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Spinner dolphin (*Stenella longirostris*) and other cetaceans in Raja Ampat waters, West Papua

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ABSTRACT

Cetaceans were surveyed using ship transects across the seas of Raja Ampat (West Papua) in November and December 2007. Sighting effort reached 120 hours, over a total distance of 1561 km. The most common cetacean sighted was the spinner dolphin, *Stenella longirostris* (~0.238 individuals/km), most frequently in pods of 15-20 individuals, in relatively-shallow to deep waters (82-2310 m). All those spinner dolphins that were positively identified from photographs were of the pelagic form (*S. l. longirostris*). Other cetaceans sighted were the short-finned pilot whale, *Globicephala macrorhynchus*, Risso's dolphin, *Grampus griseus*, the bottlenose dolphin, *Tursiops* sp., the false killer whale, *Pseudorca crassidens* and the sperm whale, *Physeter macrocephalus*.

Keywords: Halmahera Sea, Pacific Ocean, Coral Triangle, pelagic spinner dolphin, pilot whale, Risso's dolphin, bottlenose dolphin, false killer whale, sperm whale

INTRODUCTION

The eastern half of the Indo-Malay-Papua archipelago lies within the "Coral Triangle", a biogeographic region where the marine life is highly diverse (Roberts et al., 2002; Hoeksema, 2007). Yet the large-vertebrate fauna of these seas remains poorly known. Published research in the archipelago includes sightings and an investigation of cetacean catches in the Lamalera area, Sawu Sea (Barnes, 1991; 1996; Rudolph et al., 1997), miscellaneous observations gathered throughout Indonesia (Rudolph et al., 1997), opportunistic sightings off Komodo Island (Hoffmann, 1998), sightings from a transect through the Java Sea and the South China Sea (De Boer, 2001), a dedicated cetacean survey off eastern Kalimantan (Kreb and Budiono, 2005), and a partial compilation of

stranding records throughout Indonesia (Mustika et al., 2009). Branch et al. (2007) reported opportunistic sightings and strandings of blue whales, *Balaenoptera musculus* (Linnaeus, 1758). Also, a series of reports has been produced from cetacean sighting surveys in the waters of Komodo National Park (Kahn et al., 2000).

A four-week expedition at sea, on board the research vessel *KR Baruna Jaya VIII* (LIPI, Jakarta), provided a rare opportunity, the first to our knowledge, to take a census of marine mammals in the seas around Raja Ampat, West Papua, at the core of the Coral Triangle.

METHODS

The Raja Ampat archipelago at the western extremity of Bird's Head Peninsula (West Papua) is made up of the four large islands of Batanta, Misool, Salawati and Waigeo, plus a myriad of smaller islands scattered around these (Figure 1).

Observations of marine mammals were made during daytime, continuously (15-24 November 2007) or intermittently (27 November - 05 December 2007), from the upper deck or from the wheelhouse of the 50-m long *KR Baruna Jaya VIII* (ca. 10 m above sea surface) by two observers equipped with binoculars and a reflex camera fitted with a 300-mm lens. The average speed of the vessel, whose multi-beam vertical sonar was in use during the whole survey, was 6.7 knots (12.4 km/hour). The total sighting effort is shown graphically in Figure 1 and quantitatively in Table 1. of each sighting event was recorded. For each sighting event we recorded the precise time and location, determined the species occurring, and estimated the group size of each species. Species names follow Rice (1998).

RESULTS AND DISCUSSION

Six cetacean species were identified during this survey. The precise location of sightings is given in Figure 1. Total encounter rate was 0.501 individual/km in the Halmahera Sea and 0.237 individual/km in the Pacific Ocean waters of Raja Ampat (Table 1). The most commonly encountered cetacean was the spinner dolphin, *Stenella longirostris* (Gray, 1828) (Table 1). Spinner dolphins occurred in compact pods of eight to over 50 individuals, generally of 15-20 individuals, and frequently exhibited conspicuous behaviour. In several instances, individuals with pink bellies were noted. Raja Ampat lies midway between the Philippines, where the subspecies reported is the pelagic spinner dolphin (*S. l. longirostris*), and northern Australia, where the dwarf form (*S. l. roseiventris*) occurs (Perrin, 2009a). Both inshore, reef, and deep-pelagic habitats exist in Raja Ampat, making eventually possible that the two subspecies co-occur there. Therefore, the question arises of whether the spinner dolphins sighted in Raja Ampat waters were of the dwarf or of the pelagic subspecies. Clues for the distinction of the two subspecies have been provided by Perrin et al. (1999) and Perrin et al. (2007):

useful parameters are body length and the relative sizes of appendages. Measurements of total body length of the individuals were not available, but from the pictures taken, the dorsal fin height can be measured as a proportion of the distance from beak tip to dorsal fin tip. The dorsal fin height of all individuals recorded on photographs and on which measures could be taken (*N*=14, from four separate sighting events, i.e. 21% occurrences) was comprised between 14.5% and 19.1 % of the dorsal-fin/beak-tip length, indicating they were of the pelagic subspecies. Those individuals possessed the distinctive, tripartite color pattern characteristic of pelagic spinner dolphins (Figure 2). Spinner dolphins occurred in waters 134-560 m deep in the Halmahera Sea and 82-2310 m deep in the Pacific Ocean waters of Raja Ampat. Encounter rates were of the same order as those reported by Kreb and Budiono (2005) off eastern Kalimantan, or by Ballance et al. (2001) in the Maldives archipelago, where spinner dolphin density was deemed to be high. Pelagic spinner dolphins feed on small mesopelagic fishes and squids, diving to 600 m or more (Perrin et al., 1999; Perrin, 2009b). Hence, the relatively high abundance of pelagic spinner dolphins in the Halmahera Sea is an indication of abundant mesopelagic resources.

All five sperm whales (*Physeter macrocephalus* Linnaeus, 1758) sighted during the survey (Table 1) were encountered at the western extremity of the deeper part of Dampier Strait (22 November: 00°37-40'S, 130°47-56'E; depth 585-745 m). They were solitary, of large size, and appeared to be in foraging mode, i.e. alternating long dives and surface-resting with frequent blowing. A single pod of >18 short-finned pilot whales (*Globicephala macrorhynchus* Gray, 1846) was observed, swimming parallel to a pod of spinner dolphins, also in the deep waters of the Dampier Strait (22 November: 00°39'S, 130°58'E; depth 820 m). Two small, separate groups of Risso's dolphins, *Grampus griseus* (Cuvier, 1812) totalling 15 individuals were sighted in the deep waters immediately north-west of Sorong (22 November: 00°45-46'S; 131°11-13'E; depth 485-513 m). False killer whales, *Pseudorca crassidens* (Owen, 1846), were sighted twice, each time a pod of 5-6 individuals, in relatively shallow (100-190 m deep) waters of the sill at the western side of Dampier Strait, at the entrance of the Halmahera Sea (01°13'S, 130°25'E; 23 November); and off Salawati Island (00°45'S, 130°30'E; 04 December). Pilot whales and sperm whales mainly feed on deep-sea squid (Aguilar Soto et al., 2008; Olson, 2009; Whitehead, 2009). Risso's dolphins are thought to feed on neritic and oceanic squid (Baird, 2009).

Although the overall encounter rate, all species combined, was higher in the Halmahera Sea (Table 1), species diversity was higher in Pacific Ocean waters, with 6 species positively identified (vs. only two, in the Halmahera Sea). The close-to-shore occurrence of deep-sea foraging cetaceans, such as the sperm whale and the short-finned pilot whale, is made possible by the steep transition from shore to deep-sea, as in Dampier Strait and elsewhere in the Raja Ampat archipelago. The present results indicate that Raja Ampat waters are a feeding area for various cetacean species, that occur in relatively high densities, at least during the period surveyed (late November – early December), thus providing indirect evidence of abundant and diverse resources, at least during that period.

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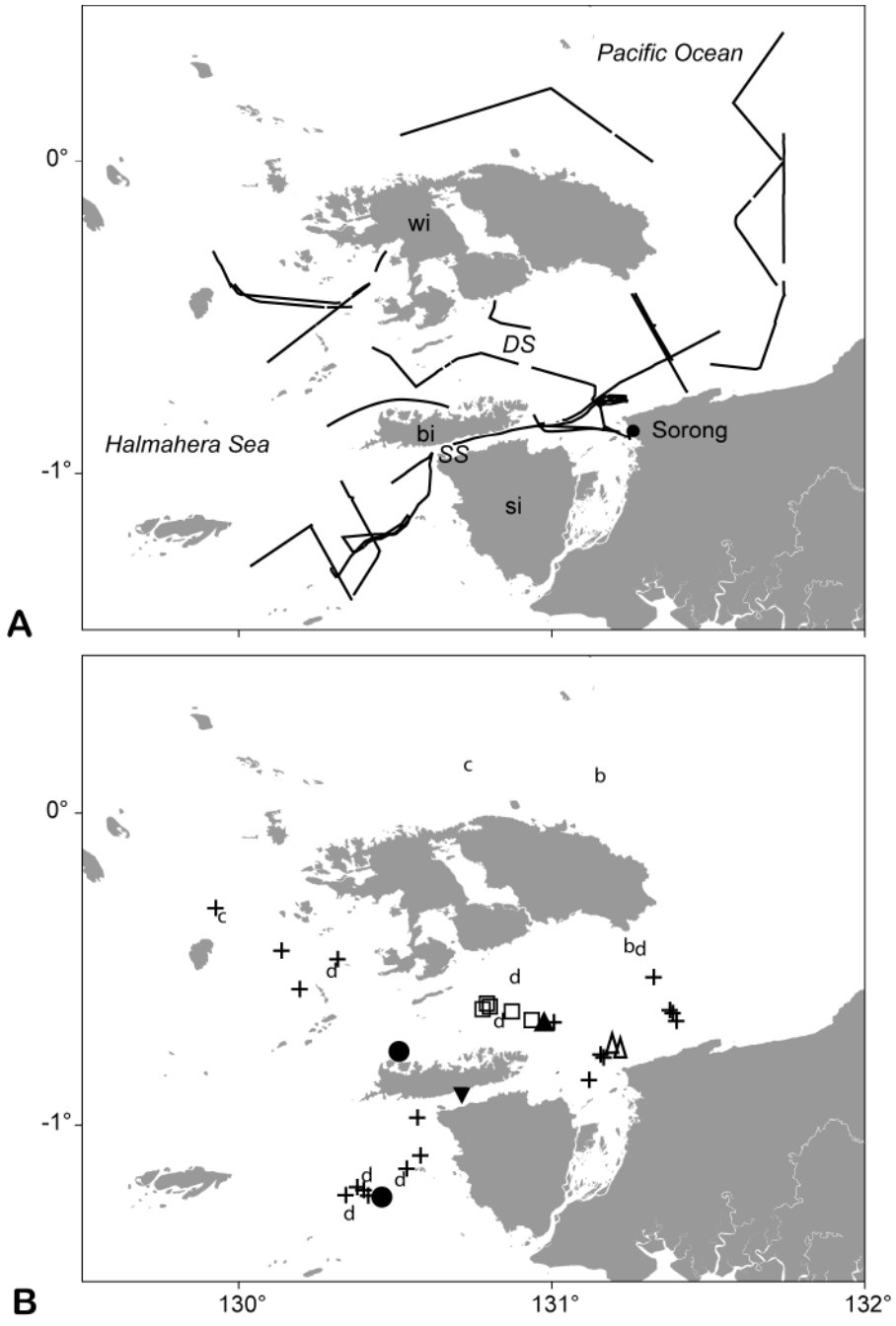
Table 1. Cetacean species sighted in Raja Ampat waters during the EWiN expedition on board *KR Baruna Jaya VIII*, 15 November - 05 December 2007. Searching effort and sighting frequency (with number of groups sighted in brackets) are reported. *Encounter rate* number of individuals/km.

Species		Region surveyed					
Vernacular name	Scientific name	Halmahera Sea			Pacific Ocean *		
		Count of individuals	(No. groups)	Encounter rate	Count of individuals	(No. groups)	Encounter rate
[EFFORT]							
[total time]	-	[38 hrs 15 min]			[82 hrs 07 min]		
[total distance]	-	[628.4 km]			[933.0 km]		
CETACEANS							
Spinner dolphin	*Stenella longirostris*	244	(11)	0.388	128	(8)	0.137
Bottlenose dolphin	*Tursiops* sp.	-	-	-	12	(1)	0.013
Short-finned pilot whale	*Globicephala macrorhynchus*	-	-	-	18	(1)	0.019
Risso's dolphin	*Grampus griseus*	-	-	-	15	(2)	0.016
False killer whale	*Pseudorca crassidens*	5	(1)	0.008	6	(1)	0.006
Sperm whale	*Physeter macrocephalus*	-	-	-	5	(5)	0.005
Unidentified dolphin	Delphinidae sp.	65	(4)	0.103	25	(3)	0.027
Unidentified blackfish	Globicephalinae sp.	-	-	-	10	(2)	0.011
Unidentified cetacean	Cetacea sp.	1	(1)	0.002	2	(1)	0.002

* includes Dampier Strait and Sagewin Strait

Figure 1. (**A**) Track of *KR Baruna Jaya VIII* across the Raja Ampat archipelago, 15 November - 05 December 2007. *DS* Dampier Strait; *SS* Sagewin Strait; *bi* Batanta Island; *si* Salawati Island; *wi* Waigeo Island. (**B**) Distribution of cetacean sightings. + spinner dolphin; ▼bottlenose dolphin; ▲ short-finned pilot whale; Δ Risso's dolphin; ● false killer whale; □ sperm whale; *b* unidentified blackfish; *c* unidentified cetacean; *d* unidentified dolphin.

Figure 2. Pelagic spinner dolphins (*Stenella longirostris longirostris*) exhibiting the relatively short appendages and the tripartite color pattern characteristic of the subspecies (Halmahera Sea, 01°00'S, 130°28'E; depth=612 m; 13 Nov. 2007).


Pacific Ocean
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