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Article

The freshwater fishes from the Costa Verde Fluminense region of southeastern Brazil

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***Abstract**:* The region between the Brazilian Shield and the Atlantic Ocean is characterized by the presence of numerous hydrographic basins isolated by mountainous terrain that flow directly into the ocean without forming wide coastal plains. However, knowledge about the diversity and distribution of freshwater fish in several coastal areas is still incipient. One of these areas is the Costa Verde Fluminense region, situated between the municipalities of Mangaratiba and Paraty in the Brazilian State of Rio de Janeiro. In order to eliminate the gap of knowledge about the freshwater fish fauna of this region, we prepared a list of the species, and dichotomous identification keys and illustrations of all species. We examined material from expeditions carried out between 1942 and 2019, deposited in the Ichthyological Collection of the Museu Nacional, Universidade Federal do Rio de Janeiro, Brazil. The material comes from 29 continental coastal rivers and four drainages on Ilha Grande island. We recognized 54 fish species belonging to 16 families and 9 orders. The order Siluriformes was the most diverse with 18 species, followed by Characiformes with 14 species, Cyprinodontiformes with 10 species, Cichliformes with four species, Gobiiformes with three species, Syngnathiformes with two species, and Gymnotiformes, Salmoniformes and Synbranchiformes with one species each. These records include two putative undescribed species and four introduced species. *Phalloceros anisophallos* was the most widely distributed species, recorded in 24 drainages. More than a half (52 %) of the native species occur exclusively in coastal streams, demonstrating the importance of the area for biogeographic and conservation studies.
***Keywords:** Angra dos Reis; Mangaratiba; Paraty.*

Os peixes de água doce da região da Costa Verde Fluminense do sudeste do Brasil

Resumo: A região entre o Escudo Brasileiro e o Oceano Atlântico é caracterizada pela presença de inúmeras bacias hidrográficas isoladas por terrenos montanhosos que deságuam diretamente no oceano sem formar amplas planícies costeiras. No entanto, o conhecimento sobre a diversidade e distribuição de peixes de água doce em diversas áreas costeiras ainda é incipiente. Uma dessas áreas é a região da Costa Verde Fluminense, situada entre os municípios de Mangaratiba e Paraty no Estado do Rio de Janeiro. A fim de eliminar a lacuna de conhecimento sobre a ictiofauna de água doce desta região, elaboramos uma lista das espécies, chaves de identificação dicotômicas e ilustrações de todas as espécies. Examinamos material de expedições realizadas entre 1942 e 2019, depositado na Coleção Ictiológica do Museu Nacional da Universidade Federal do Rio de Janeiro, Brasil. O material é proveniente de 29 rios costeiros continentais e quatro drenagens da Ilha Grande. Reconhecemos 54 espécies de peixes pertencentes a 16 famílias e 9 ordens. A ordem Siluriformes foi a mais diversa com 18 espécies, seguida de Characiformes com 14 espécies, Cyprinodontiformes com 10 espécies, Cichliformes com quatro espécies, Gobiiformes com três espécies, Syngnathiformes com duas espécies e Gymnotiformes, Salmoniformes e Synbranchiformes com uma espécie cada. Esses registros incluem duas espécies presumidamente não descritas e quatro espécies introduzidas. *Phalloceros anisophallos* foi a espécie mais amplamente distribuída, registrada em 24 drenagens. Mais da metade (52 %) das espécies nativas ocorrem exclusivamente em córregos costeiros, demonstrando a importância da área para estudos biogeográficos e de conservação.
***Palavras-chave:** Angra dos Reis; Mangaratiba; Paraty.*

Introduction

The region between the Brazilian Shield and the Atlantic Ocean is characterized by the presence of numerous hydrographic basins isolated by mountainous terrain. These drainages flow directly into the ocean without forming wide coastal plains and harbor endemic fish populations (Buckup 2011). Most eastern Brazilian coastal basins are small and isolated drainages, characterized by relatively low fish diversity (when compared to the Paraná basin), and high level of endemism (Thomaz & Knowles 2018). One of these areas is the Costa Verde Fluminense region, situated between the municipalities of Mangaratiba and Paraty, which is home to one of the largest remnants of native Atlantic Forest in the Brazilian State of Rio de Janeiro. As for most eastern Brazilian coastal basins, the knowledge about the diversity and distribution of its freshwater fish fauna is still incipient.

The basins of the Costa Verde Fluminense are included in the Fluminense Ecoregion (FEOW352), limited to the north by the Paraíba do Sul (FEOW329) and to the south by Ribeira de Iguape (FEOW330) ecoregions (Abell et al. 2008). This ecoregion is occupied by one of the highest densities of urban occupation in the Atlantic Forest. Despite of the long history of human occupation of the Atlantic coast of Rio de Janeiro, the distribution of freshwater fishes is still poorly known. The first description of a fish species, *Characidium japuhybense*, from a locality situated in the Costa Verde region was published only in the middle of the 20th Century (Travassos 1949) based on material collected in the Japuíba basin, at Angra dos Reis, a few years earlier by George Myers, Paulo Miranda-Ribeiro and Haroldo Travassos. Additional species have been described in recent decades, totaling 11 species described from specimens collected in the Costa Verde region (Table 1), but no comprehensive study of fish composition is currently available (Guimarães et al. 2021).

Bizerril & Primo (2001) provided three lists of fish species from river drainages of Ilha Grande Bay, the largest area in the Costa Verde Fluminense region. Those lists are the most comprehensive ever published for Costa Verde Fluminense, but they are not associated with voucher specimens from museum collection. One of the lists was extracted from an unpublished master's thesis by H. São-Thiago, and included 22 marine and freshwater species from the Parati-Mirim River. The second list (based on "field data" and three unpublished contributions by C. Coutinho, E. Caramaschi, and H. São-Thiago compiled fish diversity from 22 coastal basins, including again the Parati-Mirim. The third list, based on personal communication by R. Mazzoni, presented 18 species of fish that occur in the drainages of the Ilha Grande island.

Here we present a compilation of fish species from the Costa Verde Fluminense region based on voucher specimens deposited in a permanent ichthyological collection. In addition to the list of voucher specimens collected from 33 river basins, we provide identification keys for all species.

Material and Methods

1. *Study area*

The study area comprises the Costa Verde Fluminense region (Figure 1), in the municipalities of Mangaratiba, Angra dos Reis and Paraty, in the Brazilian State of Rio de Janeiro, and São José do Barreiro and Bananal in the Brazilian State of São Paulo. This region includes both continental and insular drainages of the Ilha Grande and Sepetiba Bays, between the rio Itinguçu (22°54'44.16"S, 43°52'47.97"W) in the east and the western border of the State of Rio de Janeiro where it meets the ocean (23°22'06"S, 44°43'27"W). Additionally, we included the small drainages of the Ilha Grande, the largest island inside the Ilha Grande Bay. The continental rivers drain the coastal lowlands and the slopes of the Serra do Mar, locally known as Serra da Bocaina (Francisco & Oliveira 2009), while the headwaters of some of these rivers drain the main plateau of the Bocaina highlands. The sampled coastal rivers were numbered from east to west following the shoreline (Table 2).

2. *Specimens*

For the purpose of inclusion in our list, species were considered as freshwater according to Reis et al. (2003). The list is based on examination of specimens collected between 1942 and 2019 (Supplementary file 1), and deposited at the Ichthyological Collection of the Museu Nacional (MNRJ), Universidade Federal do Rio de Janeiro, Brazil, which harbors the largest collection of freshwater fishes from the Costa Verde Fluminense region. Literature records of species from the region are included in the list and discussed as deemed appropriate, but only when associated with material deposited in a museum collection.

3. *Species*

Specimens were identified to the lowest taxonomic level possible using available literature (e.g., Buckup et al. 2014; Costa 2009; Menezes

Table 1. Freshwater fishes with type-locality located in river drainages of the Costa Verde Fluminense, southeastern Brazil.

Original species	Valid name	Type-locality (Drainage)	Authorship
Rivulus lazzarotoi	*Atlantirivulus lazzarotoi*	Jurumirim	Costa 2007
Rivulus simplicis	*Atlantirivulus simplicis*	Perequê-Açu	Costa 2004
Characidium japuhybense	*Characidium japuhybense*	Japuíba	Travassos 1949
Hemipsilichthys nimius	*Hemipsilichthys nimius*	Perequê-Açu	Pereira, Reis, Souza & Lazzarotto 2003
Listrura costai	*Listrura costai*	Jurumirim	Villa-Verde, Lazzarotto & Lima 2012
Neoplecostomus paraty	*Neoplecostomus paraty*	Perequê-Açu	Cherobim, Lazzarotto & Langeani 2017
Phalloceros anisophallos	*Phalloceros anisophallos*	São Roque	Lucinda 2008
Phalloceros aspilos	*Phalloceros leptokeras*	Parati-Mirim	Lucinda 2008
Phalloceros enneaktinos	*Phalloceros enneaktinos*	Toca do Boi	Lucinda 2008
Callichthys barbatus	*Scleromystax barbatus*	Japuíba	Quoy & Gaimard 1824
Trichomycterus potschi	*Trichomycterus potschi*	Saco (Mangaratiba)	Barbosa & Costa 2003

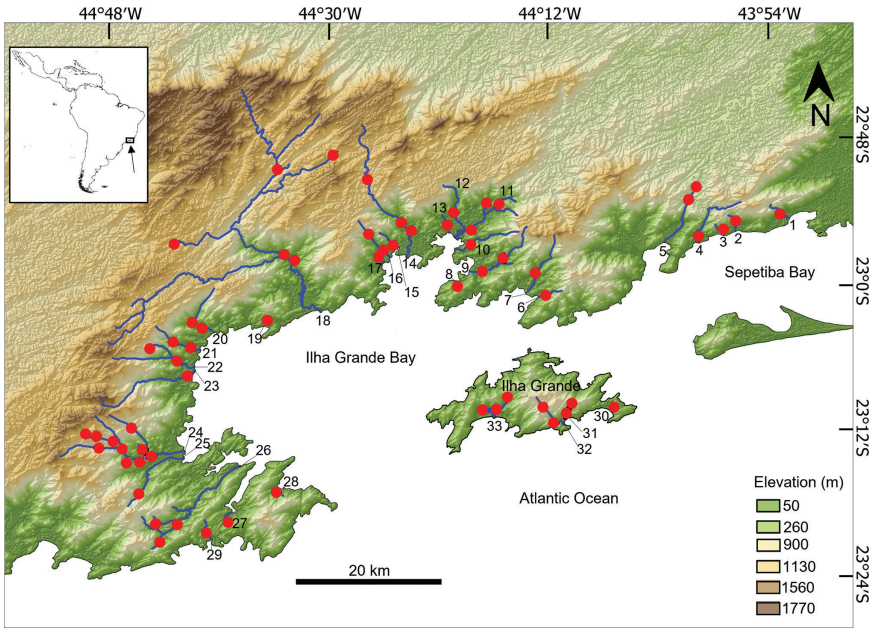

Figure 1. Sampled localities in the Costa Verde Fluminense (Rio de Janeiro) region. River drainages are numbered according to Table 2. Circles may represent more than one sample locality.

Table 2. River drainages sampled in the Costa Verde Fluminense region, numbered from east to west according to the position of their mouth (Figure 1) and coordinates of sampled localities. Drainages 30 to 33 are located on Ilha Grande island. Original geographic coordinates obtained with GPS at collection localities are provided, except for those indicated by an asterisk (*), which are estimated from topographic maps.

Number	River drainage	Latitude	Longitude
1	Itinguçu	22°54'23.7"S	43°53'22.3"W
2	Muriqui	22°55'01.2"S	43°57'10.9"W
3	Praia Grande	22°55'45.1"S	43°58'11.8"W*
4	Sahy	22°56'23.0"S	44°00'08.0"W
5	Saco (municipality of Mangaratiba)	22°52'58.0"S	44°00'44.0"W
		22°52'14.3"S	44°00'21.4"W
6	Monsuaba	23°00'40.6"S	44°12'40.8"W*
7	Jacuecanga	22°58'51.5"S	44°13'30.4"W*
8	Praia do Retiro	22°59'44.6"S	44°19'57.1"W*
9	Japuíba (=Japuhyba or Rio do Meio)	22°57'23.0"S	44°16'06.0"W
		22°57'24.0"S	44°16'07.0"W
		22°57'24.4"S	44°16'06.5"W
		22°57'54.8"S	44°16'07.1"W
		22°58'40.4"S	44°17'42.0"W
10	Caputera	22°56'29.0"S	44°18'41.0"W
		22°56'29.6"S	44°18'38.3"W
11	Jurumirim	22°53'14.0"S	44°17'18.0"W
		22°53'18.0"S	44°16'18.0"W
		22°53'09.0"S	44°16'31.0"W
		22°55'24.0"S	44°18'51.0"W
		22°55'24.0"S	44°18'37.0"W
12	Ariró	22°53'43.9"S	44°20'08.3"W*
13	Floresta	22°55'02.6"S	44°20'34.9"W*
14	Bracuí	22°51'03.0"S	44°27'03.0"W
		22°54'34.0"S	44°24'31.0"W
		22°55'13.6"S	44°23'41.3"W
		22°55'32.0"S	44°27'08.0"W
15	Saco (municipality of Angra dos Reis)	22°56'25.0"S	44°25'11.0"W
16	Grataú	22°56'52.1"S	44°25'57.1"W
17	Ambrósio	22°57'28.0"S	44°26'13.0"W
18	Mambucaba	22°49'00.0"S	44°30'00.0"W
		22°50'13.0"S	44°34'28.0"W
		22°56'00.0"S	44°43'00.0"W
		22°57'06.5"S	44°33'56.8"W
		22°57'24.8"S	44°33'18.7"W
		22°57'31.4"S	44°33'17.8"W
19	Praia Tarituba	23°02'36.6"S	44°35'37.9"W*
20	Taquari	23°02'29.0"S	44°41'38.0"W
		23°02'47.0"S	44°41'05.0"W
21	São Roque	23°04'33.0"S	44°45'06.0"W
		23°04'35.0"S	44°41'51.0"W
		23°04'04.0"S	44°43'14.0"W
22	Barra Grande	23°05'33.0"S	44°43'05.0"W
23	Pequeno	23°06'45.6"S	44°42'09.2"W*
24	Perequê-Açu	23°11'00.0"S	44°46'53.0"W
		23°11'26.0"S	44°50'30.0"W
		23°11'29.0"S	44°50'41.0"W
		23°11'52.0"S	44°49'49.0"W
		23°12'27.0"S	44°49'32.0"W
		23°12'30.0"S	44°49'45.0"W
		23°12'32.0"S	44°49'50.0"W
		23°12'33.0"S	44°47'38.0"W
		23°12'34.0"S	44°47'39.0"W
		23°12'35.0"S	44°47'39.0"W
		23°12'35.0"S	44°47'40.0"W
		23°12'44.0"S	44°46'09.0"W

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Number	River drainage	Latitude	Longitude
		23°12'44.0"S	44°47'30.0"W
		23°12'45.0"S	44°47'30.0"W
		23°12'45.0"S	44°47'31.0"W
		23°12'46.0"S	44°47'31.0"W
		23°12'48.0"S	44°45'44.0"W
		23°12'49.0"S	44°47'29.0"W
		23°12'51.0"S	44°47'48.0"W
		23°12'07.0"S	44°48'15.0"W
		23°13'04.0"S	44°45'47.9"W
		23°13'22.0"S	44°45'30.0"W
		23°13'23.0"S	44°45'14.0"W
		23°13'24.0"S	44°45'30.0"W
		23°13'26.0"S	44°45'35.0"W
		23°13'27.0"S	44°45'36.0"W
		23°13'03.0"S	44°45'47.0"W
		23°13'43.0"S	44°47'11.0"W
		23°13'44.0"S	44°47'12.0"W
		23°13'46.0"S	44°46'24.0"W
		23°13'46.0"S	44°46'25.0"W
25	Mateus Nunes	23°16'24.0"S	44°46'21.0"W
26	Parati-Mirim (=Paraty-Mirim)	23°19'00.0"S	44°45'00.0"W
		23°19'03.0"S	44°43'24.0"W
		23°20'27.0"S	44°44'48.0"W
27	Saco do Mamanguá	23°18'43.0"S	44°39'05.0"W
28	Praia Grande de Cajaíba	23°16'28.0"S	44°34'53.0"W
		23°16'30.0"S	44°34'52.0"W
29	Toca do Boi	23°19'44.0"S	44°40'52.0"W
		23°19'44.0"S	44°40'54.0"W
30	Lopes Mendes	23°10'13.0"S	44°07'25.0"W
31	Barra Pequena	23°10'01.0"S	44°10'59.0"W
		23°10'44.0"S	44°11'18.0"W
32	Andorinha	23°10'00.0"S	44°13'00.0"W
		23°11'12.0"S	44°12'02.0"W
		23°11'13.0"S	44°12'02.0"W
		23°05'23.0"S	44°06'44.0"W
33	Sistema Lagunar do Sul e do Leste	23°10'00.0"S	44°17'00.0"W
		23°10'00.0"S	44°18'00.0"W
		23°10'05.0"S	44°17'00.0"W
		23°09'00.0"S	44°16'00.0"W
		24°10'00.0"S	44°16'00.0"W

et al. 2007; Oyakawa et al. 2006) or by direct comparisons with type series or specimens identified by experts. DNA Barcoding methods (sensu Hebert et al. 2003a; Hebert et al. 2003b) were used for species confirmation of Characidae and *Trichomycterus* (data not shown). The taxonomic nomenclature follows Eschmeyer's Catalog of Fishes (Fricke et al. 2022). The species are listed following the order of the classification proposed by Nelson et al. (2016).

The identification keys are provided for the species that occur in the Costa Verde Fluminense region, including exotic species recorded to date. Exotic species are those with origins from any other continent. We first present a dichotomous key to identify fish orders. Orders that include a single family or single species, have their respective names given in parentheses. Separate keys are presented for families and genera which have more than one species present in the area.

The extinction risk of each species of fish was obtained from the Brazilian Red List and IUCN Red List of Threatened species (MMA 2014; MMA 2018; ICMBIO 2018; IUCN 2021). The distribution map of the examined material (Supplementary file 1) was generated with QGIS software (http://qgis.org) following Calegari et al. (2016), and using river traces obtained manually from Google Earth satellite images.

Results

The 13.692 examined fish specimens (857 lots) belong to 54 species, 16 families, 9 orders of freshwater fishes (Table 3). Siluriformes (Figure 2) was the most diverse order (18 species), followed by Characiformes

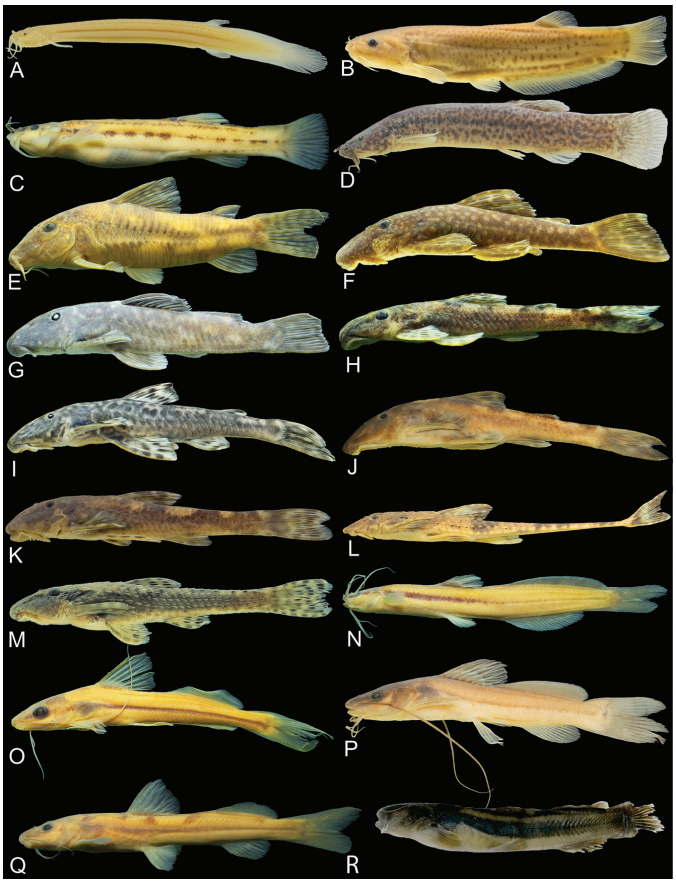

Figure 2. Species of Siluriformes from Costa Verde Fluminense region, southeastern, Brazil. A. *Listrura costai*, MNRJ 31917, 31.3 mm SL. B. *Trichogenes longipinnis*, MNRJ 11722, 62.3 mm SL. C. *Trichomycterus jacupiranga*, MNRJ 43846, 28.3 mm SL. D. *Trichomycterus potschi*, MNRJ 52215, 45.1 mm SL. E. *Scleromystax barbatus*, MNRJ 46672, 58.2 mm SL. F. *Ancistrus multispinis*, MNRJ 38081, 64.0 mm SL. G. *Hemipsilichthys nimius*, MNRJ 50595, 79.7 mm SL. H. *Kronichthys heylandi*, MNRJ 43848, 36.8 mm SL. I. *Neoplecostomus microps*, MNRJ 51835, 75.9 mm SL. J. *Neoplecostomus paraty*, MNRJ 41727, 50.9 mm SL. K. *Pareiorhina rudolphi*, MNRJ 24917, 46.0 mm SL. L. *Rineloricaria zawadzkii*, MNRJ 17185, 106.7 mm SL. M. *Schizolecis guentheri*, MNRJ 38080, 36.7 mm SL. N. *Acentronichthys leptos*, MNRJ 17182, 68.08 mm SL. O. *Pimelodella lateristriga*, MNRJ 46676, 54.1 mm SL. P. *Rhamdia quelen*, MNRJ 30539, 65.5 mm SL. Q. *Rhamdioglanis frenatus*, MNRJ 17184, 86.50 mm SL. R. *Taunayia bifasciata*, UFRN 5592, 74.9 mm SL.

Table 3. Freshwater fishes found in the Costa Verde Fluminense region. Drainages are numbered from east to west according to the position of their outlet into the sea (see Figure 1 and Table 2). One asterisk (*) indicates non-native species. Two asterisks (**) indicate record based solely on Medeiros et al. (2022).

Taxa	Drainages																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
CHARACIFORMES																																	
Crenuchidae																																	
Characidium grajahuense Travassos 1944					X																												
Characidium japuhybense Travassos 1949									X		X	X		X				X	X					X		X			X		X	X	
Characidium sp.																									X								
Erythrinidae																																	
Hoplias malabaricus (Bloch 1794)																	X								X								
Characidae																																	
Astyanax keronolepis Silva, Malabarba & Malabarba 2019									X	X	X	X	X	X			X	X					X			X							
Astyanax lacustris (Lütken 1875)														X																			
Bryconamericus ornaticeps Bizerril & Perez-Neto 1995							X				X			X				X						X		X						X	
Deuterodon hastatus (Myers 1928)	X																						X										
Deuterodon intermedius (Eigenmann 1908)					X									X																			
Deuterodon sp.																								X									
Hollandichthys multifasciatus (Eigenmann & Norris 1900)				X		X			X			X		X				X	X					X		X			X				
Mimagoniates microlepis (Steindachner 1877)	X								X	X	X	X		X								X		X									
Oligosarcus hepsetus (Cuvier 1829)										X								X															
Psalidodon scabripinnis (Jenyns 1842)																								X									
SILURIFORMES																																	
Trichomycteridae																																	
Listrura costai Villa-Verde, Lazzarotto & Lima 2012											X																						
Trichogenes longipinnis Britski & Ortega 1983																								X		X							
Trichomycterus jacupiranga Wosiacki & Oyakawa							X		X	X	X	X		X				X						X		X			X				
Trichomycterus potschi Barbosa & Costa 2003					X									X																			
Callichthyidae																																	
Scleromystax barbatus (Quoy & Gaimard 1824)									X	X	X	X		X				X															
Loricariidae																																	
Ancistrus multispinis (Regan 1912)									X		X	X		X				X						X									
Hemipsilichthys nimius Pereira, Reis, Souza & Lazzarotto 2003																								X									
Kronichthys heylandi (Boulenger 1900)							X		X		X	X		X				X						X	X	X							
Neoplecostomus microps (Steindachner 1877)					X																												
Neoplecostomus paraty Cherobim, Lazzarotto & Langeani 2017																								X	X								
Pareiorhina rudolphi (Miranda Ribeiro 1911)																								X									
Rineloricaria zawadzkii Silva, Costa e Silva, Oliveira 2022					X						X	X		X				X															
Schizolecis guentheri (Miranda Ribeiro 1918)					X		X		X	X	X	X		X	X			X			X		X	X	X		X			X			

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Taxa	Drainages																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Heptapteridae																																	
Acentronichthys leptos Eigenmann & Eigenmann 1889							X		X	X	X	X		X										X		X					X		
Pimelodella lateristriga (Lichtenstein 1823)									X	X	X	X		X			X	X						X									
Rhamdia quelen (Quoy & Gaimard 1824)					X				X		X	X		X		X	X	X						X		X							X
Rhamdioglanis frenatus Ihering 1907		X					X		X	X	X	X		X				X				X		X					X			X	
Taunayia bifasciata (Eigenmann & Norris 1900)**																		X															
GYMNOTIFORMES																																	
Gymnotidae																																	
Gymnotus pantherinus (Steindachner 1908)											X	X					X				X	X		X		X					X		
SALMONIFORMES																																	
Salmonidae																																	
Oncorhynchus mykiss (Walbaum 1792)*														X				X															
GOBIIFORMES																																	
Eleotridae																																	
Dormitator maculatus (Bloch 1792)				X													X						X									X	
Eleotris pisonis (Gmelin 1789)				X			X							X				X						X		X							X
Gobiidae																																	
Awaous tajasica (Lichtenstein 1822)	X		X				X		X	X	X	X		X		X		X			X			X		X		X					X
CICHLIFORMES																																	
Cichlidae																																	
Coptodon rendalli (Boulenger 1897)*																										X							
Crenicichla lepidota Heckel 1840	X																																
Geophagus brasiliensis (Quoy & Gaimard 1824)					X			X	X	X	X	X		X	X		X	X	X		X			X		X			X				
Oreochromis niloticus (Linnaeus 1758)*																										X							
CYPRINODONTIFORMES																																	
Rivulidae																																	
Atlantirivulus lazzarotoi (Costa 2007)									X																								
Atlantirivulus simplicis (Costa 2004)																											X						
Kryptolebias brasiliensis (Valenciennes 1821)		X		X																													
Kryptolebias ocellatus (Hensel 1868)		X																															
Poeciliidae																																	
Phalloceros anisophallos Lucinda 2008	X	X		X	X		X	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X					X	X	
Phalloceros enneaktinos Lucinda 2008																											X		X	X			
Phalloceros harpagos Lucinda 2008										X				X			X	X						X									
Phalloceros leptokeras Lucinda 2008		X			X				X																	X							
Poecilia reticulata Peters 1859*	X	X			X		X	X	X								X																
Poecilia vivipara Bloch & Schneider 1801		X		X				X	X								X	X				X				X					X	X	X
SYNBRANCHIFORMES																																	
Synbranchidae																																	
Synbranchus marmoratus Bloch 1795									X																								X
SYNGNATHIFORMES																																	
Syngnathidae																																	
Microphis lineatus (Kaup 1856)				X											X			X					X			X							X
Pseudophallus brasiliensis Dawson 1974														X	X																		

(Figure 3, 14 species), Cyprinodontiformes (Figure 4 and Figure 5, 10 species), Cichliformes (Figure 6, four species), Gobiiformes (Figure 6, three species), Syngnathiformes (Figure 6, two species), and Gymnotiformes, Salmoniformes and Synbranchiformes (Figure 6, one species each). The most diverse family was Characidae (10 species), followed by Loricariidae (eight species), Poeciliidae (six species), Heptapteriade (five species), Trichomycteridae, Cichlidae and Rivuliidae (four species each), Crenuchidae (three species), Eleotridae and Syngnathidae (two species each), and Callichthyidae, Erythrinidae, Gobiidae, Gymnotidae, Salmonidae and Synbranchidae (one species each). *Phalloceros anisophallos* Lucinda 2008 was the most common species in Costa Verde (found in 24 drainages), followed by *Awaous tajasica* (Lichtenstein 1822) and *Geophagus brasiliensis* (Quoy & Gaimard 1824) (found in 15 drainages), and by *Schizolecis guentheri* (Miranda Ribeiro 1918) (found in 14 drainages). Some species were found only in a single drainage: *Crenicichla lepidota* Heckel 1840 in the Itinguçu drainage; *Kryptolebias ocellatus* (Hensel 1868) in the Muriqui drainage; *Characidium grajahuense* Travassos 1944 and

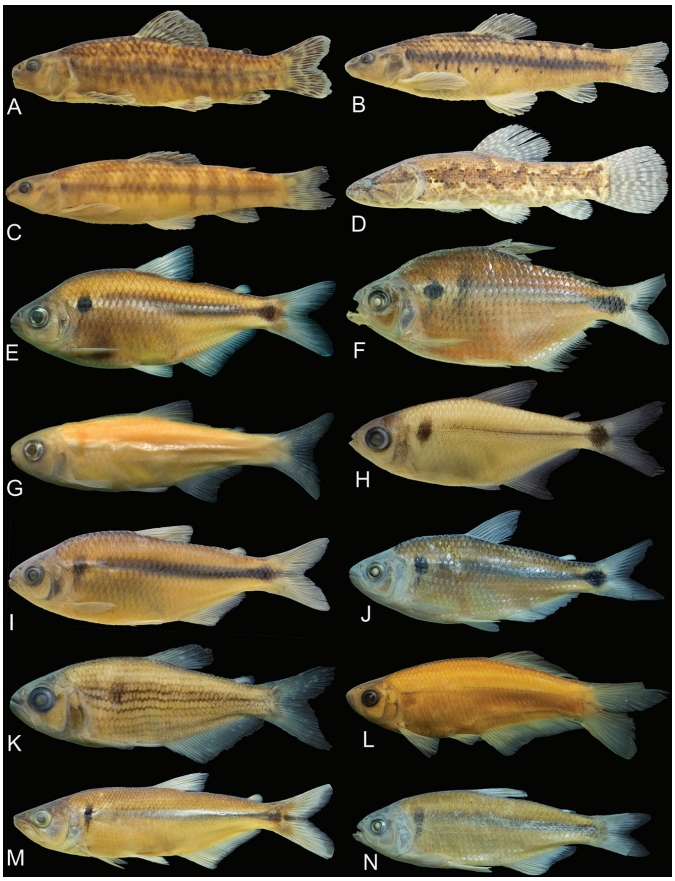

Figure 3. Species of Characiformes from Costa Verde Fluminense region, southeastern, Brazil. A. *Characidium grajahuense*, MNRJ 20866, 70.7 mm SL. B. *Characidium japuhybense*, MNRJ 43512, 58.6 mm SL. C. *Characidium* sp., MNRJ 15447, 57.8 mm SL. D. *Hoplias malabaricus*, MNRJ 43893, 120.7 mm SL E. *Astyanax keronolepis*, MNRJ 43492, 87.7 mm SL. F. *Astyanax lacustris*, MNRJ 52222, 68.30 mm SL. G. *Bryconamericus ornaticeps*, MNRJ 17181, 52.7 mm SL. H. *Deuterodon hastatus*, MNRJ 51734, 25.1 mm SL. I. *Deuterodon intermedius*, MNRJ 22795, 76.2 mm SL. J. *Deuterodon* sp., MNRJ 51718, 74.2 mm SL. K. *Hollandichthys multifasciatus*, MNRJ 43242, 46.2 mm SL. L. *Mimagoniates microlepis*, MNRJ 46673, 48.98 mm SL. M. *Oligosarcus hepsetus*, MNRJ 43495, 131.3 mm SL. N. *Psalidodon scabripinnis*, MNRJ 50607, 72.4 mm SL.

Figure 4. Females (left) and males (right) of species of Poeciliidae (Cyprinodontiformes) from Costa Verde Fluminense region, southeastern Brazil. A. *Phalloceros anisophallos*, MNRJ 43253, ♀ 34.8 mm SL, ♂ 26.0 mm SL. B. *Phalloceros enneaktinos*, MNRJ 43245, ♀ 24.9 mm SL, ♂ 22.9 mm SL. C. *Phalloceros harpagos*, MNRJ 43508, ♀ 36.2 mm SL, ♂ 19.5 mm SL. D. *Phalloceros leptokeras,* MNRJ 43505, ♀ 31.3 mm SL, MNRJ 4226, ♂ 21.2 mm SL. E. *Poecilia reticulata*, MNRJ 43892, ♀ 27.6 mm SL, ♂ 15.2 mm SL. F. *Poecilia vivipara*, MNRJ 43891, ♀ 45.1 mm SL, ♂ 31.2 mm SL.

Figure 5. Females (left), males (right), and hermaphrodite (center) of species of Rivulidae (Cyprinodontiformes) from Costa Verde Fluminense region, southeastern Brazil. A. *Atlantirivulus lazzarotoi*, MNRJ 5997, ♀ 30.2 mm SL, ♂ 35.2 mm SL. B. *Atlantirivulus simplicis*, MNRJ 20249, ♀ 12.5 mm SL, ♂ 19.8 mm SL. C. *Kryptolebias brasiliensis*, MNRJ 26460, ♀ 20.8 mm SL, ♂ 25.2 mm SL. D. *Kryptolebias ocellatus*, MNRJ 11397, hermaphrodite, 48.9 mm SL.

Neoplecostomus microps (Steindachner 1877) in the Saco drainage (in the municipality of Mangaratiba); *Atlantirivulus lazzarotoi* (Costa 2007) in the Japuíba drainage; *Listrura costai* Villa-Verde, Lazzarotto & Lima 2012 in the Jurumirim drainage; *Astyanax lacustris* (Lütken 1875) the Bracuí drainage; *Deuterodon* sp., *Psalidodon scabripinnis* (Jenyns 1842), *Hemipsilichthys nimius* Pereira, Reis, Souza & Lazzarotto 2003, and *Pareiorhina rudolphi* (Miranda Ribeiro 1911) in the Perequê-Açu drainage; *Characidium* sp., *Coptodon rendalli* (Boulenger 1897) and

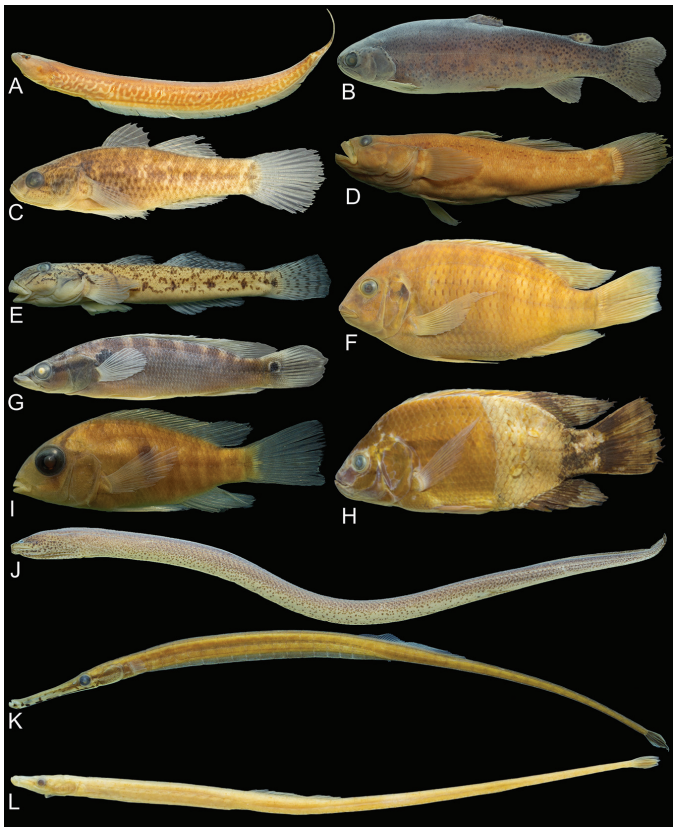

Figure 6. Fish species from Costa Verde Fluminense, southeastern Brazil. A. Gymnotiformes (*Gymnotus pantherinus*, MNRJ 28731, 88.5 mm SL). B. Salmoniformes (*Oncorhynchus mykiss*, MNRJ 22796, 181.8 mm SL). C. Gobiiformes (*Dormitator maculatus*, MNRJ 30631, 38.2 mm SL). D. Gobiiformes (*Eleotris pisonis*, MNRJ 22137, 99.02 mm SL). E. Gobiiformes (*Awaous tajasica*, MNRJ 43852, 79.6 mm SL). F. Cichliformes (*Coptodon rendalli*, MNRJ 11733, 159.1 mm SL). G. Cichliformes (*Crenicichla lepidota*, MNRJ 51738, 82.0 mm SL). H. Cichliformes (*Oreochromis niloticus*, MNRJ 11737, 157.5 mm SL). I. Cichliformes (*Geophagus brasiliensis*, MNRJ 46677, 31.8 mm SL). J. Synbranchiformes (*Synbranchus marmoratus*, MNRJ 30676, 219.0 mm SL). K. Syngnathiformes (*Microphis lineatus*, MNRJ 30930, 148.0 mm SL). L. Syngnathiformes (*Pseudophallus brasiliensis*, MNRJ 19178, 84.7 mm SL).

Oreochromis niloticus (Linnaeus 1758) in the Parati-Mirim drainage; and *Atlantirivulus simplicis* (Costa 2004) in Saco do Mamanguá drainage. Two possibly undescribed species were found (*Characidium* sp. and *Deuterodon* sp.). Four non-native species were recorded in the region: *Coptodon rendalli* (Boulenger 1897), *Oncorhynchus mykiss* (Walbaum 1792), *Oreochromis niloticus* (Linnaeus 1758), and *Poecilia reticulata* Peters 1859.

The ranking of species richness among the basins is as follows: Bracuí (25 species), Perequê-Açu (24 species), Mambucaba (23 species), Parati-Mirim (22 species), Japuíba (21 species), Jurumirim (19 species), Ariró (18 species), Caputera (13 species), Saco (Mangaratiba) and Ambrósio (11 species each), Jacuecanga (10 species), Sistema Lagunar do Sul e do Leste (eight species), Sahy, Muriqui, Andorinha and Toca do Boi (seven species each), Itinguçu and Pequeno (six species each), Saco (Angra dos Reis), São Roque and Barra Grande (five species each), Praia do Retiro (four species), Grataú, Praia Tarituba and Mateus Nunes (three species each), Saco do Mamanguá and Barra Pequena (two species each), and Praia Grande, Monsuaba, Floresta, Taquari, Praia Grande de Cajaíba and Lopes Mendes (one species each).

Identification keys

Identification Key to Orders

1. a. Dorsal fin absent 2
1. b. Dorsal fin present 3
2. a. Anal fin absent ..... SYNBRANCHIFORMES (Family Synbranchidae: *Synbranchus marmoratus*)
2. b. Anal fin present ..... GYMNOTIFORMES (Family Gymnotidae: *Gymnotus pantherinus*)
3. a. A single dorsal fin with rays 4
3. b. Two dorsal fins with rays ..... GOBIIFORMES
4. a. Sensory lateral line divided on the flank into two sections ..... CICHLIFORMES (Family Cichlidae)
4. b. Sensory lateral line continuous, without division 5
5. a. Pelvic fin absent ..... SYNGNATHIFORMES (Family Syngnathidae)
5. b. Pelvic fin present 6
6. a. Body covered with scales 7
6. b. Body covered by skin or bone plates ..... SILURIFORMES
7. a. Adipose fin usually present, except in *Hoplias malabaricus* 8
7. b. Adipose fin absent ..... CYPRINODONTIFORMES
8. a. Opercular membrane with 4-5 branchiostegal rays ..... CHARACIFORMES
8. b. Opercular membrane with more than 10 branchiostegal rays ..... SALMONIFORMES (Family Salmonidae: *Oncorhynchus mykiss*)

CHARACIFORMES

Identification Key to Families

1. a. Posterior margin of caudal fin rounded ..... Erythrinidae (*Hoplias malabaricus*)
1. b. Posterior margin of caudal fin emarginated or forked 2
2. a. Anal fin with less than 9 branched rays ..... Crenuchidae
2. b. Anal fin with more than 15 branched rays ..... Characidae

Family Characidae

Identification Key to Species

1. a. Dentary with unicuspid teeth ..... *Oligosarcus hepsetus*
1. b. Dentary with multicuspid teeth 2

 https://doi.org/10.1590/1676-0611-BN-2022-1422

2. a. Seven to nine longitudinal black lines on the flank. Maxilla with more than 10 teeth ..... *Hollandichthys multifasciatus*

2. b. Flank with one or no longitudinal black line. Maxilla with up to 9 teeth 3

3. a. Inner premaxillary dental series with 4 teeth 4

3. b. Inner premaxillary dental series with 5 teeth 5

4. a. Base of first dorsal-fin ray anterior to first anal-fin ray ..... *Bryconamericus ornaticeps*

4. b. Base of first dorsal-fin ray posterior to first anal-fin ray ..... *Mimagoniates microlepis*

5. a. Humeral spot horizontally oval, without ventral extension. Posthumeral spot present. Maxilla toothless ..... *Astyanax lacustris*

5. b. Humeral spot rounded, with ventral extension. Posthumeral spot absent. Maxilla with one or more teeth 6

6. a. No significant size difference in size between the fourth and fifth dentary teeth 7

6. b. Fifth dentary tooth conspicuously smaller than fourth tooth ..... *Psalidodon scabripinnis*

7. a. Dark spot at the posterior tip of the caudal peduncle with a rhombus shape ..... *Deuterodon hastatus*

7. b. Dark spot at the tip of the caudal peduncle with an oval shape or continuous with the dark longitudinal stripe on the flank 8

8. a. Spot on caudal peduncle continuous with the dark longitudinal stripe. Anterior half of longitudinal dark band with pigmentation similar to humeral spot ..... *Deuterodon intermedius*

8. b. Spot on the posterior region of the caudal peduncle conspicuously distinct from longitudinal stripe. Anterior half of longitudinal dark band less pigmented than humeral spot 9

9. a. Predorsal area tapered dorsally ..... *Astyanax keronolepis*

9. b. Predorsal area rounded ..... *Deuterodon* sp.

Family Crenuchidae

Identification Key to Species

1. a. Longitudinal maculae predominantly round darker ventral to the lateral longitudinal band ..... *Characidium japuhybense*

1. b. Absence of round longitudinal maculae ventral to the lateral longitudinal band 2

2. a. Three or four conspicuous vertical bars on flank posterior to dorsal fin. Dorsal fin with two conspicuous horizontal stripes. Postorbital region with a macula ..... *Characidium* sp.

2. b. More than four diffuse vertical bars in flank posterior to dorsal fin. Dorsal fin with variegated pigmented, with concentration of chromatophores in the rays. Postorbital region without macula ..... *Characidium grajahuense*

SILURIFORMES

Identification Key to Families

1. a. Body extensively covered with bony plates 2

1. b. Body skin devoid of bony plates 3

2. a. Two series of plates ..... Callichthyidae (*Scleromystax barbatus*)

2. b. Three or more series of plates ..... Loricariidae

3. a. Adipose fin present; odontodes absent ..... Heptapteridae

3. b. Adipose fin absent; patch of odontodes present in preopercle and opercle ..... Trichomycteridae

Family Heptapteridae

Identification Key to Species

1. a. Maxillary barbel is half the length of the head ..... *Taunayia bifasciata*

1. b. Maxillary barbel is longer than the length of the head 2

2. a. Adipose fin continuous with procurrent rays of caudal fin ..... *Acentronichthys leptos*

2. b. Adipose and caudal fins separated from each other 3

3. a. Dorsum with transverse dark bands. Maxillary barbel short, not extending beyond the tip of the pectoral fin ..... *Rhamdioglanis frenatus*

3. b. Dorsum without dark bands. Maxillary barbel long, extending beyond the tip of the pectoral fin 4

4. a. Supraoccipital process narrow and long, reaching predorsal plate. First ray of dorsal fin stiff and pointed ..... *Pimelodella lateristriga*

4. b. Supraoccipital process wide and triangular, not reaching predorsal plate. First ray of dorsal fin flexible ..... *Rhamdia quelen*

Family Loricariidae

Identification Key to Species

1. a. Adipose fin absent 2

1. b. Adipose fin present 3

2. a. Caudal peduncle dorsoventrally depressed, forming lateral keels ..... *Rineloricaria zawadzkii*

2. b. Caudal peduncle round in cross section 3

3. a. Teeth bicuspid. Pectoral girdle partly exposed ventrally, with visible odontodes near the pectoral-fin insertion ..... *Schizolecis guentheri*

3. b. Teeth unicuspid. Pectoral girdle not exposed ventrally, without odontodes near pectoral fin insertion ..... *Pareiorhina rudolphi*

4. a. Dorsal surface of snout without plates, with tentacles (in males). Interopercular spines evertible and hypertrophed ..... *Ancistrus multispinnis*

4. b. Dorsal surface of snout covered with plates. Absence of evertible interopercular spines 5

5. a. Teeth with symmetric cusps. Presence of preadipose keel ..... *Hemipsilichthys nimius*

5. b. Teeth with asymmetric cusps. Absence of preadipose keel 6

6. a. Odontodes of the first pelvic fin ray pointing medially. Area between pectoral and pelvic fins without plates..... *Kronichthys heylandi*

6. b. Odontodes of the first pelvic fin ray pointing distally. Area between pectoral and pelvic fins with plates..... 7

7. a. Light, horseshoe shaped area posterior to supraoccipital, with a central dark area, posterior to supraoccipital ..... *Neoplecostomus paraty*

7. b. Post supraoccipital region with pigmentation similar to the rest of the body ..... *Neoplecostomus microps*

Family Trichomycteridae

Identification Key to Species

1. a. First dorsal-fin ray posterior to first anal-fin ray ..... *Trichogenes longipinnis*

1. b. First dorsal-fin ray anterior to first anal-fin ray..... 2

2. a. Pectoral fin consisting of a single filamentous ray..... *Listrura costai*

2. b. Pectoral fin with more than 7 rays 3

3. a. Evenly variegated body color; conical jaw teeth ..... *Trichomycterus potschi*

3. b. Rectangular or rounded sequential dark maculae laterally in the midline of the body, sometimes fused and with a vermicular pattern; incisiform jaw teeth ..... *Trichomycterus jacupiranga*

GOBIIFORMES

Identification Key to Families

1. a. Six branchiostegal rays; separate pelvic fins..... Eleotridae

1. b. Five branchiostegal rays; pelvic fins completely united..... Gobiidae (*Awaous tajasica*)

Family Eleotridae

Identification Key to Species

1. a. Anteroventral portion of preopercle with spine ..... *Eleotris pisonis*

1. b. Preopercle without spine..... *Dormitator maculatus*

CICHLIFORMES (Family Cichlidae)

Identification Key to Species

1. a. Upper branch of the first gill arch with fleshy lobe..... *Geophagus brasiliensis*

1. b. Upper branch of the first gill arch without fleshy lobe 2

2. a. Presence of a humeral blotch ..... *Crenicichla lepidota*

2. b. Region above tip the pectoral fin without a blotch 3

3. a. First ceratobranchial with up to gill 12 rakers ..... *Coptodon rendalli*

3. b. First ceratobranchial with more than 20 gill rakers ..... *Oreochromis niloticus*

CYPRINODONTIFORMES

Identification Key to Families

1. a. Tip of dorsal fin not reaching the beginning of the caudal fin; males with anal-fin rays 3, 4 and 5 extended, forming a copulatory organ (gonopodium) ..... Poeciliidae

1. b. Tip of dorsal fin reaching the origin of the caudal fin; male anal fin not forming a gonopodium ..... Rivulidae

Family Rivulidae

Identification Key to Species

1. a. Males and females without a spot on the upper posterior margin of the caudal peduncle. Males with vertical bars on the caudal peduncle ..... *Kryptolebias brasiliensis*

1. b. Rounded spot on the upper margin of the caudal peduncle in females or hermaphrodites..... 2

2. a. Humeral spot present..... *Kryptolebias ocellatus*

2. b. Humeral spot absent..... 3

3. a. Origin of dorsal fin on vertical line through 11th or 12th anal fin-ray base; tip of pelvic fin not reaching anus in males ..... *Atlantirivulus lazzarotoi*

3. b. Origin of dorsal fin above base of 9th or 10th anal fin-ray; tip of fin reaching anus in males ..... *Atlantirivulis simplicis*

Family Poeciliidae

Identification Key to Species

1. a. Lateral spot located anterior to the first dorsal-fin ray in males and females ..... *Poecilia vivipara*

1. b. Lateral spot absent or located posterior to the first dorsal-fin ray 2

2. a. Males with ventral fleshy palp at the tip of ray 3 of the gonopodium. Females without fleshy process (urogenital papilla) between the anus and the first anal-fin ray ..... *Poecilia reticulata*

2. b. Males with a pair of ventral bone appendix at the tip of ray 3 of the gonopodium. Females with fleshy palp (urogenital papilla) between the anus and the first anal-fin ray..... 3

3. a. Urogenital papilla of females turned to the right. Males with asymmetrical gonopodium tip, left appendix of ray 3 with a hook and thinner than right appendix (hookless ..... *Phalloceros anisophallos*

3. b. Urogenital papilla of females turned to left or straight ventrally. Males with symmetrical gonopodium tip, both appendices of ray 3 with a hook..... 4

4. a. Urogenital papilla of females straight, pointing ventrally. In males, hook positioned in distal portion of both gonopodial appendix ..... *Phalloceros enneaktinos* + *P. harpagos*

4. b. Urogenital papilla of females turned to the left. In males, hook positioned in medial portion of both gonopodial appendices ..... *Phalloceros leptokeras*

SYNGNATHIFORMES (Family Syngnathidae)

Identification Key to Species

1. a. Anal fin present ..... *Microphis lineatus*

1. b. Anal fin absent..... *Pseudophallus brasiliensis*

Discussion

Although the Costa Verde Fluminense region is located between the two largest metropolitan areas (Rio de Janeiro and São Paulo) in Brazil, this study is the first comprehensive inventory of freshwater fishes of this region based on material deposited in a permanent collection. A previous broad ichthyological inventory of the region did not provide catalog numbers nor pictures of the material examined (Bizerril & Primo 2001), which limits identification and distribution discussions. Other publications provide reliable records, but focused on restricted taxa (Costa 2004; Medeiros et al. 2022; Souto-Santos et al. 2019) or restricted drainages (Guimarães et al. 2021).

Notable differences in species richness (number of species) were found among the drainages. Continental drainages of Ilha Grande Bay (drainages 6–28) are more diverse than those of Sepetiba Bay (drainages 1–5) and Ilha Grande island (drainages 30–33). The highest species richness was registered at Bracuí, Perequê-Açu, Parati-Mirim e Mambucaba, which are the basins with the largest area.

As expected for the Serra do Mar mountain range, several endemic coastal species were found. Eleven species have their type-locality within the study area (Table 1). Species of exclusively coastal distribution (52 %, excluding non native species from Table 3) along the Serra do Mar are *Characidium grajahuense, Characidium japuhybense, Characidium* sp., *Astyanax keronolepis, Deuterodon* sp., *Hollandichthys multifasciatus, Mimagoniates microlepis, Listrura costai, Trichogenes longipinnis, Trichomycterus potschi, Ancistrus multispinis, Hemipsilichthys nimius, Kronichthys heylandi, Neoplecostomus paraty, Acentronichthys leptos, Gymnotus pantherinus, Dormitator maculatus, Eleotris pisonis, Awaous tajasica, Atlantirivulus lazzarotoi, Atlantirivulus simplicis, Kryptolebias brasiliensis, Kryptolebias ocellatus, Phalloceros enneaktinos, Microphis lineatus*, and *Pseudophallus brasiliensis.* This coastal diversity demonstrates the importance of Serra do Mar as a biogeographical barrier for freshwater fishes.

Eleven species are listed in the Brazilian red list as "Critically Endangered" (*Characidium grajahuense*, *Listrura costai*, *Atlantirivulus lazzarotoi,* and *Kryptolebias brasiliensis*), as "Endangered" (*Atlantirivulus simplicis*), as "Near Threatened" (*Trichogenes longipinnis*, *Hemipsilichthys nimius*, *Pareiorhina rudolphi*, *Dormitator maculatus,* and *Kryptolebias ocellatus*), and as "Vulnerable" (*Taunayia bifasciata*) (ICMBIO, 2018). Unlike most species recorded in Costa Verde Fluminense streams, *T. bifasciata* does not occur in lowland streams. A call for conservation of highland areas of the Costa Verde region was made by Medeiros et al. (2022), but our results highlight the strong need for conservation actions in lowland areas where these species are found.

Specific identifications of characids in faunal surveys of Atlantic Forest fishes are often inaccurate (Oyakawa et al. 2006). Identifying these species became an even more challenging task after the understanding that there are no clear morphological characters that diagnose some genera (Terán et al. 2020).

Previous ecological studies listed *Bryconamericus microcephalus* in rivers of the Ilha Grande (e.g. Mazzoni & Silva 2006). More recently the species of *Bryconamericus* from the Perequê-Açu drainage was identified as *B. ornaticeps* (Guimarães et al. 2021). However, based on our evaluation of morphological and molecular data from drainages associated with type localities we identify the species of *Bryconamericus* from Costa Verde Fluminense as *B. ornaticeps* Bizerril & Perez-Neto (1995). DNA sequences of the COI mitochondrial gene of *Bryconamericus* from Costa Verde Fluminense clusters with topotypes of *B. ornaticeps*, and are not related to topotypes of *B. microcephalus* (Buckup et al., in prep).

Guimarães et al. (2021) provided a list of 23 species of freshwater fishes from the Perequê-Açu drainage. Our sampling from the Perequê-Açu revealed an additional species, *Characidium japuhybense*. Additionally, according to our reexamination of voucher specimens, their identifications of "*Deuterodon intermedius"* and "*D. hastatus"* correspond, respectively, to *Psalidodon scabripinnis* and an undescribed species of *Deuterodon* morphologically similar to *Astyanax keronolepis*. Based on DNA barcode sequences of samples MNRJ 50603 and MNRJ 50607, the former species is a member of Barcode Index Number (BIN) BOLD:AAC5910. According to data available in the Bold Systems database (https://www.boldsystems.org/index.php/Public_BINSearch), BIN BOLD:AAC5910 this BIN includes 456 specimens from an extensive area in southeastern South America. These specimens have been identified by over two dozen taxonomic names. Among those names, *Psalidodon bockmanni* (83 occurrences), *Psalidodon paranae* (62 occurrences), *Psalidodon rivularis* (42 occurrences); and *Psalidodon scabripinnis* (32 occurrences) are the most frequent ones. The majority of these identifications suggest that BOLD:AAC5910 corresponds to the so-called *P. scabripinnis* species complex. Here we use the name *P. scabripinnis* for this widespread species, following Limeira et al. (2022). The extensive geographic distribution of this species and future reexamination of type specimens may eventually require synonymizing several nominal species that are currently regarded as valid (e.g., *P. paranae, P. rivularis*).

The family Trichomycteridae harbors the greatest diversity of species among Siluriformes (Nelson et al. 2016). The genus *Trichomycterus* comprises approximately 170 valid species (Katz et al. 2018), and is the most complex taxon in the family due to its non-monophyletic status and confusing taxonomy (Reis & de Pinna 2022). Despite the great diversity of this genus, we recognized only two species in the Costa Verde Fluminense region: *Trichomycterus potschi*, and *Trichomycterus jacupiranga*. *Trichomycterus potschi* belongs to the *T. brasiliensis* species complex (Barbosa & Costa 2003), and was recorded only in its type-locality in the Saco (municipality of Mangaratiba, Table 1), and Bracuí drainages. The second species belongs to the *T. jacupiranga* species complex (Costa et al. 2022) and occurs along the entire Costa Verde Fluminense region (Table 3). This species is remarkable for its great intraspecific variation in pigmentation pattern.

The single specimen of *Crenicichla* examined from the Costa Verde region fits the redescription of *C. lepidota* provided by Kullander (1982). This record is noteworthy because the known distribution of the species extends from Guaporé River (Amazonas basin) to coastal drainages in the State of Rio Grande do Sul (Kullander 1982). The occurrence in coastal rivers of southeastern Brazil raises three possibilities: *Crenicichla lepidota* is (1) native from Costa Verde or (2) an introduced species, or (3) the new record represents an undescribed species very similar to *C. lepidota*. However, testing these hypotheses requires additional studies that are beyond the scope of the present contribution.

We provided identification keys for species, but, in the identification key for Poeciliidae, *Phalloceros enneaktinos* and *P. harpagos* are morphologically indistinguishable. Morphological characters originally used by Lucinda (2008) to distinguish *P. enneaktinos* from *P. harpagos* are variable, and there is overlap in the number of dorsal-fin rays of the two species. These species were recognized through DNA barcodes (Souto-Santos et al. 2019).

According to a model of coastal paleodrainages for southeastern Brazil (Thomaz et al. 2015; Thomaz & Knowles 2018), the freshwater drainages from Ilha Grande and Sepetiba Bays, including those of the main island (Ilha Grande), were interconnected by a single paleodrainage during the Last Glacial Maximum (26,000-19,000 years before present). Such interconnection would allow for the presence of conspecific populations of fishes in currently isolated drainages along the Costa Verde Fluminense region. A test of phylogeographic hypotheses in the region corroborated low genetic divergence in currently isolated populations of *Phalloceros leptokeras* (Souto-Santos et al. 2022). It is likely that phylogeographic analyzes including other widely distributed species in the region will find this same pattern.

In conclusion our study demonstrates that the rivers that drain the Costa Verde slope of the Serra do Mar have 54 species of freshwater fishes reliably registered, including four introduced species, 11 species under threat of extinction, and two probably undescribed species. This ichthyological inventory fills an important gap in the knowledge about fish communities of coastal streams of the Atlantic Forest of southeastern Brazil.

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Conflict of Interest

The authors declare they have no conflict of interest.

Data availability

Supporting data are available at <https://data.scielo.org/dataset.xhtml?persistentId=doi:10.48331/scielodata.1WHG2P>

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