2008)

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