

Record of Tawny Nurse Shark (*Nebrius ferrugineus*) in Southern Morotai, North Maluku, Indonesia

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Abstract

Tawny nurse shark (*Nebrius ferrugineus*) is a species of carpet shark distributed across the tropical Indo-Pacific region. Tawny nurse shark is listed as “Vulnerable” on IUCN Redlist and rarely seen, recorded and studied in Indonesia. We recorded this species during SCUBA diving activity in Morotai waters in April 2022. Scientific record of the species is highly important for conservation and habitat management, particularly in Morotai, a region in North Maluku famous for shark-based marine tourism.

Introduction

Tawny nurse shark (*Nebrius ferrugineus*) is a species of carpet shark and the only species from the genus *Nebrius* widely distributed across the tropical Indo-Pacific region (Randall et al., 1998). This nocturnal species occurs near coral reefs and seagrass lagoonal habitats with depths less than 70 m (Ebert et al., 2013). Males mature at 225–250 cm TL and females mature at 230–290 cm TL (Ebert et al., 2013) and recorded maximum size of 320 cm (Compagno, 1984). This species is known to be nocturnal but can be active during the daytime. Diet consists of a wide variety of bottom invertebrates, small fishes, cephalopods, crustaceans and sea urchins (Compagno, 1984; Myers, 1989)

This species has little species-specific information on biology and fisheries. In Indonesia, it is rarely seen in fish landing sites and caught mostly by demersal longline and coastal gillnet vessels. In Muncar, East Java Province, tawny nurse shark was recorded as just around 0.1% of the elasmobranch catch landed in 2017–2018 (Winter et al., 2020). In Tanjung Luar, East Lombok, West Nusa Tenggara Province, only 14 specimens between April 2001 and March 2006 (Dharmadi et al., 2015) and 62 specimens were recorded between 2014 - 2020 (Wildlife Conservation Society, 2022). In Labuan Bajo, West Manggarai, East Nusa Tenggara Province, one specimen in March 2014 (Alaydrus et al., 2014).

In Western Sumatera (Lampulo and Sibolga), 12 specimens between October 2013 to June 2014 (Dharmadi et al., 2017). A study on DNA barcoding identified 582 shark fins from markets and traders across Indonesia between 2012 to 2014 and found eight specimens of tawny nurse sharks (Sembiring et al., 2015).

Recorded live encounters by SCUBA diving activities in Indonesia are even more scarce. In Morotai, North Maluku, this species anecdotally exists by reports from SCUBA divers, however, have not been documented very well. Scientific record of the species is highly important for conservation and habitat management.

Methods

The shark (Figure 1) is encountered opportunistically during SCUBA diving activity by GOMO Dive Morotai on 19 May 2022 afternoon in the Tosininga dive site (Figure 2) within Dehegila-Rao Marine Protected Area, Morotai, North Maluku Province, Indonesia. This species was recorded in Tosininga reef, a pinnacle reef in the middle of the ocean western side of Mitita Island. The reef starts at 10 m from the surface and descends to a depth of 37 m. The average temperature for southern Morotai water is around 28°-31° Celsius (Ichsan et al., 2015). The specimen was documented and recorded, although no specimen was retained. The video was analysed and species identification following the Identification guidelines by White et al. 2006 and Ebert et al. 2013 and we also notified the habitat usage by the species.



Figure 1. Tawny nurse shark (*Nebrius ferrugineus*) in Morotai

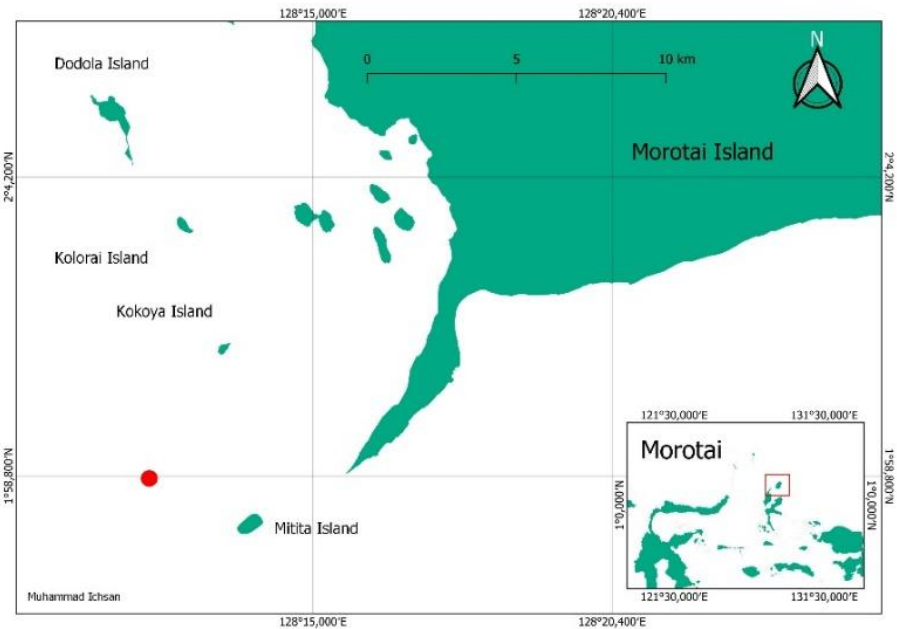


Figure 2. Tosininga Divesite (red dot), Morotai, North Maluku, Indonesia.

Results

Scientific classification and identification

Tawny nurse shark classified as follows. Kingdom: Animalia, Phylum: Chordata, Class: Chondrichthyes, Subclass: Elasmobranchii, Order: Orectolobiformes, Family: Ginglymostomatidae, Genus: Nebrius, Species: *Nebrius ferrugineus* (Lesson 1831).

From the video, the specimen is distinguished by its bulky features, long barbules with angular fins and asymmetrical caudal fins about one-quarter to one-third of its length (Allen & Erdmann, 2012; Compagno, 1984; Food and Agriculture Organization of the United Nations, 2008; White et al., 2006). At the time of the dive, this site has a strong current and approximate visibility of 25-30 m. When recorded, this species is found in coral reef beds at around 12 m depth and seen passive until approached by divers. The size and sex cannot be determined due to distance and limited time of encounter but most likely reach maturity size, approximately 3 m in length.

Discussion

Utilization

Globally Tawny nurse shark is listed as “Vulnerable” on IUCN Redlist (IUCN, 2020). This species is caught regularly by various demersal fisheries and utilised for its fins, meat, oil skin, and cartilage (Compagno, 1984; IUCN, 2020). This species is also utilised as an ornamental fish, displayed and bred in aquaria worldwide, with live specimens exported mainly from Indonesia and Australia (IUCN, 2020). However, as one of the main exporter countries for tawny nurse sharks, research from Indonesia is still limited, especially on trade and supply chain. One study stated that low quantity is utilised and exported since the species size is too big for house aquariums and the price is relatively high compared to other ornamental fish commodities (Akmal et al., 2020).

Conservation

The government of Indonesia also recognised the significance of biodiversity and potential marine tourism in Morotai by declaring 65,520.75 hectares of Marine Protected Area (MPA) named *Taman Wisata Perairan (TWP) Pulau Rao - Tanjung Dehegila* (Indonesia, 2020). This MPA focuses on protecting marine biodiversity, historical object preservation (World War II underwater relics) and sustainable small-scale fisheries (Dinas Kelautan dan Perikanan Provinsi Maluku Utara, 2019). However, species-specific protection for tawny nurse shark does not exist and marine protected areas are only effective in conserving reef shark if it is sufficiently large and well-enforced and monitored (MacNeil et al., 2020).

The biodiversity of sharks and rays in Morotai especially encountered during SCUBA diving, is relatively high, with at least ten species recorded or studied, as shown in Table I. Some species, for example, Blacktip reef shark (*Carcharhinus monopteros*), Whitetip reef shark (*Triaenodon obesus*) and Grey reef shark (*Carcharhinus amblyrhynchos*), are well-studied especially for ecology and behaviour.

88 Table 1. Sharks and Rays Studied and Recorded in Morotai, North Maluku.

Shark and Rays	Species	Author / Documenter
Whitespotted Eagle Ray	<i>Aetobatus ocellatus</i>	Documented by Shark Diving Indonesia, 2015
Grey reef shark	<i>Carcharhinus amblyrhynchos</i>	(Ahmad Mukharror et al., 2017), (Ichsan et al., 2015), (Sofyan et al., 2020)
Blacktip reef shark	<i>Carcharhinus melanopterus</i>	(Ahmad Mukharror et al., 2017), (Ichsan et al., 2015) (Mukharror et al., 2019) (Sofyan et al., 2020), (Saputra, 2022), (Mukharror et al., 2020), (Mukharror et al., 2021; Sentosa et al., 2020)
Halmahera walking shark	<i>Hemiscyllium halmahera</i>	(Ichsan et al., 2015)
Oceanic Manta ray	<i>Mobula birostris</i>	Documented by Shark Diving Indonesia, 2014
Bentfin devil ray	<i>Mobula thurstoni</i>	(Mukharror et al., 2018)
Tawny Nurse Shark	<i>Nebrius ferrugineus</i>	This study
Whale shark	<i>Rhincodon typus</i>	Documented by Dive Morotai, 2022
Bottlenose Wedgefish	<i>Rhynchobatus australiae</i>	Documented by Dimas, 2019
Whitetip reef shark	<i>Triaenodon obesus</i>	(Ahmad Mukharror et al., 2017), (Ichsan et al., 2015), (Sofyan et al., 2020)

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90 The sightings record of this species in Morotai will help inform local authorities and can be used as a

91 recommendation to strengthen the species and habitat protection and improve the exposure of

92 Morotai as a shark tourism centre in Indonesia. In the last few years, the government of Morotai has

93 made shark and shark-diving activities their flagship theme for marine tourism, even promoting

94 Gorango Morotai (GOMO) as their regional mascot (Abdullah, 2020) where Gorango is ‘shark’ in the

95 local language.

96 **Acknowledgement**

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99 the region.

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