

Chelonia mydas, (Linnaeus, 1758) from the eastern coast of the United Arab Emirates. *Marine Pollution Bulletin* 135: 55-61.

Yaghmour, F. 2019. Are oil spills a key mortality factor for marine turtles from the eastern coast of the United Arab Emirates? *Marine Pollution Bulletin* 149: 110624.

Yaghmour, F. 2020. Anthropogenic mortality and morbidity of marine turtles resulting from marine debris entanglement and boat strikes along the eastern coast of the United Arab Emirates. *Marine Pollution Bulletin* 153: 111031.

Yaghmour, F., F. Samara & I. Alam. 2020. Analysis of polychlorinated biphenyls, polycyclic aromatic hydrocarbons and organochlorine pesticides in the tissues of green sea turtles, *Chelonia mydas*, (Linnaeus, 1758) from the eastern coast of the United Arab Emirates. *Marine Pollution Bulletin* 160: 111574.

Yaghmour, F., M. Al Bousi, H. Al Naqbi, B. Whittington-Jones & C.J. Rodriguez-Zarate. 2021. Junk food: Interspecific and intraspecific distinctions in marine debris ingestion by marine turtles. *Marine Pollution Bulletin* 173: 113009.

FIRST OFFICIAL RECORD OF LOGGERHEAD SEA TURTLE CARCASS STRANDED IN STRAITS OF MALACCA, MALAYSIA

HIN BOO WEE^{1,#}, SEH LING LONG^{2,3}, MOHAMAD SAUPI ISMAIL⁴, SYED MOHAMAD AZIM BIN SYED MAHIYUDDIN⁵ & WEI CHEN LIM⁶

¹Institute of Climate Change, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia

²Lang Tengah Turtle Watch, 17 Jalan Tunku, Bukit Tunku, Kuala Lumpur, Malaysia

³Institute of Oceanography and Environment, Universiti Malaysia Terengganu, Kuala Nerus, Terengganu, Malaysia

⁴Fisheries Research Institute Batu Maung, Batu Maung, Penang, Malaysia

⁵Fisheries Research Institute Langkawi, Langkawi, Malaysia

⁶The Datai Langkawi, Jalan Teluk Datai, Langkawi, Kedah, Malaysia

#weehinboo@ukm.edu.my

Of the seven species of sea turtle worldwide, four have extensive records in Malaysia: the green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*), and leatherback (*Dermochelys coriacea*) turtle. The records of these turtles in Malaysia consist of primarily nesting (Hendrickson, 1958; Siow & Moll, 1982; Mortimer *et al.*, 1993; Chan *et al.*, 1999; Chan, 2006, 2013; Hamann *et al.*, 2006; Mohd Salleh *et al.*, 2012, 2018) and stranding data (Chan, 2006; FRI, 2020). Unfortunately, most of the strandings are of dead turtles, including 90.1% (n = 90/99) of the records from Malaysian waters in 2019 (FRI, 2020). The cause of mortality has been attributed to bycatch, illegal take, mortal injuries (including vessel strike), ingestion of plastics, exposure to oil slicks, and diseases such as fibropapillomatosis (Siow & Moll, 1982; Chan, 2006; Joseph *et al.*, 2019). These are concerning as it indicates the insidious effect of anthropogenic activities on sea turtles in Malaysia.

In comparison to the other four species, not much is known about loggerhead sea turtle nesting in Malaysia, except for the historical mention of loggerhead turtle nesting in small numbers in Sarawak (Leh, 1985).

The nesting of loggerhead turtles in Malaysia was also mentioned by Chuang (1961), but this may have been a misidentification of an olive ridley turtle as a loggerhead, as the photo shown is of the former species. The in-water presence of loggerhead turtles has been recorded in the South China Sea (Kobayashi *et al.*, 2011); however, these records are sparse and little is known about the loggerhead turtles in Malaysia and Southeast Asia (Chuang, 1961; Leh, 1985; Abdul Rahman *et al.*, 2021). In 2019, a stranded loggerhead sea turtle was found entangled in a ghost net off the coast of Pulau Kendi (5.235° N, 100.192° E), an island south of Penang Island on the western coast of Peninsular Malaysia. This was the first documented loggerhead sea turtle encountered in the Straits of Malacca. The turtle was rehabilitated and released later in the same year (Abdul Rahman *et al.*, 2021).

On 8th December 2020, a female loggerhead turtle carcass with a wound at the top of the carapace was washed ashore at the west end of the beach of The Datai Langkawi Resort (6.426° N, 99.669° E), Langkawi, Malaysia (Figure 1). The carcass was severely decomposed (State 3 *sensu* López-Barrera *et al.*, 2016), with the skin and scales

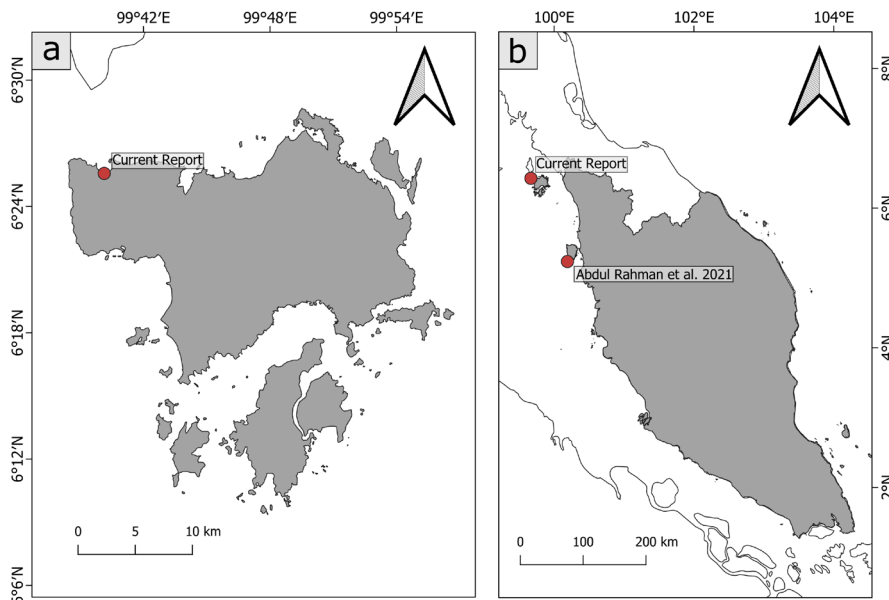


Figure 1. Map of (a) Langkawi and Teluk Datal where the carcass of loggerhead turtle was discovered; and (b) The two most recent records of loggerhead turtles in the Straits of Malacca (This study and Abdul Rahman *et al.* 2021). The grey area in the map represents the terrestrial domain of Malaysia.

peeled off, bloated carcass, and bad smell (Figure 2). The curved carapace width (CCW), curved carapace length (CCL), and the dimension of the wound were measured by the Datal Langkawi Resort (WC Lim) and Langkawi Fisheries Research Institute (SMA Syed Mahiyuddin). Photos were taken at all four sides (anterior, posterior, left and right side) and the facial scutes for the carcass (Figure 2a-e). The carcass measured 80cm (CCW) by 90cm (CCL). Based on the CCL, the specimen in this study was an adult female (Baptistotte, 2003, Casale *et al.*, 2011; Ishihara & Kamezaki, 2011; Tucek *et al.*, 2014; Patel *et al.*, 2015). The open fracture (Figure 2b) on the carapace measured 16cm wide and 45cm long. The split wound was most likely from an anthropogenic source, suspected to be either vessel strike or human mishandling.

The individual in this report was larger than the individual (CCW=75cm; CCL=82cm) reported by Abdul Rahman *et al.* (2021). The identity of the individual was determined (Figure 2e-f) by comparing the left facial scute of the carcass with the records in Abdul Rahman *et al.* (2021) using manual visual comparison via photo-ID method as described in Schofield *et al.* (2008) and Long (2016). The comparisons confirmed that the two reported loggerhead sea turtles were different individuals.

This incident is the first official record of a loggerhead sea turtle carcass washing ashore on the coast of Malaysia and one of few for the region. The distance between locations of the current report and Abdul Rahman

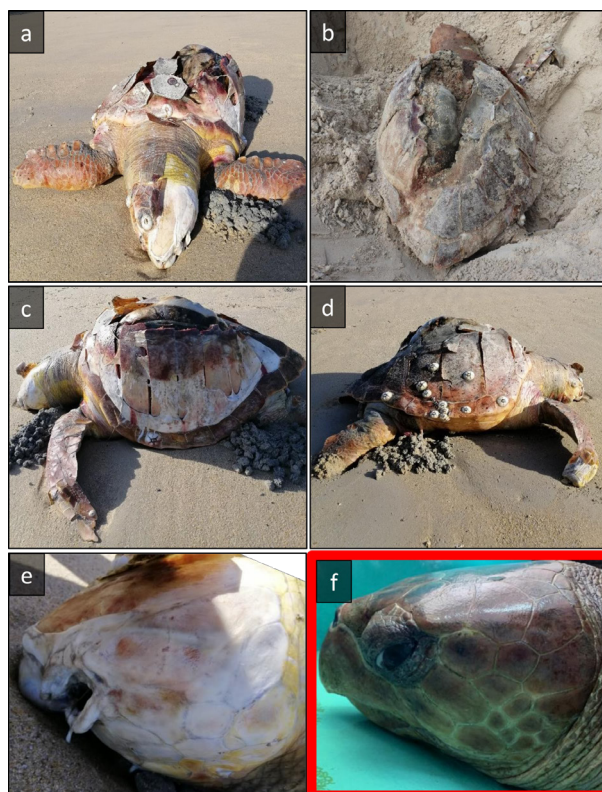


Figure 2. (a) Anterior, (b) Posterior, (c) Left, and (d) Right view of the loggerhead turtle carcass. (e) The left facial scale pattern of the loggerhead turtle found in this report and compared to (f: in red box) the individual found in Abdul Rahman *et al.* (2021).

et al. (2021) was approximately 144km. The records suggest that there are loggerhead turtles in the waters of Malaysia. Previous studies mentioned loggerhead turtles migrating to the South China Sea, possibly for foraging (Charuchinda *et al.*, 2002; Kobayashi *et al.*, 2011). However, the ecological importance of Malaysia for the loggerhead turtle population in this region is still unknown due to lack of records and study.

Nevertheless, the distribution of loggerhead sea turtles in the adjacent Indian and Pacific Oceans are well known. There are at least 107 nesting sites of loggerhead sea turtle across these oceans and many in-water sightings (Wallace *et al.*, 2010). In the Indian Ocean, most of the nesting and foraging loggerhead turtles are concentrated in the west and north-west Indian Ocean, including Oman (one of the largest rookeries in the world) and eastern African nations (Hughes, 2010; Rees *et al.*, 2010; Nolte *et al.*, 2020; Willson *et al.*, 2020; Lohe & Possardt, 2021), and Western Australia (Hamann *et al.*, 2013). There are smaller nesting populations in Tamil Nadu (India), Sri Lanka, and the coast of Thailand, which is adjacent to the northern Straits of Malacca (Dodd Jr., 1988; Charuchinda *et al.*, 2002; Ali *et al.*, 2004). Sporadic reports and tracking studies found that loggerhead sea turtles do pass through the Andaman Sea or South China Sea (adjacent to the southern end of Straits of Malacca) (Charuchinda *et al.*, 2002; Ali *et al.*, 2004; Kobayashi *et al.*, 2011). Thus, the Straits of Malacca might be a common migratory route or foraging ground of loggerhead sea turtles; more data is required to understand the importance of this habitat.

Based on the state of decomposition, the loggerhead turtle had died within the month prior and drifted ashore. The northern end of the Straits of Malacca passes through the Andaman Sea before going into the Eastern Indian Ocean. The Straits of Malacca experiences northeastern monsoon sea surface current (SSC) system in December, whereby the SSC experiences northerly movement from the southern to northern end of Straits of Malacca and ends in the eastern Indian Ocean. This is due to the water movement driven by the push from the strong monsoon current of South China Sea, pushed into the southern channel of the Straits of Malacca (Haditjar *et al.*, 2016). Furthermore, there is an eddy of SSC between Langkawi Island and Tarutao Island during the monsoon period (Rizal *et al.*, 2010; Syamsul Rizal *et al.*, 2012; Isa *et al.*, 2020). Hence, the period where the carcass was found (December) suggests that the turtles might met its demise at the northern islands of the Andamans (e.g., Tarutao Island) or was a migratory individual from the South China Sea.

The state of both loggerhead turtles raises concerns

about the threats to sea turtles in Malaysian waters. The individual found in 2019 was entangled in a ghost net before it was rehabilitated and released by authorities (Abdul Rahman *et al.*, 2021), while the individual reported in this study was possibly killed by human activity(s). Busy water ways, especially in the Straits of Malacca, and under-regulated maritime and fishery industries might pose serious threats to sea turtles and other marine megafauna (Balakrishnan & Varkkey, 2017; Wong & Yong, 2020) and require further investigation.

ACKNOWLEDGEMENTS

WHB was supported by Universiti Kebangsaan Malaysia grant, Young Lecturers Incentive Grant (GGPM-2021-056), in collaboration with The Datai Langkawi. We thank the Malaysian Department of Fisheries and Mohd Tamimi Ali Ahmad (Fisheries Research Institute Rantau Abang) for allowing the handling of the carcass and releasing the data for publication. All necessary permits for sampling and observational of the specimen were obtained from the competent authorities. The study is compliant with Convention on Biological Diversity and Nagoya protocols. The authors would like to express their sincere appreciation for Rushan Bin Abdul Rahman and Nicolas J. Pilcher PhD. for their feedback on an early draft of the manuscript.

Literature cited:

- Abdul Rahman, R., E.P. Wong, J. Joseph, M.S. Sarahaizad, S.N. Khoo, I. Mohamad Saupi & A.R. Masazurah. 2021. First record of a stranded loggerhead turtle (*Caretta caretta*) in a ghost net off Penang, Malaysia. *Marine Turtle Newsletter* 162: 22-24.
- Ali, A., Z. Talib & K.K.K. Yaacob. 2004. Sea turtle species of the Southeast Asian countries. Marine Fishery Resources Development and Management Department, Southeast Asian Fisheries Development Center: 31-40. Terengganu, Malaysia. SEAFDEC Malaysia.
- Balakrishnan, K.S. & H. Varkkey. 2017. The Straits of Malacca: Malaysia's Threat Perception and Strategy for Maritime Security. *Maritime Security in East and Southeast Asia*: 23-42. Palgrave, Singapore. Springer.
- Baptistotte, C., J.C. Thomé & K.A. Bjorndal. 2003. Reproductive biology and conservation status of the loggerhead sea turtle (*Caretta caretta*) in Espírito Santo State, Brazil. *Chelonian Conservation and Biology* 4: 1-7.
- Chan, E.H. 2006. Marine turtles in Malaysia: On the verge of extinction? *Aquatic Ecosystem Health & Management* 9: 175-184.
- Chan, E.H. 2013. A report on the first 16 years of a long-term marine turtle conservation project in Malaysia. *Asian Journal of*

Conservation Biology 2: 129-135.

Chan, E.H., J. Joseph & H.C. Liew. 1999. A study on the hawksbill turtles (*Eretmochelys imbricata*) of Pulau Gulisaan, Turtle Islands Park, Sabah Malaysia. *Sabah Parks Nature Journal* 2: 11-22.

Charuchinda, M., W. Sakamoto, S. Monanunsap & N. Arai. 2002. Satellite tracking for loggerhead turtles, *Caretta caretta*: note on navigational ability in the ocean. *Proceedings of the 3rd Workshop on SEASTAR 2000*: 59-62.

Casale, P., A.D. Mazaris & D. Freggi. 2011. Estimation of age at maturity of loggerhead sea turtles *Caretta caretta* in the Mediterranean using length-frequency data. *Endangered Species Research* 13: 123-129.

Chuang, S.H. 1961. On Malayan shores. Caslon Printers Pte., Hong Kong. Pp. 255.

Database of Marine and Coastal Resources (DMCR). 2012. Sea Turtle: Distribute information. Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment. https://km.dmcr.go.th/en/c_6/d_982. Accessed on March 20, 2021.

Dodd Jr, C.K. 1988. Synopsis of the biological data on the loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). Biological Report 88(14). Pp. 110. Washington, DC: Fish and Wildlife Service, U.S. Department of the Interior.

Fisheries Research Institute (FRI). 2020. Laporan Tahunan (Annual Report) 2019. Pp. 180. Institut Penyelidikan Perikanan, Pulau Pinang, Malaysia.

Haditjar, Y., S. Rizal & F. Abdullah. 2016. Current simulation in the Malacca Strait and part of South China Sea due to wind. 12th International Conference on Mathematics, Statistics, and Their Applications (ICMSA). Pp. 47-50.

Hamann, M., K. Ibrahim & C. Limpus. 2006. Status of leatherback turtles in Malaysia. Assessment of the Conservation Status of the Leatherback Turtle in the Indian Ocean and South East Asia, IOSEA Species Assessment (eds. Hamann, M., C. Limpus, G. Hughes, J. Mortimer & N. Pilcher). Pp. 78-82.

Hendrickson, J.R. 1958. The green sea turtle, *Chelonia mydas* (Linn.) in Malaya and Sarawak. *Proceedings of the Zoological Society of London* 130: 455-535.

Hughes, G. R. 2010. Loggerheads and leatherbacks in the Western Indian Ocean. *Indian Ocean Turtle Newsletter* 11: 24-31.

International Union for Conservation of Nature (IUCN). 2021. The IUCN Red List of Threatened Species. Version 2020-3. <https://www.iucnredlist.org>. Accessed on March 17, 2021.

Isa, N.S., M.F. Akhri, I. Khalil, P.H. Kok & N.H. Roseli. 2020. Seasonal characteristics of the sea surface temperature and sea

surface currents of the Strait of Malacca and Andaman Sea. *Journal of Sustainability Science and Management* 15: 66-77.

Ishihara, T. & N. Kamezaki. 2011. Size at maturity and tail elongation of loggerhead turtles (*Caretta caretta*) in the North Pacific. *Chelonian Conservation and Biology* 10: 281-287.

Joseph, J., H. Nishizawa, J.M. Alin, R. Othman, G. Jolis, I. Isnain & J. Nais. 2019. Mass sea turtle slaughter at Pulau Tiga, Malaysia: genetic studies indicate poaching locations and its potential effects. *Global Ecology and Conservation* 1: e00586.

Kobayashi, D.R., I.J. Cheng, D.M. Parker, J.J. Polovina, N. Kamezaki & G.H. Balazs. 2011. Loggerhead turtle (*Caretta caretta*) movement off the coast of Taiwan: Characterization of a hotspot in the East China Sea and investigation of mesoscale eddies. *ICES Journal of Marine Science* 68: 707-718.

Leh, C. 1985. Marine turtles in Sarawak. *Marine Turtle Newsletter* 35: 1-3.

Lohe, A. & E. Possardt. 2021. Loggerhead Sea Turtle (*Caretta caretta*) North Indian Ocean DPS, Southwest Indian Ocean DPS, Southeast Indo-Pacific Ocean DPS, South Pacific Ocean DPS, South Atlantic Ocean DPS, Northeast Atlantic Ocean DPS, and Mediterranean Sea DPS 5-year review: summary and evaluation. Pp. 113. National Marine Fisheries Service, Maryland.

Long, S.L. 2016. Identification of a dead green turtle (*Chelonia mydas*) using photographic identification. *Marine Turtle Newsletter* 1: 4.

López-Barrera, E.A., E.C. Reis, S.T. Vilaça & S.M. Vargas. (2016). Genetics and conservation of sea turtles. In: *Advances in Research Techniques for the Study of Sea Turtles* (ed. J. Rguez-Baron, M. Lara-Uc, R. Rodriguez). Pp.119-163. Nova Publishers, New York USA.

Mortimer, J.A., Z. Ahmad & S. Kaslan. 1993. The status of the hawksbill *Eretmochelys imbricata* and green turtle *Chelonia mydas* of Melaka and Negeri Sembilan, Malaysia. *Malayan Nature Journal* 46: 243-253.

Nolte, C.R., R. Nel & M.C. Pfaff. 2020. Determining body condition of nesting loggerhead sea turtles (*Caretta caretta*) in the south-west Indian Ocean. *Journal of the Marine Biological Association of the United Kingdom* 100: 291-299.

Patel, S.H., A. Panagopoulou, S.J. Morreale, S.S. Kilham, I. Karakassis, T. Riggall, D. Margaritoulis & J.R. Spotila. 2015. Differences in size and reproductive output of loggerhead turtles *Caretta caretta* nesting in the eastern Mediterranean Sea are linked to foraging site. *Marine Ecology Progress Series* 535: 231-241.

Rees, A.F., s. Al Saady, A.C. Broderick, M.S. Coyne, N. Papathanasopoulou & B.J. Godley. 2010. Behavioural polymorphism in one of the world's largest populations of loggerhead sea turtles *Caretta caretta*. *Marine Ecology Progress*

Series 418: 201-212.

Rizal, S., P. Damm, M.A. Wahid, J. Sündermann, Y. Ilhamsyah & T. Iskandar. 2012. General circulation in the Malacca strait and Andaman Sea: a numerical model study. *American Journal of Environmental Sciences* 8: 479-488.

Rizal, S., I. Setiawan, T. Iskandar, Y. Ilhamsyah, M.A. Wahid & M. Musman. 2010. Currents simulation in the Malacca Straits by using three-dimensional numerical model. *Sains Malaysiana* 39: 519-524.

Salleh, S.M., S.A.M. Sah & A.J.K. Chowdhury. 2018. Assessing nesting status of green turtles, *Chelonia mydas*, in Perak, Malaysia. *Tropical Life Sciences Research* 29: 155-171.

Salleh, S.M., M. Yobe & S.A.M. Sah. 2012. The distribution and conservation status of green turtles (*Chelonia mydas*) and olive ridley turtles (*Lepidochelys olivacea*) on Pulau Pinang beaches (Malaysia), 1995–2009. *Tropical Life Sciences Research* 23: 63-76.

Schofield, G., K.A. Katselidis, P. Dimopoulos & J.D. Pantis. 2008. Investigating the viability of photo-identification as an objective tool to study endangered sea turtle populations. *Journal of Experimental Marine Biology and Ecology* 360: 103-108.

Siow, K.T. & E.O. Moll. 1982. Status and conservation of estuarine and sea turtles in West Malaysian waters. In: *Biology and conservation of sea turtles* (ed. K.A. Bjorndal): 339-348. Washington, DC, USA. Smithsonian Institution Press.

Tucek, J., R. Nel, M. Girondot & G. Hughes. 2014. Age-size relationship at reproduction of South African female loggerhead turtles *Caretta caretta*. *Endangered Species Research* 23: 167-175.

Wallace, B.P., A.D. DiMatteo, B.J. Hurley, E.M. Finkbeiner, A.B. Bolten, M.Y. Chaloupka, B.J. Hutchinson *et al.* 2010. Regional management units for marine turtles: A novel framework for prioritizing conservation and research across multiple scales. *PLOS One* 5: e15465.

Willson, A., B. Witherington, R. Baldwin, M. Tiwari, T. Al Sariri, A. Al Kiyumi, S. Al Harthi. 2020. Evaluating the long-term trend and management of a globally important loggerhead population nesting on Masirah Island, Sultanate of Oman. *Frontiers in Marine Science* 7: 666.

Wong, H.S. & C.C. Yong. 2020. Fisheries regulation: a review of the literature on input controls, the ecosystem, and enforcement in the straits of Malacca of Malaysia. *Fisheries Research* 230: 105682.

RESCUE OF TWO SEA TURTLES FROM GHOST NET DURING MARINE MAMMAL SURVEY ALONG THE SOUTHWEST COAST OF INDIA

PRADIP N. CHOGALE^{1#}, ARUN GANESAN¹, AOUEDIYAKKAL E. AYOOB², JEYABASKARN RAJA³ & RATHEESH KUMAR RAVEENDRAN¹

¹Marine Mammal Lab, Central Marine Fisheries Research Institute, Cochin, India

²Fishery Survey of India, Kochi, India

³Fishery Survey of India, Mumbai, India

#pradipnc93@gmail.com

The Central Marine Fisheries Research Institute (CMFRI) in Kochi, the Marine Products Export Development Authority (MPEDA) in Kochi, and the Fishery Survey of India (FSI) in Mumbai, jointly began conducting deep sea surveys in the Indian exclusive economic zone (EEZ) to assess marine mammal populations and estimate marine mammal and sea turtle bycatch on 1st April 2020. On 28th July, along the southwest coast of Kerala, we observed two ghost nets (Table 1) at different locations with entangled turtles. One alive and one dead olive ridley turtle (*Lepidochelys olivacea*) were entangled in the net at 10.730167° N, 75.389694° E (Figure 1 and 2) and a live

green turtle (*Chelonia mydas*) was entangled in the net at 10.65780° N, 75.546333° E (cover image; this issue). Water depth was between 130-200m and temperature 27-28°C at each location. Algae and goose-necked barnacles (*Lepas anserifera*) were growing on the nets, and the nets and attached biota may have provided a source of food, shelter, and basking platform for the turtles before entanglement (Whittow & Balazs, 1982; Nichols *et al.*, 2001; Boyle & Limpus, 2008; Stelfox *et al.*, 2019).

The sea turtles were successfully disentangled from the ghost net and examined. The live turtles displayed no