

MARINE RECORD

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First record of the white shark *Carcharodon carcharias* (Lamniformes: Lamnidae) from Sabah, Malaysian Borneo

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Abstract

Background: Although widespread and intensively studied in the Southwest and Northeast Pacific Ocean, relatively little is known of the distribution and biology of the white shark (*Carcharodon carcharias*) Northwest Pacific.

Results and conclusions: Three underwater photographs of a large white shark taken near the St. Joseph oil field, Sabah, in 1981 represent the first confirmed record of the species from Borneo. This record and one from Lombok Strait suggest that white sharks may move between Northwest Pacific and Indian Oceans across the Sunda Shelf.

Keywords: *Carcharodon carcharias*, White shark, Sabah, South China Sea

Background

The white shark (*Carcharodon carcharias*) has been recorded from sub-polar to tropical waters worldwide (Compagno 2001; Bonfil et al. 2005; Duffy et al. 2012). Although intensively studied in the Southwest and Northeast Pacific Ocean, relatively little is known of the species in the Northwest Pacific (Compagno 2002; Bruce et al. 2006; Domeier 2012; Duffy et al. 2012). Christiansen et al. (2014) reviewed 240 observations of white sharks from the Northwest Pacific concluding that although the species is not abundant, it is present in the region year round. The northernmost record of the species from the Northwest Pacific is from Tatar Strait, Sakhalin, Russia (47° 19.45' N, 141° 25.74' E), the southernmost is from the Bohol Sea, Philippines (c. 8° 39.66' N, 124° 37.33' E) (Herre 1953, Christiansen et al. 2014). In early 1981 a large white shark (*Carcharodon carcharias*) was photographed by commercial divers while laying an underwater pipeline from the barge E.T.P.M. DLB801 near the St Joseph offshore oil field, Sabah. This represents the first record of a white shark from Borneo. This note provides details of the sighting and reproduces one of

the photographs, confirming identification of the shark as *C. carcharias*.

Methods

Details of the sighting were obtained in an interview with one of the divers involved on 11 January 2015. The dates and approximate location that the barge was working in were confirmed by reference to the diver's commercial dive log, and three underwater photographs of the shark were examined. The largest, a 203 × 254 mm print mounted on board, was photographed using a digital camera (Fig. 1).

Results

The St. Joseph oil field is located in the South China Sea about 35 km off the coast of Usukan Bay, Sabah (6° 35.677' N, 116° 7.180' E) (Fig. 2). Water depth varies from 27 m to 43 m (Johnson et al. 1989). Sea surface temperature (SST) during April and May is 28–29 °C (Huang and Fang 1998, <http://envf.ust.hk/satop/south-china-sea.html>; Gordon et al. 2003).

The shark was observed from the barge over a period of about two days sometime between 12 April and 5 May 1981. Two of the photographs show the right side and ventral aspect of shark's head from the snout to just posterior to the lower jaw. The third is shown in Fig. 1. Diagnostic characters visible in Fig. 1 are the heavy, muscular body; relatively short, bluntly conical snout;

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Fig. 1 Large white shark (*Carcharodon carcharias*) photographed near the St Joseph offshore oil field, Sabah, Malaysian Borneo, April-May 1981 (Image: courtesy of Glen Ladkin, Pacific Diving)

large, black eye; five large gill slits located anterior to the pectoral fin base; and the large, triangular anterior teeth in the lower jaw. The diver estimated the shark to be 22 ft (6.7 m) total length (TL) by comparing it to a 12.2 m section of pipe. It was not possible to independently estimate the shark's length from any of the photographs because it was always pictured some distance in front of any objects that could have been used for scale. The sex of the shark is unknown.

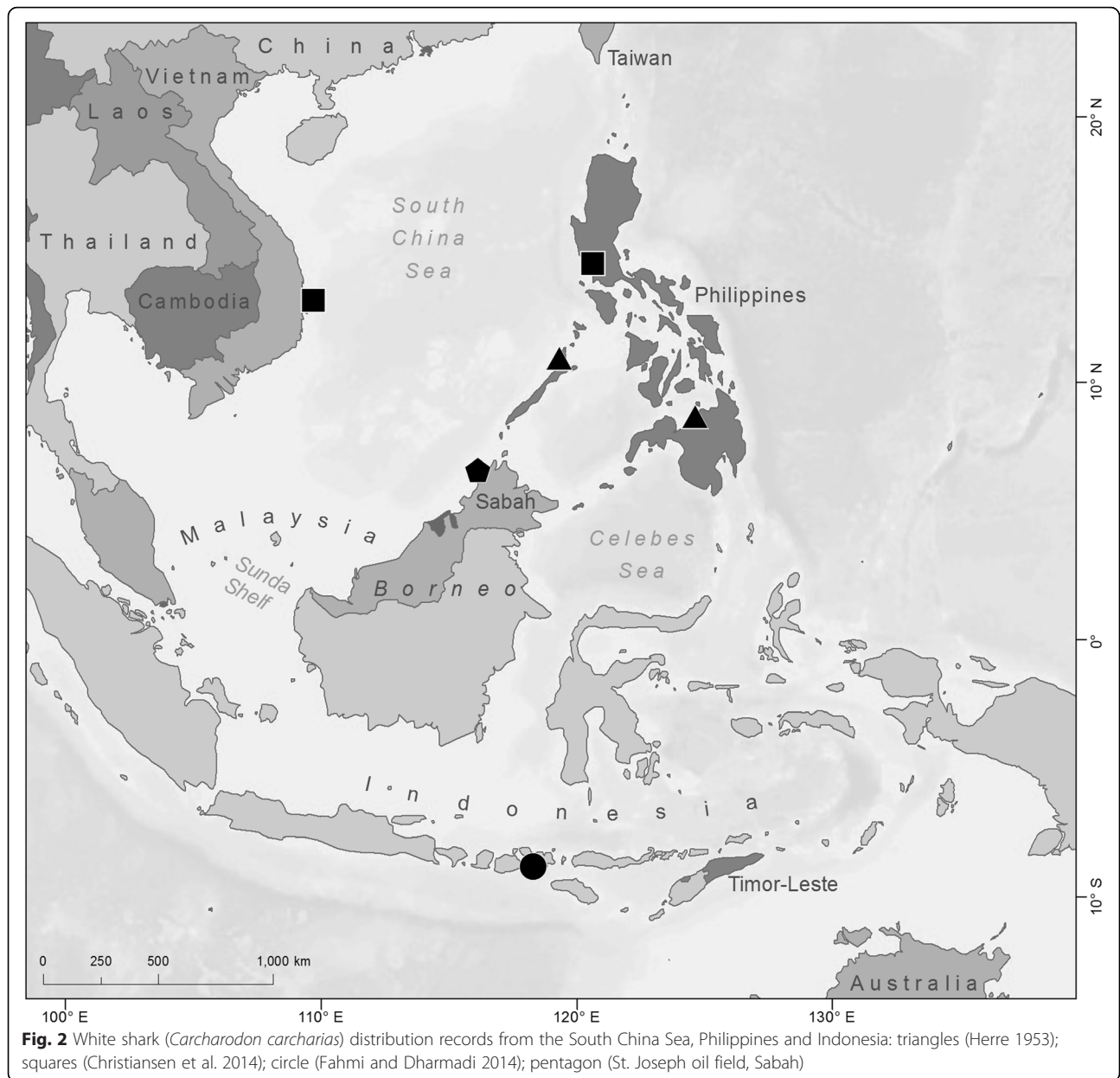
Discussion

As well as being the first record of *Carcharodon carcharias* from Borneo, this represents the southernmost confirmed record of the species from the Northwest Pacific Ocean (Fig. 2). *Carcharodon carcharias* is widely distributed in the South China Sea (Compagno 2002; Compagno et al. 2005; Christiansen et al. 2014). Christiansen et al. (2014) most southerly records were two reports from Qui Nhon Bay, Vietnam, and one from the Philippines. One of the Vietnamese records was an unconfirmed media report of a 1.6 m TL juvenile, whereas the other was of a 5 m TL specimen (unknown sex) that was confirmed by a photograph (http://www.elasmollet.org/Cc/Cc_list.html). The record from the Philippines was based upon a media report of several purported sightings of *C. carcharias* near the towns of Limay and Orion, Manila Bay (Cervantes 2003). That report also included reference to an attack on a fisher by *C. carcharias* off Barangay Luz, Cebu Island; the capture of a 6 m pregnant female near Limay in April 2003; and sightings off Palawan and Mindanao (Cervantes 2003). Herre (1953) reported *C. carcharias* from Malampaya

Sound, Palawan, and the Bohol Sea off Misamis Oriental, Mindanao (Fig. 2). Compagno et al. (2005) found no confirmed contemporary records of *C. carcharias* from the Philippines but commented these are to be expected given the species' wide distribution in tropical waters.

Although the generally accepted maximum size of *C. carcharias* is 6.4 m TL, there are plausible reports of individuals up to 7.0 m TL (Mollet et al. 1996; Compagno 2001). As female *C. carcharias* are generally larger than males, the Sabah shark was probably a mature female. The maximum size of male *C. carcharias* is generally accepted to be 5.1 m TL, possibly 5.5 m TL (Compagno 2001). Fahmi and Dharmadi (2014) reported the capture of a 6.6 m TL male *C. carcharias* off Dompu, Lombok Strait, Indonesia (08° 51' S, 118° 18' E) in July 2013 (Fig. 2). However, this shark had been cut into five pieces for transport prior to measurement and it may have been less than or equal to 6 m TL (Fahmi, LIPI, pers. comm.).

The occurrence of *C. carcharias* off Sabah in April-May is consistent with the seasonal movements of the species in the Northwest Pacific inferred by Christiansen et al. (2014). They reported *C. carcharias* during all months except July-August in the south (China, Taiwan, Philippines, and Vietnam), and all months except October-January in the north (Russia and Republic of Korea). This is similar to the seasonal movements of *C. carcharias* in the Northeast Pacific, Southwest Pacific and North Atlantic Oceans (Casey and Pratt 1985; Bruce et al. 2006; Jorgensen et al. 2009; Duffy et al. 2012). In these regions juvenile and adult white sharks tend to undertake rapid, directed movements from temperate to



subtropical and tropical waters in the autumn and winter, returning to inshore temperate habitats in the spring and early summer.

Conclusion

The occurrence of *Carcharodon carcharias* in the southern South China Sea during the Northern Hemisphere Spring is confirmed by three underwater photographs of a large *C. carcharias* taken near the St. Joseph oil field, Sabah, in 1981. Although the seasonal movements of Northern and Southern Hemisphere populations are out of phase, the presence of *C. carcharias* on the Sunda Shelf and in Lombok Strait suggests dispersal between

the Northwest Pacific and Indian Ocean populations may occur through the Java Sea and Sunda Islands.

Acknowledgements

I would like to thank Glen Ladkin, Pacific Diving, Tauranga, New Zealand, for providing details of the white shark encountered off Sabah, as well as access to his dive log and photo album. Dr Fahmi, Indonesian Institute of Sciences (LIPI), provided advice on the reliability of the length measurement of the Dompu white shark. Figure 2 was prepared by Geraldine Moore, New Zealand Department of Conservation, using data sourced from ESRI, USGS and NOAA. Funding was provided by New Zealand Oil & Gas Ltd (University Project Number: 3703064).

Competing interests

The author declares that he has no competing interests.

Authors' contributions

CD interviewed Glen Ladkin on 11 January 2015, examined Mr Ladkin's dive log and photographs of the shark, reviewed the relevant literature, and prepared the manuscript and Fig. 1.

Received: 9 May 2015 Accepted: 25 February 2016

Published online: 04 July 2016

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