

# Ten new records of reef fish on the coast of Santa Catarina State, Brazil

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*We present a list with 10 new records of reef fish on the coast of Santa Catarina State, the southernmost site of tropical reef fish occurrence on the Brazilian coast. We also comment on the distribution-range of the recently described Halichoeres sazimai (Labridae).*

**Keywords:** rocky reefs, reef fish, Santa Catarina State, Brazil

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## INTRODUCTION

The coast of Santa Catarina, which is characterized by rocky reefs, is known to be the southernmost limit of most tropical reef fish species in the south-western Atlantic (Hostim-Silva *et al.*, 2006; Floeter *et al.*, 2001, 2008). We report here a list with 10 new records of reef fish, extending their occurrence-range to the coast of Santa Catarina State, Brazil. The last few years represent a significant increase of knowledge about the biogeography and macroecology of Brazilian reef fish (Floeter *et al.*, 2001, 2004, 2005, 2008; Ferreira *et al.*, 2004).

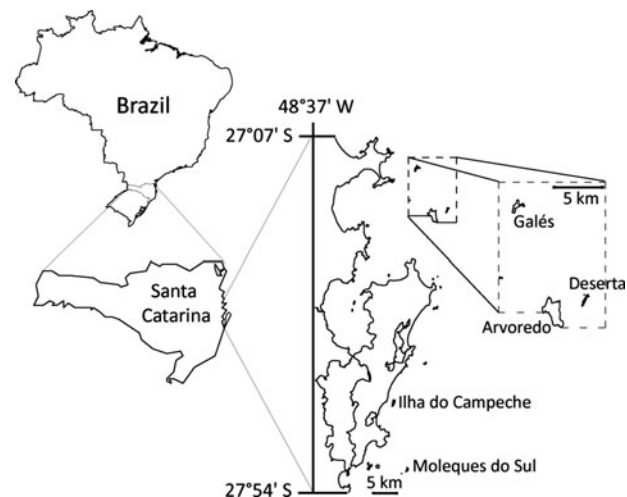
The Brazilian coast extends through ~9500 km and is under the influence of a diverse set of oceanographical and ecological conditions (Campos *et al.*, 1995; Floeter *et al.*, 2001). From Espírito Santo to Santa Catarina States, coastal areas may be under the continuous influence of oligotrophic tropical waters from the Brazilian Current (BC), or seasonally affected by upwelling of cold, nutrient-rich waters (cf. Castro & Miranda, 1998; Ekau & Knoppers, 1999; Luiz Jr *et al.*, 2008).

The coast of Santa Catarina (south Brazil) represents a convergence zone between the tropical BC and the temperate Malvinas Current (MC), where the latter reaches the coast during austral winter. Such a convergence zone may vary each year, and thus winter sea surface temperature (SST) can present thermal amplitude between 21 and 12.5°C (Seeliger *et al.*, 1997), allowing the occasional survival of tropical fish species in years with low influence from the MC. However, during harsh years with very low SSTs, the survival of such species may be compromised, leading to the extirpation of some populations (cf. Bohnsack, 1983; Hsieh *et al.*, 2008). Field observations at the Santa Catarina coast have registered a large number of goatfish (*Pseudupeneus*

*maculatus*) dead on the seafloor and parrotfish paralysed by cold waters (winter SST below 15°C) (A. Dalben & S.R. Floeter, personal communication).

## MATERIALS AND METHODS

All records were made by underwater photographs taken between 2006 and 2009 at the following coastal islands (Figure 1): Arvoredo (27°17'2.93"S 48°21'56.51"W), Galés (27°10'47.21"S 48°24'26.98"W), Deserta (27°16'4.23"S 48°20'17.16"W) (all three belonging to Arvoredo Marine Biological Reserve), Ilha do Campeche (27°41'49.10"S 48°27'54.50"W) and Moleques do Sul Archipelago (27°50'45.75"S 48°25'51.89"W). Sea temperature ranged between 23.5°C–26°C. Photographic records were taken during a non-destructive diurnal visual censuses sampling campaign. Taxonomic classification follows Nelson (2006).



**Fig. 1.** Map of the coastal islands of Santa Catarina where the new records were observed. The dashed line indicates Arvoredo Marine Biological Reserve.

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## RESULTS AND DISCUSSION

During this study ten new species of reef fish were recorded for the coast of Santa Catarina: *Muraena retifera* Goode & Bean, 1882, *Serranus baldwini* (Evermann & Marsh, 1899), *Calamus penna* (Valenciennes, 1830), *Halichoeres dimidiatus* (Agassiz, 1831), *Xyrichthys novacula* (Linnaeus, 1758), *Scarus zelindae* Moura, Figueiredo & Sazima, 2001, *Ctenogobius saepepallens* (Gilbert & Randall, 1968), *Gnatholepis thompsoni* Jordan, 1904, *Ptereleotris randalli* Gasparini, Rocha & Floeter, 2001 and *Cyclopsetta fimbriata* (Goode & Bean, 1885). We also comment on the recently described *Halichoeres sazimai* Luiz Jr, Ferreira & Rocha, 2009. With the exception of *C. penna*, *C. fimbriata* and *H. sazimai*, all the other listed species are typical from tropical regions and perhaps they should be ephemeral on the coast of Santa Catarina.

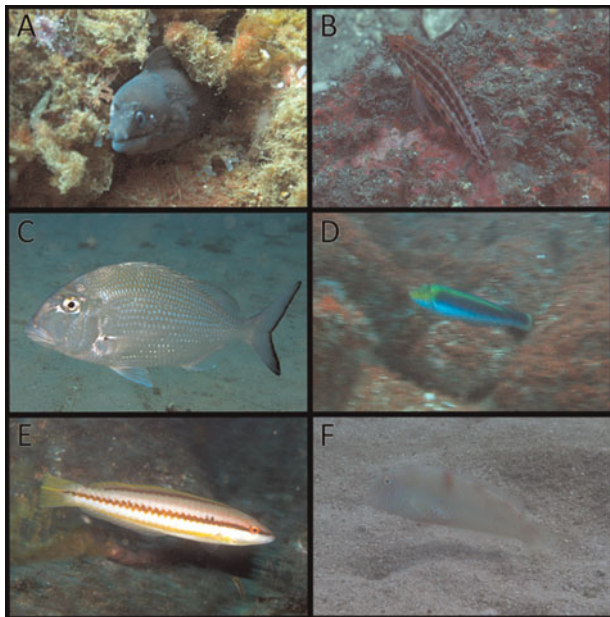
## SYSTEMATICS (Nelson, 2006)

Class ACTINOPTERYGII  
Subclass NEOPTERYGII  
Division TELEOSTEI  
Subdivision ELOPOMORPHA  
Order ANGUILLIFORMES  
Suborder MURAENOIDEI

## FAMILY MURAENIDAE

*Muraena retifera*—individual (Figure 2A) recorded at the approximate depth of 7 m, Moleques do Sul Archipelago, Santa Catarina, 2008.

Remarks: the individual recorded represents a south range extension. The southernmost occurrence of the reticulate eel



**Fig. 2.** Five new occurrences of reef fish species recorded at Santa Catarina State coast between 2006 and 2009 and the recently described *Halichoeres sazimai*. (A) *Muraena retifera*; (B) *Serranus baldwini*; (C) *Calamus penna*; (D) *Halichoeres dimidiatus*; (E) *H. sazimai*; (F) *Xyrichthys novacula*. Photographs were taken by D.R. Barneche (A, B), Banco de imagens da REBIOMar Arvoredo, M. Kammers (C, E), S.R. Floeter (D) and C.E.L. Ferreira (F).

was reported from the south-eastern coast of Brazil (Carvalho-Filho, 1999).

Subdivision EUTELEOSTEI  
Superorder ACANTHOPTERYGII  
Series PERCOMORPHA  
Order PERCIFORMES  
Suborder PERCOIDEI

## FAMILY SERRANIDAE

*Serranus baldwini*—individual (Figure 2B) recorded at the depth of 13 m, Moleques do Sul Archipelago, Santa Catarina, 2008.

Remarks: this report represents a south range extension. The lantern bass was recorded previously in Laje de Santos, São Paulo (Luiz Jr *et al.*, 2008).

## FAMILY SPARIDAE

*Calamus penna*—individual (Figure 2C) recorded at the approximate depth of 10–12 m, Arvoredo, Santa Catarina, 2009.

Remarks: this report represents a south range extension. The previous report of sheepshead porgy points to Tijucas Island, Rio de Janeiro, Brazil (IGFA, 2001).

## Suborder LABROIDEI

## FAMILY LABRIDAE

*Halichoeres dimidiatus*—individual (Figure 2D) recorded at the approximate depth of 7–8 m, Deserta, Santa Catarina, 2009.

Remarks: the observed individual was a terminal phase male, which indicates that it may be surviving in Santa Catarina waters for more than one year. This report represents a south range extension. The southernmost range of this species in Brazilian reefs is Laje de Santos, São Paulo (Luiz Jr *et al.*, 2008).

*Halichoeres sazimai*—individual (Figure 2E) recorded at the depth of 21 m, Deserta, Santa Catarina, 2008 and 2009.

Remarks: this species was recently described (Luiz Jr *et al.*, 2009) and it is known to occur only from depths over 20 m. Our observations at Deserta, Santa Catarina, agree with Luiz Jr *et al.* (2009) that this species is always observed below the thermocline at temperatures below 17–19°C. Previously recorded at Porto Belo (27°09'29.16"S 48°33'12.96"W), Santa Catarina coast as *Halichoeres bathyphilus* (Moura *et al.*, 1999). *Halichoeres sazimai* display both following and nuclear behaviours (Luiz Jr *et al.*, 2009), however, such interactions were not yet observed in Santa Catarina.

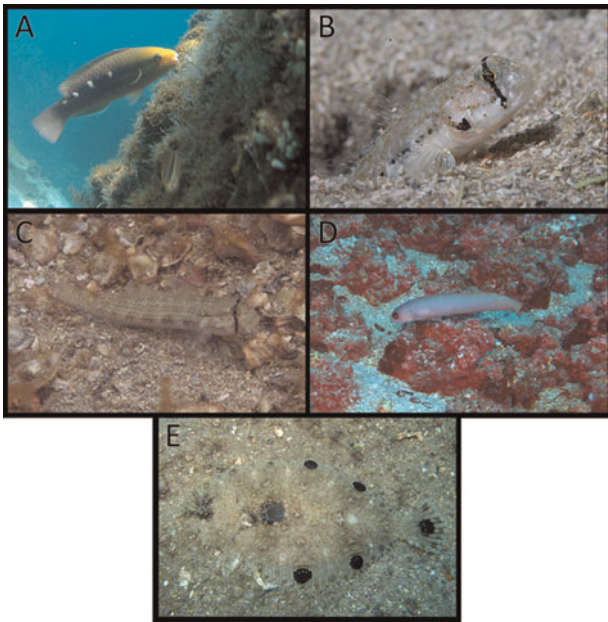
*Xyrichthys novacula*—individual (Figure 2F) recorded at the approximate depth of 10–12 m, Arvoredo, Santa Catarina, 2007.

Remarks: this report represents a south range extension. The southernmost range of this species in Brazilian reefs is the coast of São Paulo State (Carvalho-Filho, 1999).

## FAMILY SCARIDAE

*Scarus zelindae*—individual (Figure 3A) recorded at the approximate depth of 4–7 m, Deserta, Santa Catarina, 2009.

Remarks: the Zelinda's parrotfish is endemic to Brazil (Moura *et al.*, 2001). This report represents a south range extension. The southernmost range of the species in



**Fig. 3.** Five new occurrences of reef fish species recorded at Santa Catarina State coast between 2006 and 2009. (A) *Scarus zelindae*; (B) *Ctenogobius saepepallens*; (C) *Gnatholepis thompsoni*; (D) *Ptereleotris randalli*; (E) *Cyclosetta fimbriata*. Photographs were taken by S.R. Floeter (A), M. Krause (B), D.R. Barneche (C) and Banco de imagens da REBIOMar Arvoredo, M. Kammers (D, E).

Brazilian reefs is Laje de Santos, São Paulo (Luiz Jr *et al.*, 2008).

#### Suborder GOBIOIDEI

##### FAMILY GOBIIDAE

*Ctenogobius saepepallens*—individual (Figure 3B) recorded at the depth of 7 m, Ilha do Campeche and Arvoredo, Santa Catarina, 2008.

Remarks: this species was observed together with the bridled goby, *Coryphopterus glaucofraenum* Gill, 1863. This report represents a south range extension. The dash goby was recorded previously in Laje de Santos, São Paulo (Luiz Jr *et al.*, 2008).

*Gnatholepis thompsoni*—individual (Figure 3C) recorded between the depth of 9–11 m, Galés, Santa Catarina, 2009.

Remarks: this report represents a south range extension. It was previously recorded at Laje de Santos, São Paulo (Luiz Jr *et al.*, 2008). Inhabits open sand, rock, and rubble areas. It was observed together with the bridled goby, *C. glaucofraenum*, as described in the literature (Smith, 1997).

##### FAMILY PTERELEOTRIDAE

*Ptereleotris randalli*—individual (Figure 3D) recorded at the approximate depth of 13–15 m, Galés and Deserta Islands, Santa Catarina, 2009.

Remarks: this report represents a south range extension. This species was known to occur from the south-eastern Caribbean to Laje de Santos (south-eastern Brazil) (Gasparini *et al.*, 2001; Rocha, 2002; Luiz Jr *et al.*, 2008).

#### Order PLEURONECTIFORMES

##### Suborder PLEURONECTOIDEI

##### FAMILY PARALICHTHYIDAE

*Cyclosetta fimbriata*—individual (Figure 3E) recorded at the approximate depth of 10–12 m, Arvoredo, Santa Catarina, 2009.

Remarks: this report represents a south range extension of the spotfin flounder. The southernmost range of this species was recorded previously on the coast of São Paulo (Carvalho-Filho, 1999; Figueiredo & Menezes, 2000).

#### CONCLUSIONS

It seems that the Santa Catarina coast has a regular connectivity with the south-eastern and/or north-eastern coast of Brazil via Brazilian Current larval pools, as observations of tropical-affinity species are recurring. Long-term monitoring studies will allow a better understanding of connectivity patterns along the coast of Santa Catarina as well as the possible establishment of new populations at their southernmost limit of distribution.

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