

Gobioides broussonnetii Lacepède, 1800 (Pisces: Gobiidae): First record of the violet goby in the state of Bahia (central coast of Brazil) and evidence of the effect of increased salinity on its local distribution

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ABSTRACT: New recordings of *Gobioides broussonnetii* Lacepède, 1800 and the distribution of which extends for approximately 1,000 km both to the North and South along the coast of Brazil are reported in the Paraguaçu river estuary (Todos os Santos Bay). Preliminary data regarding the impact of increasing salinity on violet goby populations are shown and discussed.

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The violet goby, *Gobioides broussonnetii* is a large member of the Gobiidae family and its estimated distribution extends from the Atlantic coast of the United States to Paraná, Brazil, including the Gulf of Mexico and the Caribbean coasts of Colombia, Venezuela and French Guyana (Hoese and Moore 1998; Murdy 1998; Passos *et al.* 2012). It typically occurs in marine and estuarine environments (Hoese and Moore 1998; Camargo and Isaac 2003) but has been found in fresh water (Rodríguez and Villamizar 2006). It prefers muddy sediments where it is commonly captured (Cervigón 1994) and reaches 60 cm in total length, making it the largest species of its family to occur in the western Atlantic (Menezes and Figueiredo 1985). Little data is available on the ecology and life history of this species, with the exception of some systematic (Pezold 1993; Murdy 1998) and a few recent studies on its economic importance to traditional fisheries (Bragança 2005, unpublished data) and its feeding ecology and reproduction (Mata-Cortés *et al.* 2003; Rodríguez and Villamizar 2006).

To the best of our knowledge, records of this species in Brazilian waters to date have been reported in the Amazon (Camargo and Isaac 2003) and Caeté River estuaries (Barletta *et al.* 2005) in northern Brazil, on the coast of Ceará in northeastern Brazil (Araújo *et al.* 2000), in the São Mateus river estuary (Sarmento-Soares and Martins-Pinheiro 2012) and the Cananéia estuarine complex (Menezes and Figueiredo 1985) in southeastern Brazil, and in the Itajaí-Açu river estuary (Antunes 2010, unpublished data) and the Antonina Bay (Cortelete *et al.* 2009) in southern Brazil. In all of the above-listed reports, *G. broussonnetii* showed low abundance and was always captured in the mixohaline zones of estuaries. According to Andrade-Tubino *et al.* (2008), who synthesized studies

of the temporal-spatial organization of estuarine fish fauna along the coast of Brazil, *G. broussonnetii* is absent from the East coast of Brazil in at least some of those studies. Hatje and Andrade (2009) and Sousa *et al.* (2001) published studies on the Todos os Santos Bay in the state of Bahia, which do not report the species, despite the latter focusing specifically on the Gobiidae family. Recent studies of the Paraguaçu estuary (Reis-Filho *et al.* 2010; 2011; 2012) do not mention the violet goby either, because have been carried out mainly in shallow high salinity estuarine zones.

This study reports the recording of *Gobioides broussonnetii* (Figure 1) in the Paraguaçu river estuary (Figure 2), inside the Todos os Santos Bay (TSB) on the East coast of Brazil. Species identification was performed consulting the Menezes and Figueiredo (1985) which



FIGURE 1. (a) *Gobioides broussonnetii*, MZUFBA - 07122. 48.5 cm TL, Cachoeira, Paraguaçu river estuary, Todos os Santos Bay, Bahia State. (b) Details of the anterior portion of the body highlighting dermal pores in the rostrum and preopercle.

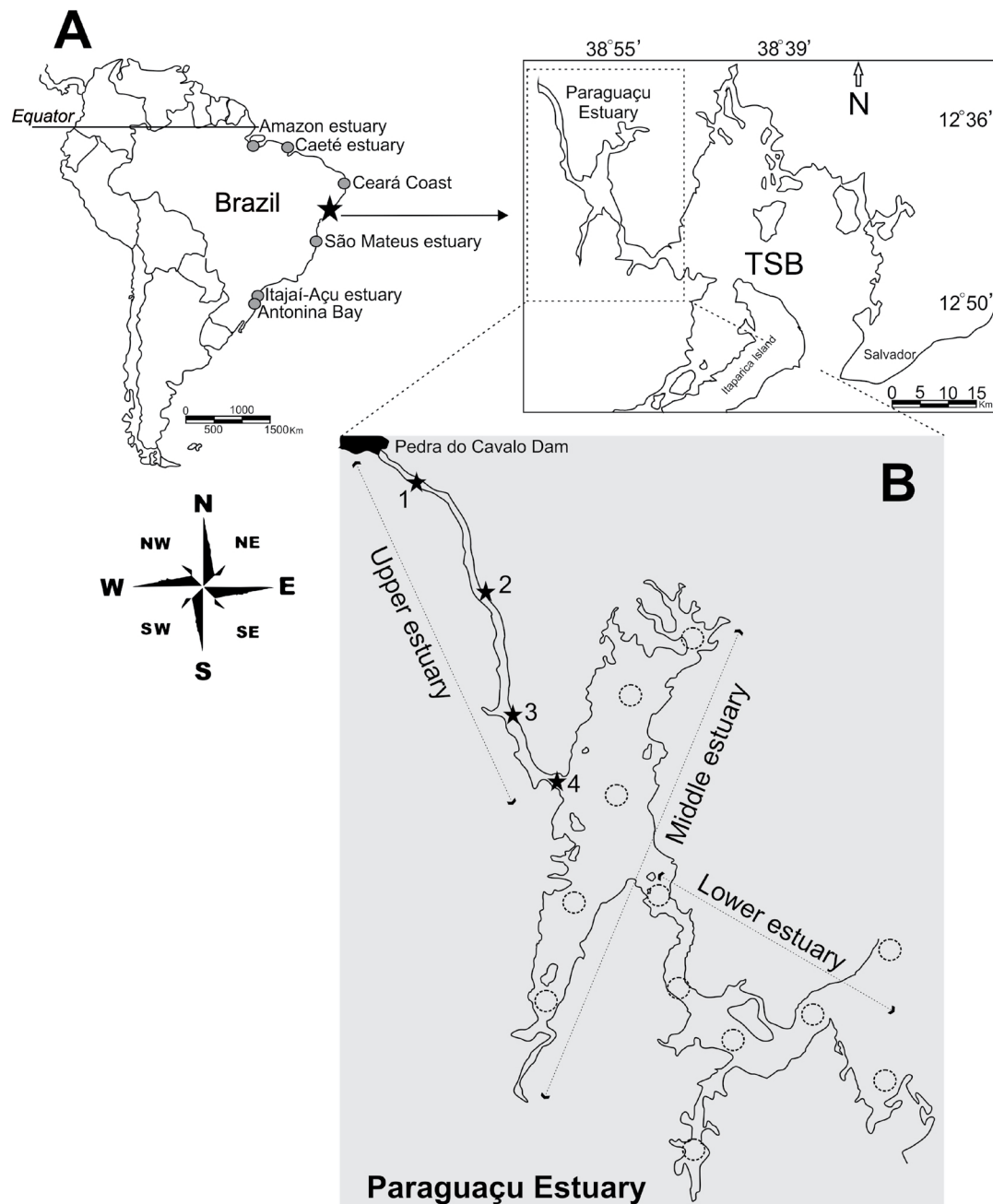


FIGURE 2. Area of distribution of *Gobioides broussonnetii* on the coast of Brazil. (a) The gray circles represent the recording along the coast of Brazil and black stars represent the new recordings in the Todos os Santos Bay; (b) black stars and theirs numbers represent the upper estuary (Paraguaçu river) where the violet goby was captured in recent years (2010-2013), dotted circles represent others areas in the Long Term Fish and Fisheries Monitoring Program and experimental sampling.

present a taxonomic guide and general remarks about the species. The species of the *Gobioides* genus differ from other gobies by having long bodies and a first dorsal fin with one spine joined to a second dorsal fin. Among the genus *Gobioides*, *G. broussonnetii* differs from other species by having an oblique mouth, the anterior part of the lower jaw in a horizontal position with the eyes and body of a purplish-brown color (Murdy 1998). These recordings are one of the results of a long term fish and fisheries monitoring program carried out in the area. Bimonthly experimental sampling of fish and environmental variables such as salinity has been done in the area since January 2010. The collection of this type of data has made it possible to make inferences about the effect of salinity changes on the local distribution of the violet goby.

Fifty eight (58) individuals of *G. broussonnetii* were captured at four locations in the Paraguaçu estuary, always in sub-tidal habitats of the main channel, which confirm the expansion of the area of occurrence in the TSB: the town of Cachoeira/São Felix (Figure 3A, 12°35'42" S, 38°59'05" W); Tacha's location (Figure 3B, 12°36'01" S, 38°58'41" W), Valéria's location (Figure 3C, 12°39'10" S, 38°56'55" W) and the Nagé community (Figure 3D, 12°44'13" S, 38°55'36" W). Of the total catch, five individuals from the catch in Valéria's location (see Figure 2, sampling point 3) were deposited at the Museum of Zoology of Universidade Federal da Bahia, all belong to vouchers MZUFBA - 07122. The hydrological regime of the Paraguaçu estuary was altered in 2005 due to the implantation of the Pedra do Cavalo Hydroelectric Power Plant (HPP) which changed the flow of fresh water (Genz



FIGURE 3. Environment and locations where *Gobioides broussonnetii* specimens were recorded. A) Main channel of the towns of São Felix and Cachoeira ; B) Tacha location with fishermen removing a trawl net from the edge of the main channel; C) Valéria location and typical riverside vegetation and D) the Nagé community with the Iguape bay visible in the background.

et al. 2008). Figure 4 shows how the upstream flow control and consequent increase in salinity affects the occurrence of the violet goby is its population. Nowadays, violet goby individuals are captured only in regions of the Paraguaçu river where salinity still has little influence (see locations 1 and 2, Figure 2).

Finally, based at the captures of *Gobioides broussonnetii* presented here we suggest that this species and its populations are suffering significant damage, both by alteration to habitat quality and overfishing, which is a result of the general scenario of local fishery activity. Even if the *G. broussonnetii* population recorded in the Paraguaçu estuary is well-established, the current conditions reported above may be a sign that the violet goby is threatened. Moreover, data collected on traditional fisheries might be inestimable information regarding estuarine biodiversity, especially rare and/or unusual fish species. We recommend more investigation into life cycles and responses to salinization of the upper estuary and principally an immediate return to past hydrological conditions which are more appropriate to the fitness of this species. Besides, the present type record becomes very useful for biogeographic knowledge mainly when is important relate environmental factors and biogeographic fingerprint and thereby have both played a role in structuring the components of Atlantic fish assemblages.

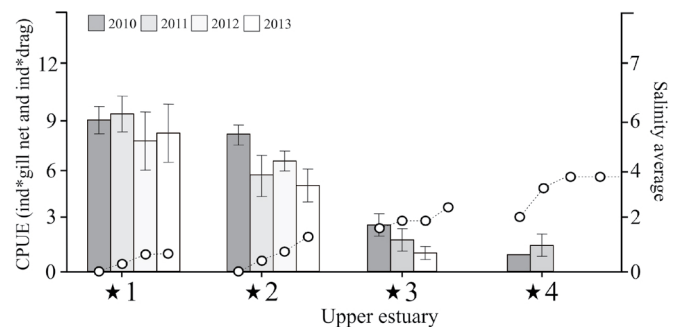


FIGURE 4. Number of *Gobioides broussonnetii* individuals captured in the upper estuary of the Paraguaçu river (Todos os Santos Bay, Bahia) along the mixohaline main channel over a four year period. Average bi-monthly salinity values are also shown as white circles.

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