Record of Halmahera Walking (*Hemiscyllium halmahera*) Shark in South Morotai

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Abstract

Halmahera walking shark (*Hemiscyllium halmahera*) was first discovered by Allen in 2013 and studies regarding this species are still limited. This species distribution includes Halmahera Island and surrounding islands in North Maluku, such as Ternate, Tidore, Bacan and Morotai. Records in Morotai, one of Indonesia's most well-known marine tourism sites for shark diving, are discussed in this study, including a new record in Dehegila, South Morotai. One individual recorded opportunistically during SCUBA Diving activity on April 2022 in Southern Morotai. The species distribution, habitat and behaviour are highly important for conservation, especially for endemic shark species with a limited habitat range.

Introduction

Halmahera walking shark (*Hemiscyllium halmahera*) is a species of shark that was recently found in North Maluku waters, Indonesia. (Allen et al., 2013). This species is classified within the family Hemiscylliidae, commonly known as walking sharks, bamboo sharks and epaulette sharks with two genera; Chiloscyllium and Hemiscyllium (Müller & Henle - 1837 & 1838) with seven and nine species respectively. This group of sharks is nocturnal and lives in a coral reef, seagrass and sandy substrate ecosystem (Compagno, 2001). Total length is not more than 80 cm according to Allen et. al 2013, and another study by Madduppa et. al 2013 shows the maximum TL of 74 cm and average TL of 52.3±10.2 cm for both species (N=32). Depth recorded mostly around 3-10 m (Akbar et al., 2020; Allen et al., 2013; Madduppa et al., 2020) with the maximum depth recorded in studies being 18 m (Ichsan et al., 2015).

This species was first discovered by Allen in 2013 and since studies regarding its distribution, biology, ecology and conservation are still limited. *H. halmahera* distribution including northwestern Ternate Island (Ternate City); Kao Bay (North Halmahera District); Tidore, Maitara, Mare Island (Tidore Islands City); Loleo (Central Halmahera District) and Proco Island, Bacan Island, Guraici, Weda Bay and Lei-Lei (South Halmahera District) and Southern

Morotai (Morotai Island District) (Akbar et al., 2020; Allen et al., 2013; Ichsan et al., 2015; Jutan et al., 2018; Madduppa et al., 2020; Mukharror et al., 2019).

Some records in Morotai are very scarce, even though we noted anecdotal reports from local dive guides and fishers throughout the years. Two records in Fathiya Point, South Morotai, both seen at night dive by Ichsan et al. in 2015 and in an Instagram social media post (@rumahfirman and @sharkdivingindonesia) in 2016 that located around 5 km from this finding. The species distribution, habitat and behaviour are highly important for conservation, especially for endemic shark species with a limited habitat range.

Methods

Halmahera walking shark was observed in Ciko Play Ground (CPG) Dive site, Tanjung Dehegila, South Morotai, North Maluku (Figure 1 and 2). This dive site is a reef slope with a maximum depth of 30 m. One of the authors reported seeing one individual Halmahera walking shark during recreational SCUBA diving when the individual was hiding between coral reefs at approximately 7 m depth. Documentation of Halmahera walking shark was taken at 11 am on 8 of April 2022 at a depth of 7 m during the only sighting recorded with GoPro 10 Action Camera with automatic underwater setting. The temperature recorded at the sighting time was 29^{o}C. Photographs and video stills were taken during the encounter and were identified based on morphological features based in several scientific publications focusing on this species (Akbar et al., 2020; Allen et al., 2013; Madduppa et al., 2020).

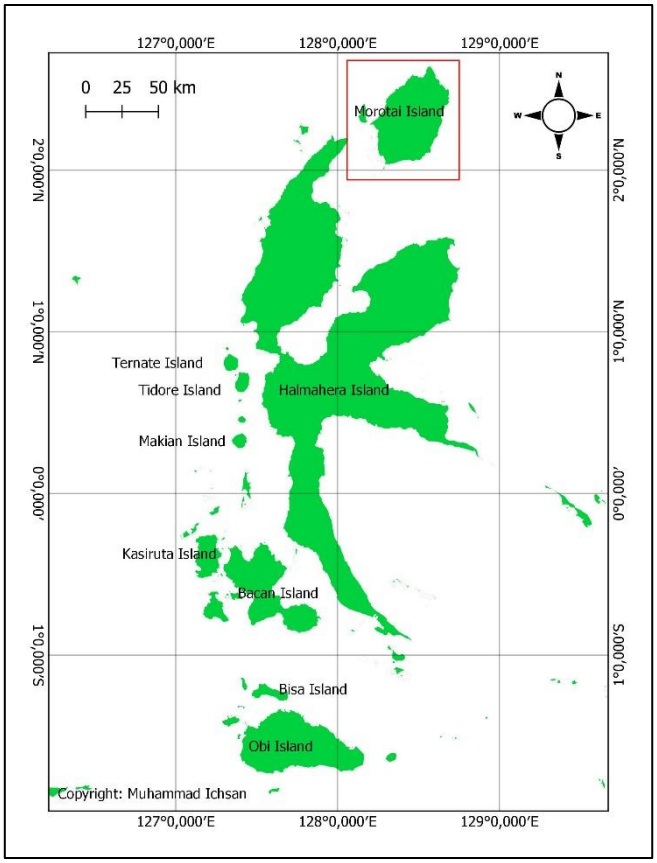

Figure 1. Morotai Island District (red box) within North Maluku Province.

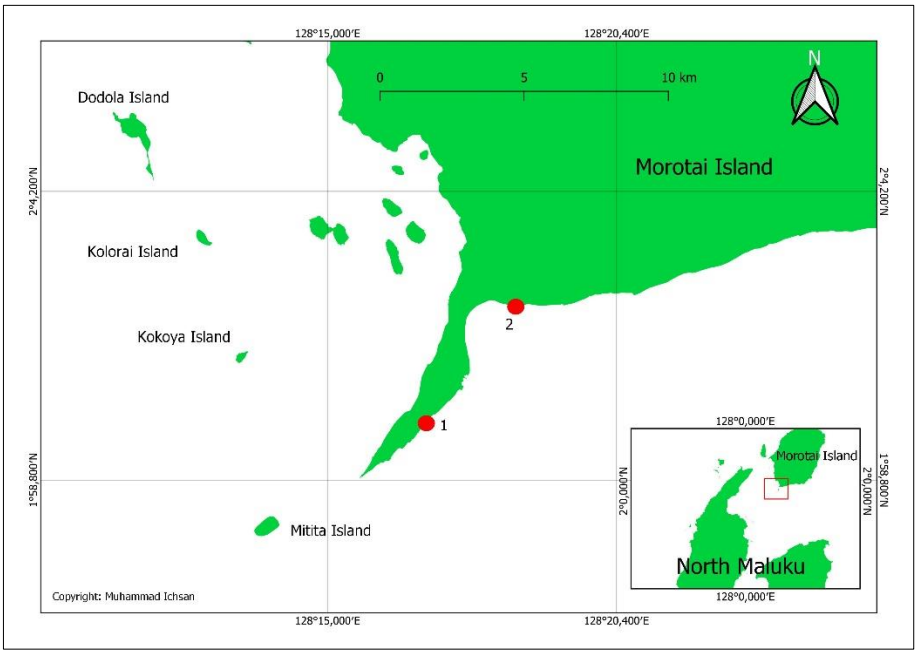

Figure 2. Location of documented *H. halmahera* individuals in Morotai. Ciko Play Ground (CPG), Tanjung Dehegila (in red dot no. 1, this study) and Fathiya Point (in red dot no. 2, Ichsan et. al. 2015) both in South Morotai Sub-district (inset in red box), Morotai Island District.

Results and Discussion

Species identification

Order: Orectolobiformes
Family: Hemiscylliidae
Genus: Hemiscyllium
Species: *H. halmahera* (G. R. Allen, Erdmann & Dudgeon, 2013)

Based on the documentation (Figure 3 and 4), this individual is distinguished by its shape and colour pattern (Allen et al., 2013). The sex of the individual cannot be observed due to the shark's position when encountered.

Figure 3. The head part image of *H. halmahera*

Figure 3. the rear part image of *H. halmahera*

Extention risk

H.halmahera face several threats to survival, such as loss and degradation of habitat, artisanal fisheries as secondary catch, local and international trade for aquaria and negative impact on climate change. Like every species in the genus of Hemiscylliidae, *H. halmahera* heavily relies on shallow reef habitats and has small range sizes. Any disturbance in their habitat will improve the possibility of local extinction (VanderWright et al., 2022). In North Maluku, habitat degradation of reef flats due to unsustainable fishing and mining activities in coastal zones is a concerning threat. For example, a study shows a heavy metal exposure in *H. halmahera* (Jutan et al., 2019). Change of habitat can also result in rising sea surface temperature that can negatively affect species survival, especially in species that are highly reliant on specific and small habitats (Heinrich et al., 2014; Heupel et al., 2007; VanderWright et al., 2022; Wise et al., 1998). *H. halmahera,* a bottom-dwelling species with a colorful appearance, is collected as an ornamental fish in the aquarium trade for national and international trade, with a report of up to 60 individuals per shipment (Jutan et al., 2018; VanderWright et al., 2021).

Conservation

H. halmahera is listed as Near Threatened by the International Union of Conservation of Nature (IUCN), with no species-specific protection at global and national levels (VanderWright et al., 2021). Marine spatial protection is essential for species that highly rely on specific habitats like H. halmahera. As per 2020, North Maluku Province have six (6) Marine Protected Areas that cover 667.683,08 Ha of their marine area (Table 1)(Direktorat Jenderal Pengelolaan Ruang Laut, Kementerian Kelautan dan Perikanan, 2022).

Table 1. MPAs of North Maluku (Direktorat Jenderal Pengelolaan Ruang Laut, Kementerian Kelautan dan Perikanan, 2022)

MPA	District / City	Area (Ha)
KKPD Pulau Mare	Tidore Islands City	7.060,87
KKPD Pulau Rao-Tanjung Dehegila	Morotai Island District	65.892,42
KKPD Kepulauan Sula	Sula Islands District	120.723,88
KKPD Kepulauan Widi	South Halmahera District	315.117,92
KKPD Kepulauan Guraici	South Halmahera District	91.538,99
KKPD Pulau Makian-Moti	Ternate City	67.349,00
Total Area		**667.683,08**

In Morotai Island District, KKPD Pulau Rao-Tanjung Dehegila covers 65.892,42 Ha of marine area, with seven subzones that focus on the protection of habitat, marine tourism and sustainable fisheries. The sites of documented *H. halmahera* currently are within traditional

fisheries zone (CPG) and the sustainable tourism zone (Fathiya Point) (Dinas Kelautan dan Perikanan Provinsi Maluku Utara, 2019). Based on the habitat preference and its behavior, it is safe to assume that this species' habitat could occupy most of the Morotai Island. However, considering the lack of reports and many undocumented sightings, monitoring and conservation effort must be improved. Some recommendations include: 1) strengthening awareness for endemic and small-range species protection; 2) developing clear and specific objectives in the MPA Management action plan; 3) encouraging research effort, especially for citizen science, with active participation from tourism stakeholders such as dive-and snorkelling guides.

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