*Journal of the Marine Biological Association of the United Kingdom*

**cambridge.org/mbi**

## Marine Record

**Cite this article:** Venables SK, Conradie J, Marshall AD (2021). First records of the ornate eagle ray *Aetomylaeus vespertilio* from the Inhambane Province, Mozambique. *Journal of the Marine Biological Association of the United Kingdom* **101**, 1085–1088. https://doi.org/10.1017/S0025315422000054

Received: 20 October 2021
Revised: 3 January 2022
Accepted: 31 January 2022
First published online: 9 March 2022

**Key words:**
Bazaruto Archipelago; Myliobatidae; range extension; Western Indian Ocean

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# First records of the ornate eagle ray *Aetomylaeus vespertilio* from the Inhambane Province, Mozambique

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**Abstract**

We report two separate sightings of the ornate eagle ray *Aetomylaeus vespertilio* (Bleeker, 1852) in the Bazaruto Seascape of southern Mozambique. In May 2021, a single individual was encountered at a depth of 30 m during an in-water survey in the Bazaruto Archipelago National Park. Another solitary individual was documented ~55 km away during an aerial survey in the Vilanculos Coastal Wildlife Sanctuary three days later. These represent the first documented sightings of *A. vespertilio* in the Inhambane Province of Mozambique, confirming the presence of the species in the region and extending the known range northward along the south-east African coastline. Given the rarity of reported sightings, additional records are particularly valuable for these threatened and elusive rays in order to expand current knowledge of their distribution and range.

## Introduction

The ornate eagle ray *Aetomylaeus vespertilio* (Bleeker, 1852) is the largest of the eagle rays (family Myliobatidae), reaching a disc width (DW) of >300 cm and a total length (TL) of up to 600 cm due to a long, whip-like tail (Last *et al.*, 2016). The species is rare and poorly studied, yet based on the presence of unregulated fisheries throughout most of its range and an inherent susceptibility to overexploitation, *A. vespertilio* is suspected to have experienced population declines of >50% over the last three generations (45 years) and is classified as Endangered on the IUCN Red List (White & Kyne, 2016). Reproductive biology specific to the species remains unknown, but *A. vespertilio* is expected to have slow growth, large size at maturity and low fecundity similar to other myliobatids (Compagno & Last, 1999; Last & Stevens, 2009).

Despite their large size and distinct dorsal colour patterning, sightings of *A. vespertilio* are rare. Few records exist from fisheries (e.g. Paul, 2011; Benjamin *et al.*, 2012), and live sightings are limited, with a recent study using social media searches and citizen science contributions to add 53 photo-documented sightings of the species to existing records (Araujo *et al.*, 2020). Given the extreme rarity of sightings, additional records are particularly valuable for these threatened and elusive rays in order to expand knowledge of their distribution, especially from locations where the species is yet to be documented.

*Aetomylaeus vespertilio* is a pelagic ray, occurring in coastal waters to depths of at least 110 m in tropical and sub-tropical regions of the Indo-Pacific, and is commonly sighted over coral reefs and sand/mud flats (Last *et al.*, 2016; White & Kyne, 2016). The known distribution is patchy and spans from eastern Australia through southern China, Indonesia, Palau, the Philippines, Malaysia, India, the Maldives and Seychelles archipelagos, to the Red Sea (White & Kyne, 2016; Araujo *et al.*, 2020). In southern Africa, a single report exists from Richard's Bay, South Africa where an individual was caught by a sports angler in 2018 and released alive (Araujo *et al.*, 2020; Ebert *et al.*, 2021). The species is documented to occur in Mozambique (Last *et al.*, 2016; White & Kyne, 2016; Araujo *et al.*, 2020) and was acknowledged to exist in Mozambican coastal waters by Warnell *et al.* (2014), however we were unable to trace a specific report to confirm the exact location and nature of the sighting(s).

The coastal waters of southern Mozambique support a high diversity of elasmobranchs, including many rare and threatened species (e.g. giant manta rays *Mobula birostris*, zebra sharks *Stegostoma tigrinum* and bowmouth guitarfish *Rhina ancylostoma*). The region contains suitable habitat for *A. vespertilio*, as well as considerable threats in the form of artisanal and commercial fisheries, particularly with the high use of gillnets throughout coastal waters (Romanov, 2002; Temple *et al.*, 2018). Here, we report two live sightings of *A. vespertilio* from the Inhambane Province of southern Mozambique. To our knowledge, these are the first records from this location and therefore extend the known distribution of the species in Mozambique and the Western Indian Ocean.

## Materials and methods

The Bazaruto Seascape spans 200 km of the Inhambane Province coastline in southern Mozambique and encompasses the waters of the Bazaruto Archipelago, San Sebastian peninsula and coastal waters to Pomene at its southern boundary. Two established marine protected

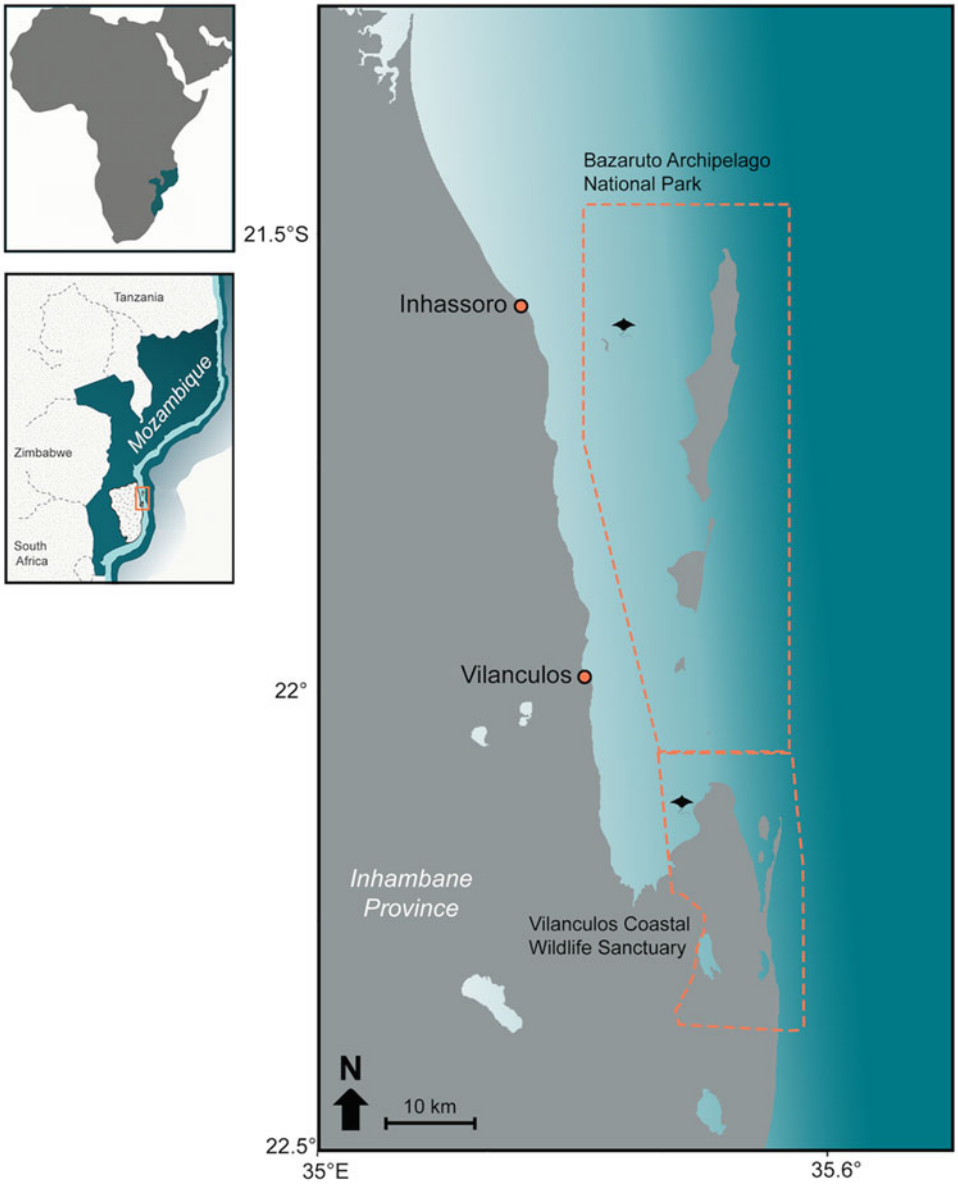


**Fig. 1.** Map of the Bazaruto Seascape with *Aetomylaeus vespertilio* sighting locations indicated by the black eagle ray icons.

areas are located within the seascape – the Bazaruto Archipelago National Park (BANP) and the Vilanculos Coastal Wildlife Sanctuary (VCWS; Figure 1). Marine habitats range from mangrove forests, seagrass beds and shallow sandy habitats to deeper rocky reefs and the open ocean. Trained scientists conducted regular survey dives (within recreational scuba diving limits to ~40 m) throughout the Bazaruto Seascape since 2013 to record and photo-document species of marine megafauna (elasmobranchs, sea turtles, cetaceans and billfish). Surveys were either carried out independently on a dedicated research vessel or in conjunction with tourism operators. A total of 785 survey dives (mean (±SE) = 98 (±25) dives year$^{-1}$) were conducted across 20 main dive sites between 2013–2021, with some sites surveyed up to 50–80 times per year. Aerial surveillance flights in a BatHawk microlight (MicroAviation, South Africa) and opportunistic unmanned aerial vehicle (UAV; DJI Phantom 4 Pro drone) surveys were also carried out between 2013–2021.

## Results

We documented two separate sightings of *A. vespertilio* during surveys in the Bazaruto Seascape in May 2021. On 18 May 2021, we encountered a single *A. vespertilio* during a survey dive around Santa Carolina Island (aka Paradise Island; −21.617, 35.342), which lies inside the boundaries of the BANP. The individual was swimming off the reef over the seabed at a depth of 30 m and was filmed on a RED weapon camera (Figure 2a). The individual had an estimated disc width of >175 cm; sex could not be determined as only the dorsal surface and rear of the animal were observed. On 21 May 2021, another solitary *A. vespertilio* was documented ~55 km south during an opportunistic UAV survey in the VCWS (−22.125, 35.436; Figure 2b). The ray was observed swimming over a shallow sand bank (<3 m deep) and sex could not be determined due to the dorsal view from the aerial footage. On both occasions, species identification was verified by the unique dorsal patterning characteristic of *A. vespertilio* – dark anterior stripes and posterior reticulated spots and compared against Last *et al.* (2016) for confirmation. While dorsal spot patterns on the pelvic and pectoral fins have been used to distinguish between *A. vespertilio* individuals (Araujo *et al.*, 2020), the photo of the first sighting was not of sufficient quality to assess whether the two sightings were of a single individual, or multiple individuals.

https://doi.org/10.1017/S0025315422000054 Published online by Cambridge University Press

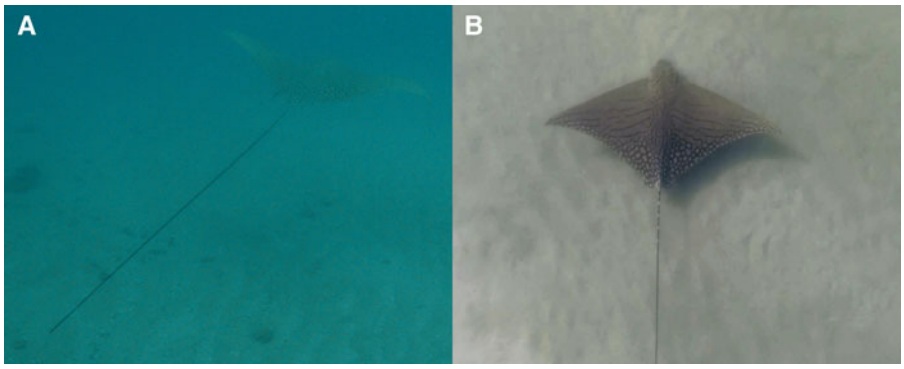


**Fig. 2.** Photographic records of *Aetomylaeus vespertilio*. (a) An individual recorded on a dive survey around Santa Carolina Island; (b) an individual sighted during an opportunistic aerial survey in the Vilanculos Coastal Wildlife Sanctuary. Photo credits: Janneman Conradie.

## Discussion

Here, we document the first sightings of *A. vespertilio* in the Inhambane Province of Mozambique, confirming the presence of the species in the Bazaruto Seascape region and extending the known range northward along the south-east African coastline. As an unusually rare species, each record of this cryptic ray provides important information that adds to our knowledge of geographic range and distribution.

While the species has previously been documented to occur in Mozambique, we were unable to trace specific sighting reports confirming the location and nature of the sighting(s). Extensive research has been conducted throughout the Inhambane Province over the past two decades, particularly focused on recording the abundance, diversity and distribution of elasmobranch species using methods such as diver surveys and Baited Remote Underwater Video (BRUV) (for example, see Rohner *et al.*, 2013; Boggio-Pasqua *et al.*, 2019; Keeping *et al.*, 2021; O'Connor & Cullain, 2021; Pottie *et al.*, 2021). Yet, despite consistent and extensive survey effort, confirmed sightings of *A. vespertilio* have been lacking until now.

Interestingly, both sightings were located within the boundaries of local marine protected areas – the BANP and the VCWS, which span 1360 and 420 $km^2$ (terrestrial and marine reserve), respectively. Although, it is important to note that these protected areas are not designated entirely as no-take zones and fishing is permitted within certain areas throughout both the BANP and VCWS. However, it is positive that the sightings were within conservation areas under the jurisdiction of management, where more rigorous protection strategies can be put into place in the future if deemed necessary. Being a mobile species, it is highly likely that *A. vespertilio* move outside of these refuges and into potential high-risk fishing zones along the coastline. Artisanal fishing pressure, particularly the common use of gill nets, is high in Mozambique's nearshore coastal waters and bycatch in such non-selective fishing gears poses a major threat to elasmobranchs and other mobile marine species (Temple *et al.*, 2018). Eagle rays in particular are also targeted by spearfishers in these waters (Authors, pers. obs.).

In light of the rarity of this species worldwide and the threats to which it is exposed in Mozambican coastal waters, these sightings provide important information to guide the extension of national protected species laws. We suggest the addition of *A. vespertilio* to the list of species protected by Regulamento da Pesca Marítima (REPMAR), which prohibits the capture of a range of threatened species in Mozambican waters (Boletim da República, 2020). The occurrence of these rare elasmobranchs in remote protected areas (see also Araujo *et al.*, 2018) underlines the need for further investigation of the distribution of threatened, enigmatic species along the Mozambican coastline and the potential that different management options such as fisheries management interventions, protected species listings or MPAs may have in preserving such species. With only a small percentage of provincial waters officially protected, sightings of little-known and previously unreported species reinforce the need for the expansion of protected areas in the region. Given the overall lack of knowledge surrounding the ecology, movements and habitat use of *A. vespertilio*, combined with their Endangered status and susceptibility to trawls and gillnets (McClenachan *et al.*, 2012), efforts to mitigate such threats, at least on a local scale, should be pursued.

## Data

All data generated or analysed during this study are included in this published article.

**Acknowledgements.** We are grateful to Administração Nacional das Áreas de Conservação Mozambique (ANÁC), the Vilanculos Coastal Wildlife Sanctuary, the Bazaruto Archipelago National Park and African Parks for permitting this work and collaborating on larger elasmobranch research and conservation efforts in the region. We thank A. Rooney and J. Artendale, the Barlow family and Our Children's Earth Foundation for their generous and ongoing support of our work in Mozambique. We also thank the Shark Conservation Fund for their support of this research and two anonymous reviewers for their valuable feedback on the manuscript.

**Author contributions.** J.C. collected the data, S.V. and A.M. wrote and edited the manuscript. All authors read and approved the final manuscript.

**Conflict of interest.** The authors declare that they have no competing interests.

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https://doi.org/10.1017/S0025315422000054 Published online by Cambridge University Press