New records of the snow bass *Serranus chionaraia* (Perciformes: Serranidae) confirm an established population in the Brazilian Province

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**Abstract**
The snow bass *Serranus chionaraia* is a small-bodied reef fish presumed to be restricted to the Caribbean Province, with a single specimen captured south of the Amazon River mouth. Recent surveys with baited remote underwater stereo-video systems detected the species c. 1900 km southward. Meristic and morphometric characters of two specimens examined in this study confirmed the species identity, which greatly extends the species’ range southward on the eastern coast of Brazil and indicates the presence of an established population of *S. chionaraia* in the Brazilian Province.

**KEYWORDS**
Abrolhos Bank, BRUVS, mesophotic habitats, rhodolith beds, south-western Atlantic Ocean

Nine *Serranus* Cuvier 1816 species are currently reported in the south-western Atlantic Ocean (Pinheiro et al., 2018), comprising one undescribed and eight formally described species. The latter include the snow bass *Serranus chionaraia* Robins & Starck 1961 (Figure 1), which has a distribution previously presumed to be restricted to the Caribbean Province (Robins & Starck, 1961; Humann & Deloach, 2014). In 1963, however, the species was recorded from c. 65 m depth in the Brazilian Province, south of the Amazon River mouth (Florida Museum of Natural History, UF 211605), but there were no subsequent captures of snow bass off the Brazilian coast (Carvalho-Filho, 1999; Rocha & Costa, 1999; Lessa & Nóbrega, 2000; Menezes et al., 2003; Hostim-Silva et al., 2005; Sampaio & Nottingham, 2008; Nóbrega et al., 2009; Lindner, 2014; Rolim et al., 2017; Francini-Filho et al., 2019), only a single visual record from the Abrolhos Archipelago, on the eastern coast of Brazil (Carvalho-Filho & Ferreira, 2013; Pinheiro et al., 2018). Therefore, the southern range limit of snow bass is unclear and except for the records of Robertson & Van Tassel (2015), published distributions do not include the Brazilian coast (Robins & Starck, 1961; Humann & Deloach, 2014; Froese & Pauly, 2019; Fröcke et al., 2019).
The best practice recommendations of Bello et al. (2014) suggest a thorough examination of all current information (e.g., catalogues and collections) and to provide the most accurate and verifiable treatment of first record material (e.g., photographs, meristic and morphometric characters, voucher specimens). Following these guidelines, we confirm the occurrence of an established population of snow bass on the eastern coast of Brazil (18°–19° S), a new southern limit for the species distribution. The new records were obtained through surveys with baited remote underwater stereo-video systems (stereo-BRUVS), near or over rhodolith (calcareous nodules of coralline red algae) beds in the Abrolhos Bank (May 2017 and 2018), state of Bahia, and in the Costa das Algas multiple-use marine protected area (MPA; April 2018), state of Espírito Santo (Figure 2). Twelve individuals were filmed at depths between 62 and 65 m in the Abrolhos Bank, and another eight individuals were recorded between 43 and 50 m in the Costa das Algas MPA. To confirm the species identity, in May 2018 three individuals from the Abrolhos Bank were collected at c. 62 m depth, through scuba diving and hand nets. The fish died during the return to the surface due to barotrauma caused by decompression. They were morphologically identified following Robins & Starck (1961) and a voucher specimen was deposited at the Museu Nacional do Rio de Janeiro (MNRJ 51422).

We also conducted an extensive search in the main Brazilian ichthyological collections. One misidentified snow bass specimen was found at the Museu de Zoologia da Universidade Estadual de Feira de Santana (MZFS 3691). This individual was caught in June 1999 off the southern coast of the state of Bahia (Figure 2). Meristic (dorsal fin: X,
human pressures on snow bass and other poorly-known organisms inhabiting the Brazilian coast by its very conspicuous snow white belly and the dark cross bars on the upper and lower caudal rays (Figure 1; Robins & Starck, 1961; Humann & Deloach, 2014).

These new records extend the species known range southward in a straight line by c. 1900 km or 17° latitude. As in the Caribbean (Robins & Starck, 1961; Humann & Deloach, 2014), snow bass is apparently uncommon on the eastern coast of Brazil. The species occurred in less than 5% and 10% of the stereo-BRUVS deployments in the Abrolhos Bank and Costa das Algas MPA, respectively, and represented less than 1% of the total fish abundance in both sites. Moreover, Simon et al. (2016) explored these same mesophotic habitats and did not register the species for the region. Based on previous observations and from our recordings, snow bass is a relatively sedentary, bottom-dwelling species usually associated with mesophotic rhodolith beds (Robins & Starck, 1961; Humann & Deloach, 2014). This might be related to the high complexity of this habitat and to the availability of structures that enable the individuals to hide or camouflage when frightened (Humann & Deloach, 2014; BRUVS recordings).

In contrast with expectations, our results indicate that snow bass is established in the Brazilian Province, rather than present as vagrant individuals. The scarcity of snow bass records in Brazil before our study appears to be related, at least in part, to the low sampling effort directed toward the ichthyofauna associated with rhodolith beds. This is possibly due to the risks and difficulties associated with the techniques and logistics required to survey mesophotic habitats (Pinheiro et al., 2015; Rosa et al., 2016; Simon et al., 2016; Rocha et al., 2018).

Brazil harbours the world’s largest continuous rhodolith beds (Amado-Filho et al., 2012). These complex habitats cover almost the entire continental shelf, mainly in the mesophotic zone (30–150 m depth), the tops of seamounts and the shelf around oceanic islands (Horta et al., 2016). Brief explorations of mesophotic environments on the Brazilian coast (Carvalho-Filho & Ferreira, 2013; Simon et al., 2016; Smith-Vaniz et al., 2018; present study) and elsewhere have repeatedly demonstrated that many new species and occurrences remain to be discovered in this low-light zone. However, industrial activities, particularly large-scale mining and hydrocarbon exploitation, are already threatening some endangered, endemic and data deficient species inhabiting rhodolith beds (Moura et al., 2013; Simon et al., 2016). Other threats are bottom trawling and the aquarium trade in which sea basses are appreciated due to their attractive colour and easy maintenance. Despite southernmost known specimens being localized within a multiple-use MPA (Figure 2), this region is a major shrimp-fishing ground where intense trawling takes place (Bourguignon et al., 2018). The widespread exploitation of sea resources even within Costa das Algas MPA arise concerns about human pressures on snow bass and other poorly-know organisms associated with mesophotic ecosystems. Our findings highlight the importance of this poorly studied but ecologically significant benthic megahabitat, which is under severe anthropogenic impact.

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