



Range extension and observations of the Redstripe Bigeye, *Pristigenys meyeri* (Teleostei: Priacanthidae) from mesophotic coral ecosystems in Bali, Indonesia

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Abstract

Although Indonesia is known to have the highest biodiversity of shallow-water coral-reef fishes, the deeper mesophotic coral ecosystems have comparatively few reports on ichthyofauna. Through technical scientific diving in Bali, Indonesia, we report observations and high-resolution photographs of the Redstripe Bigeye, *Pristigenys meyeri*, at depths of 96 to 110 m. Of the 17 observations of this species, we regard 9 to be different individuals based on size and body markings, and one individual was shown to have high site fidelity, being found at the same location on at least 4 different days. These observations represent the most western records for this species, with other observations from approximately 1500 km to the northeast in North Sulawesi and Maluku provinces of Indonesia. This species ranges north to Japan, and south and east to New Guinea and the Coral Sea, New Caledonia, and Samoa.

Key words: ichthyology, coral-reef fishes, rebreather diving, Indo-Pacific, deepwater, biogeography, biodiversity

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Mesophotic Coral Ecosystems (MCEs) are composed of communities of light-dependent corals and other organisms occurring at depths typically ranging from 30 to 150 m (Pyle & Copus 2019). It has been estimated that MCEs represent approximately 80% of potential coral reef habitat worldwide, yet very little is known about them compared to shallow reefs, due to the difficulty of scientific observations at these depths (Pyle & Copus 2019).

Indonesia is a central part of the Coral Triangle, the area of highest marine fish biodiversity (Allen 2008). However, limited research has been conducted on MCEs in this archipelagic country, creating a significant knowledge gap for Southeast Asia (Turner et al. 2017). In recent years, the technology for deep diving has improved, in particular the use of mixed-gas and closed-circuit rebreathers, allowing efficient diving to mesophotic depths and thus promoting observations and research on deep coral habitats (Pyle 2019).

Here, we report multiple observations and photographs of the Redstripe Bigeye, *Pristigenys meyeri* (Günther, 1872) at depths of 96 to 110 m, on three different sites around Tulamben in eastern Bali, Indonesia (Fig. 1). Individuals of *P. meyeri* were photographed by the first author (AC) while conducting mixed-gas diving with closed-circuit rebreathers between 2019 and 2021. To our knowledge, these observations are the first diving-based sightings and photographs of this species within Indonesia.

Pristigenys meyeri is one of the 5 extant species in the genus *Pristigenys*, three of which are found in the Indo-Pacific region, with a generally accepted depth range from 100 to 200 m (Starnes 1999, Iwatsuki et al. 2012). The geographic range currently reported for this species is in the western Pacific from southern Japan southward to New Guinea and the Coral Sea and eastward to Samoa (Starnes 1999). In Indonesia, the predicted distribution by Starnes (1999) shows the westernmost range extending from east of Kalimantan, through North Sulawesi to the province of Maluku, Indonesia.

Recently, Bucher et al. (2020) reported a specimen caught close to Ambon, in Maluku province, which was the first published record of this species in Indonesia since the original description by Günther (1872), nearly 150 years ago. Other sightings in Indonesia are reported for North Sulawesi by Masamitsu Iwata (pers. comm.) following ROV surveys in the region (Iwata et al. 2019), and by Teguh Peristiwadi of a specimen obtained from the Bitung fish market in 2008 (pers. comm.). Our observations represent the most western records for this

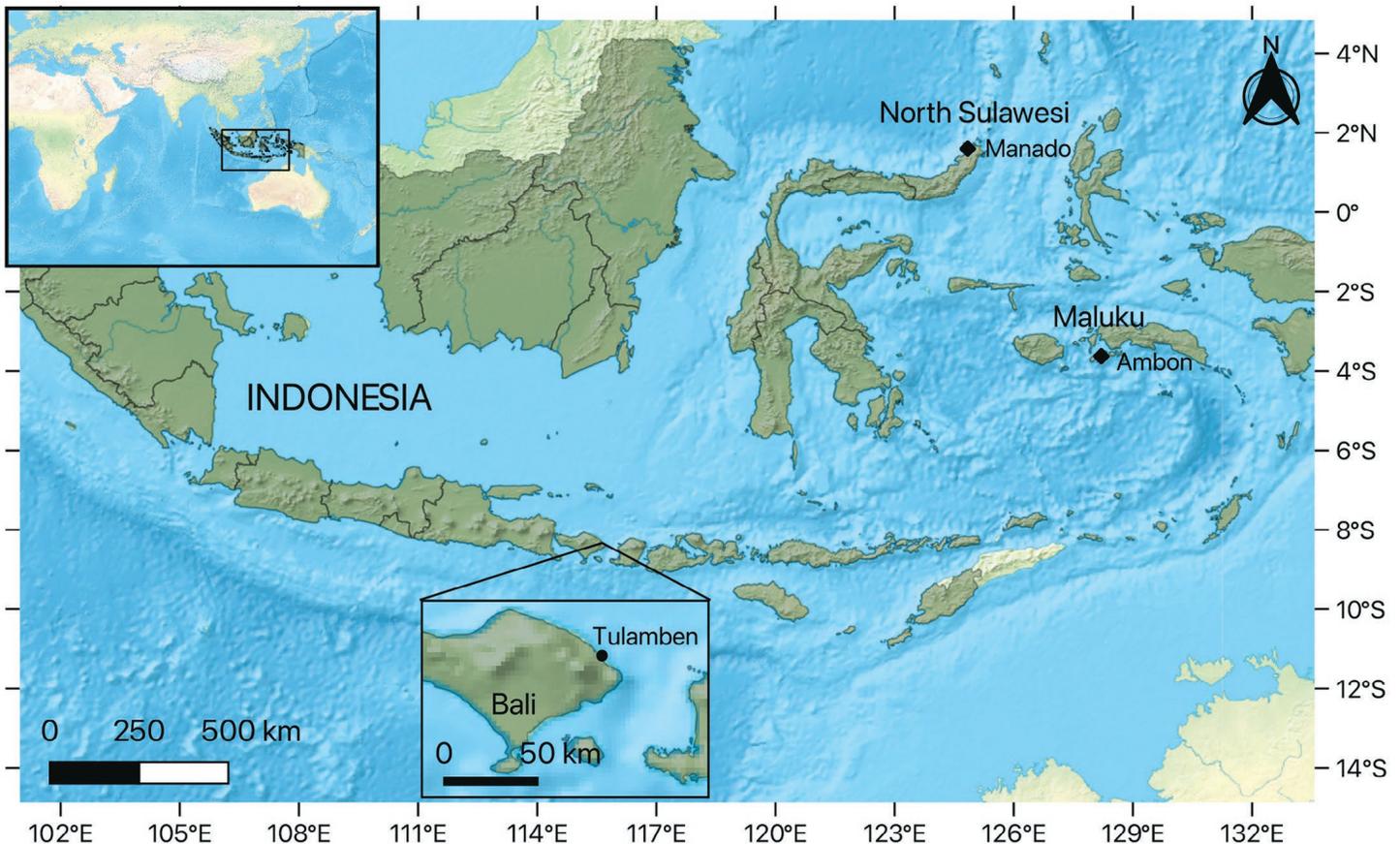


Figure 1. Map showing the location of sightings of *P. meyeri* in Bali (circle) and the cities in the vicinity of the other records in Indonesia (diamonds).

species, with the nearest known records from Indonesia being specimens obtained ~1500 km to the northeast, in the vicinity of Manado and Ambon (Fig. 1).

From 20 February 2019 to 22 January 2021, approximately 45 dives were made on three research dive sites in Bali at depths greater than 95 m. From these dives, 17 observations of *P. meyeri* were made, but, as the main objectives of the dives were not to document fish biodiversity, it is possible that additional individuals might have been overlooked. High-resolution photographs or video footage are available for all but one observation. From the distinctive lines and spot markings and body size, we were able to identify at least 9 different individuals from the photographic records (Fig. 2). The shallowest records were at 96 and 97 m, of two presumably juvenile specimens estimated at 10 cm total length (Fig. 2A & I), made during the monsoon season (24 February 2019 and 22 January 2021). The other specimens were observed between 98 m and 110 m and were estimated to range from 15 to 25

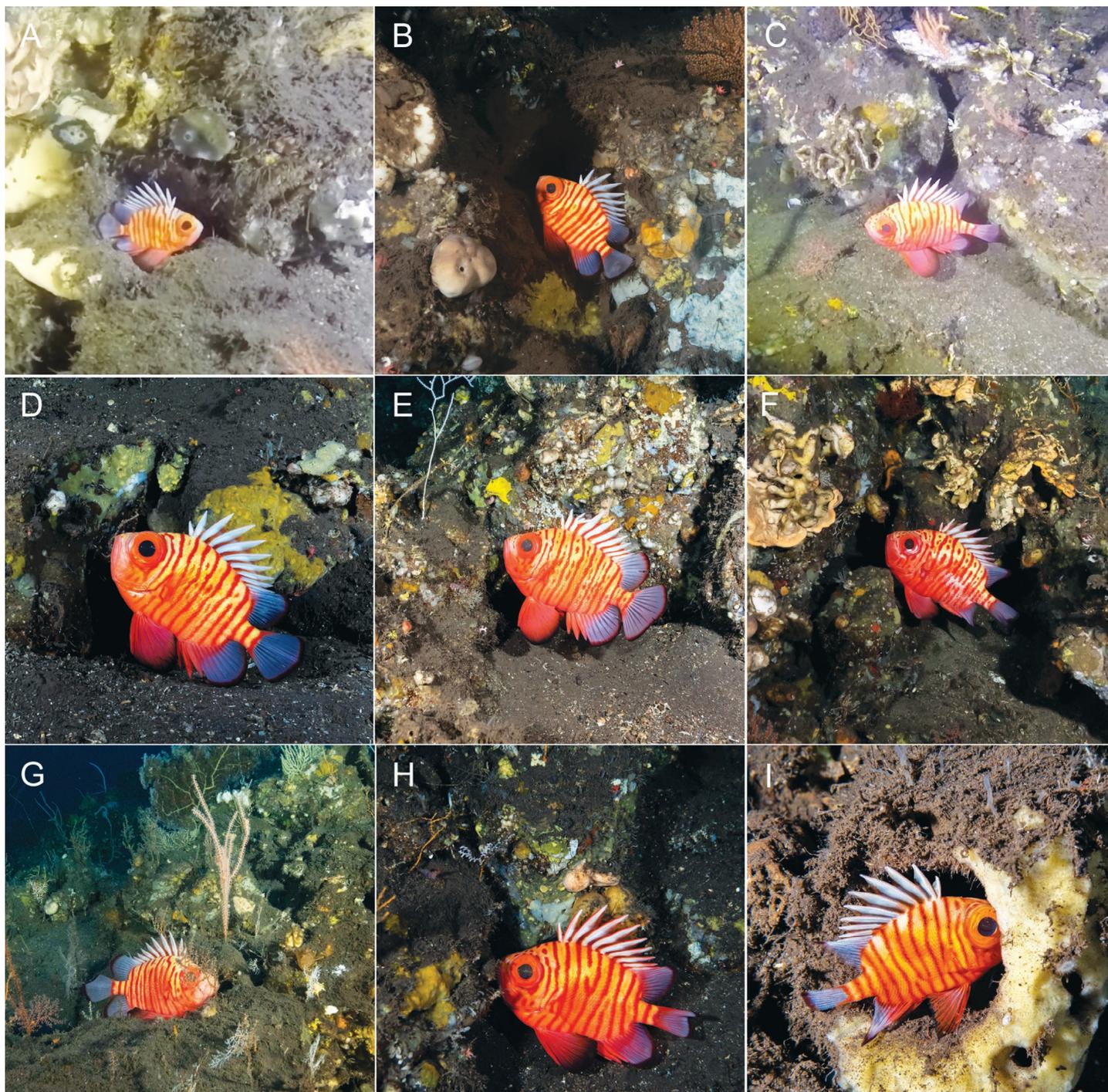


Figure 2. *Pristigenys meyeri*, different individuals (site, depth, date): (A) Emerald, 97 m, 24/02/19 (B) Batu Niti, 100 m, 25/02/19 (C) Emerald, 104 m, 26/02/19 (D) Batu Niti, 105 m, 15/10/19 (E) Batu Niti, 107, 21/10/19 (F) Emerald, 110 m, 26/10/19 (G) Drop Off, 98 m, 20/11/20; (H) Drop Off, 101 m, 01/12/20 (I) Drop Off, 96 m, 22/01/21.

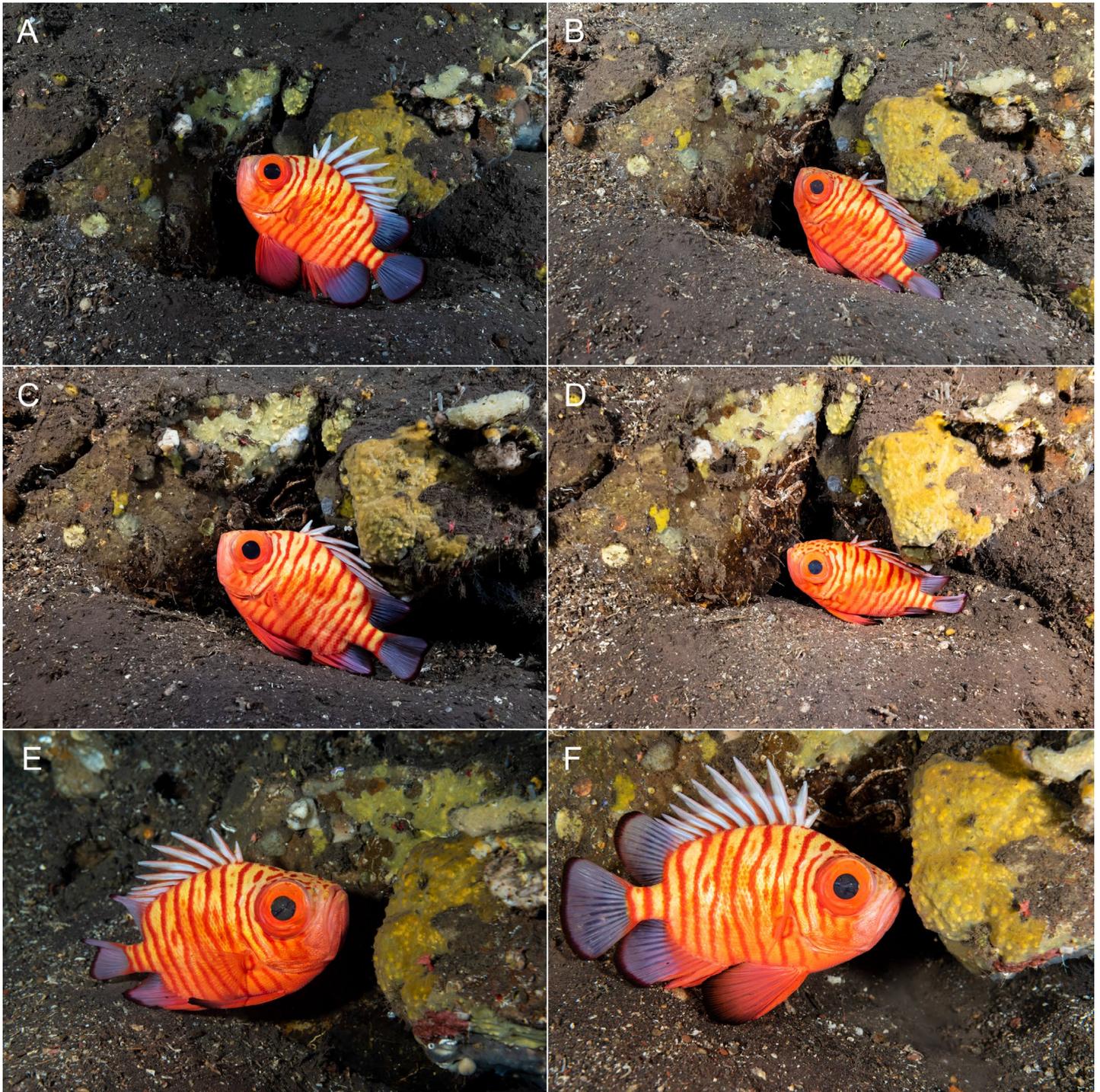


Figure 3. *Pristigenys meyeri*, images of 6 potential resightings of the same individual at the same site (Batu Niti), at the same depth (105 m): (A) 15/10/19 (B) 17/10/19 (C) 20/10/19 (D) 21/10/19 (E) 14/11/19 (F) 15/11/19.

cm total length. This species appears to be restricted to complex reef habitats at these depths, where individuals can retreat into cracks or scree on the reef slope if threatened.

Repeated dives at the same sites showed at least one individual having high site fidelity, where it was observed 4 times on 4 different days (15, 17, 20 & 21 October 2019), at the same spot at 105 m (Fig. 3A, B, C & D). Potentially two additional later sightings of the same individual were made at the exact location (14 & 15 November 2019). However, despite having a similar size and color pattern, its identity could not be verified as it was only displaying the opposite side of its body from that documented previously (Fig. 3E & F).

Our observations of multiple individuals, including two presumed juveniles, between 2019 and 2021, suggest that a resident population of *P. meyeri* exists in the waters off the northeast coast of Bali. It is likely that this

species is more widespread within the Indonesian archipelago and may also range farther into the Indian Ocean. Although *P. meyeri* might be occasionally caught by line fishing, the low numbers of fish seen at these dive sites and the few reported catches within Indonesia suggest that it is likely to remain unnoticed without observational surveys within its depth range.

The difficulty in accessing such depths and the consequent lack of scientific surveys in MCEs likely explain the scarcity of observations made for this species across the Indonesian archipelago. Given the known high levels of biodiversity from the shallow coral ecosystems in these regions, more extensive research on MCEs in Indonesia will likely reveal new species and new species distributions, highlighting the need for a stronger protection of these deeper habitats.

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