

SHORT
COMMUNICATION

New Record and Range Expansion of Frigate Tuna *Auxis thazard* (Scombridae) in the Equatorial Mid-Atlantic Ocean

N. P. A. Bezerra^{a, *}, F. V. Albuquerque^b, J. Figueiredo-Filho^b,
B. C. L. Macena^a, and F. H. V. Hazin^a

^aUniversidade Federal Rural de Pernambuco, Recife, PE 52171-900 Brazil

^bUniversidade Federal da Paraíba, João Pessoa, PB 58051-900 Brazil

*e-mail: natalia_pab@hotmail.com

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Abstract—We report the first record of frigate tuna *Auxis thazard* from the Saint Peter and Saint Paul Archipelago, a small Brazilian group of oceanic rocky islands, located in the equatorial Mid-Atlantic Ridge. This finding constitute a range extension of the distribution of the species in Brazilian waters.

Keywords: *Auxis thazard*, first occurrence, Saint Peter and Saint Paul Archipelago, Brazil

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The genus *Auxis* is composed by two species: the frigate tuna *Auxis thazard* (Lacepède, 1800) and the bullet tuna *Auxis rochei* (Risso, 1810) (Collette and Aadland, 1996; Catanese et al., 2008). Two subspecies are recognised for each species: *Auxis thazard thazard* (Lacepède, 1800) and *Auxis thazard brachydorax* (Collette and Aadland, 1996) for frigate tuna and *Auxis rochei rochei* (Risso, 1810) and *Auxis rochei eudorax* (Collette and Aadland, 1996) for bullet tuna. The distribution of both *A. thazard brachydorax* and *A. rochei eudorax* restricted to the eastern Pacific Ocean while other subspecies occurs in the Atlantic, Indian and Western Pacific Oceans (Collette and Aadland, 1996).

The *Auxis thazard thazard* occurs in warm tropical and subtropical waters occupying neritic habitats across the shelves of continents and oceanic islands. It is not known to perform extensive migratory movements but is occasionally caught offshore (Collette and Nauen, 1983; Maguire et al., 2006). However, *Auxis* species are commonly aggregate around floating debris and artificially made fish aggregating devices (FADs) which may provide both shelter and feeding opportunities. The association with drifting FADs may also cause dispersion of *Auxis*-species over great distances in the open-ocean environment (Castro et al., 2002). *Auxis* are often caught offshore by industrial purse seine tuna fisheries but are typically not the target species in the fishery (Amandè et al., 2010). In Brazil, *Auxis* are caught by a variety of fishing gears, with purse seine and bait-boat fisheries targeting skipjack *Katsuwonus pelamis* and tunas *Thunnus* sp., while two latter groups accounting for most of the catches (Meneses de Lima et al., 2000; Menezes et al., 2010; Rangely et al., 2010).

On April 9th 2017, two frigate tunas were captured for the first time around the Saint Peter and Saint Paul Archipelago (SPSPA), an oceanic group of islets located ~1000 km off the Brazilian coast in the equatorial Atlantic Ocean (0°55' N, 29°20' W) (Fig. 1) (Vaske et al., 2005; Viana et al., 2015). The specimens were captured about 1 nautical mile west of the archipelago by trolling fishing (Fig. 2). The fishes were identified and fixed with 10% formalin, preserved in 70% ethanol and deposited in the reference collection (no. 11713, Arquipélago SP/SP00.IV.2017) at Universidade Federal da Paraíba, Brazil. Morphometrics and meristics are summarized in Table 1. The identification was conducted using main morphological and morphometric diagnostic features: body shape and pattern of staining, corselet extension, 1 to 5 scales wide under origin of second dorsal fin, dorsal scaleless area extending anteriorly the tip of pectoral fins, presence of 36 to 44 (usually 38 to 42) gill rakers on the first arch and 15 or more dark wavy lines in scaleless area above lateral line (Collette and Nauen, 1983; Collette and Aadland, 1996). Morphology of both our specimens corresponds well to the description of the *Auxis thazard thazard*. Body measurements and counts lies within ranges presented in Collette and Aadland (1996).

This finding constitutes a new distributional record for the frigate tuna in the Atlantic Ocean. The present study describes the first occurrence of frigate tuna in the SPSPA, and it has never before been recorded in waters surrounding the Brazilian oceanic islands (Soto, 2001; Vaske et al., 2005; Pinheiro et al., 2015; Viana et al., 2015). Recently, the congeneric species *A. rochei* was also recorded in the SPSPA (Pinheiro et al.,

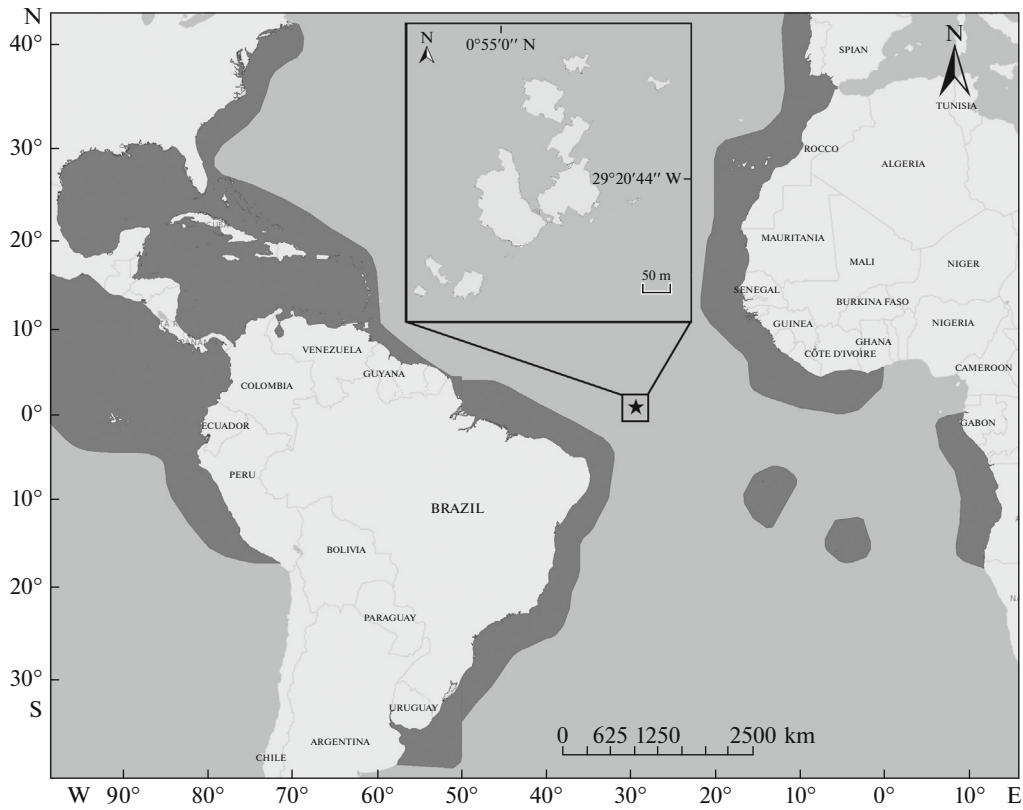


Fig. 1. Geographical location (black star) and details (inlet) of the Saint Peter and Saint Paul Archipelago (SPSPA). Dark grey shadow indicates the frigate tuna *Auxis thazard* Atlantic Ocean distribution (IUCN, 2019).

Table 1. Morphometric measurements and meristic characters of two specimens of the frigate tuna *Auxis thazard* captured in the Saint Peter and Saint Paul Archipelago

Character	Frigate tuna 1	Frigate tuna 2
Morphometric, mm		
Total length	440.0	365.0
Fork length	428.0	357.0
Standard length	330.0	278.0
Head length	107.6	94.3
Pre-orbital length	22.3	22.5
Post-orbital length	66.2	56.2
Orbital diameter	20.4	16.2
Orbital height	16.3	15.4
Head height	81.5	73.5
Body height	99.4	82.6
First dorsal fin base length	46.9	45.2
Second dorsal fin base length	22.5	20.6
Pectoral fin length	60.1	46.8
Anal fin base length	26.0	20.4
First dorsal fin to second dorsal fin	95.0	68.7
Pectoral fin to pelvic fin	11.1	14.4
Distance from pectoral fin to anterior dorsal scales	45.5	32.9
Corselet width under second dorsal fin origin	27.1	29.1
Meristic		
Spines	8	8
Scales wide under origin of second dorsal fin	5	5
Second dorsal fin rays	12	12
Gill rakers on the first arch	39	38

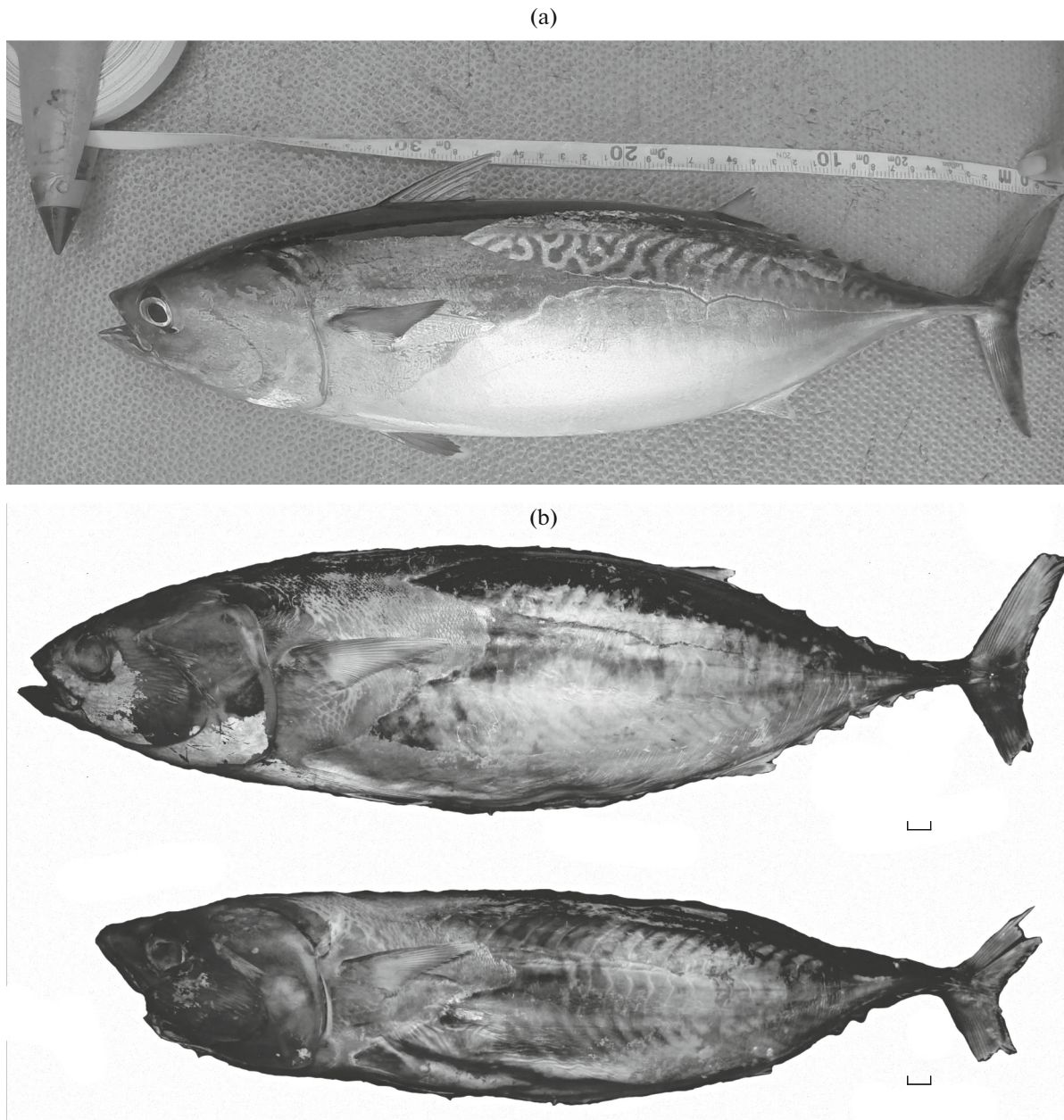


Fig. 2. (a) First record of the frigate tuna *Auxis thazard* in the Saint Peter and Saint Paul Archipelago; (b) Specimens of *Auxis thazard* deposited at Universidade Federal da Paraíba, Brazil (No. 11713, Arquipélago SP/SP00.IV.2017). Scale: 10 mm.

2018). These findings suggest that the small tunas may carry out long distance migrations, possibly by associating with drifting fish aggregating devices into the open ocean (Fig. 1). In addition, the South Equatorial Current (SEC), which flows superficially, east-to-west throughout the year, may also transport frigate tuna larvae and/or juveniles to SPSPA (Stramma and England, 1999; Katsuragawa et al., 2014). These find-

ings provide data for an expansion of the frigate tuna range to include a remote Brazilian archipelago.

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COMPLIANCE WITH ETHICAL STANDARDS

Conflict of Interest. The authors declare that they have no conflict of interest.

Ethical approval. All applicable international, national, and/or institutional guidelines for the care and use of animals were followed by the authors. Brazilian Environmental license (SISBIO 53702-3).

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