

Fishes from affluents of Rio Branco, Municipality of Caracaraí, Roraima State, northern Brazil

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LOPEZ, G.G.S., CETRA, M., MATTOX, G.M.T. **Fishes from affluents of Rio Branco, Municipality of Caracaraí, Roraima State, northern Brazil.** Biota Neotropica 24(1): e20231533. <https://doi.org/10.1590/1676-0611-BN-2023-1533>

Abstract: The Amazon has the richest freshwater ichthyofauna of the planet, with tens of new species being described annually. Although studies on Amazonian fish in the literature are increasingly common recently, there are still significant gaps concerning primary data on the ichthyofauna. One such gap is the state of Roraima and its main drainage, Rio Branco. There is a single book published in 2007 on fishes of Rio Branco, and although it presents a rather complete list of over 580 species known until then, the information is now a little outdated and many species found in some of its affluents are not listed in the book. Due to the scarcity of published data on the fish diversity of Roraima and taking into account that ichthyofaunal surveys are important tools towards freshwater conservation, we carried out an inventory of the ichthyofauna in the region of Caracaraí (RR) in 18 sampling sites including seven affluents of both left and right margins of Rio Branco. We recorded a total of 64 species of 41 genera and 18 families of five orders that occur in the Neotropical region, representing more than 11% of the species previously registered in the book for the entire Rio Branco basin. Twelve species were added to the list presented in the book, with four representing first records for the basin, one of them a new record for Brazil. Two of the 64 species are putative new taxa in need of further taxonomic studies. The order with the highest diversity was Characiformes (40 species), with highlights for the family Characidae (24 of these species), followed by Cichliformes (11 species) and Siluriformes (9 species). The richest collecting sites had 23 species, and the least rich site had only two species. *Hyphessobrycon bentosi* and *Nannostomus marginatus* occurred in more than 60% of the sites. There has been a significant difference in the exclusive ichthyofauna from affluents of both margins of Rio Branco, with the number of exclusive species in left margin tributaries approximately five times higher. Results presented herein complement data from the literature regarding the still poorly known ichthyofauna from Roraima.

Keywords: Amazon; Guiana Shield; ichthyofauna.

Peixes de afluentes do Rio Branco, Município de Caracaraí, Estado de Roraima, norte do Brasil

Resumo: A Amazônia possui a mais rica ictiofauna de água doce do planeta, com dezenas de novas espécies sendo descrita anualmente. Apesar de estudos sobre os peixes amazônicos serem cada vez mais comuns na literatura, ainda existem lacunas importantes com relação aos dados primários da ictiofauna. Uma dessas lacunas é o estado de Roraima e sua principal bacia hidrográfica, o Rio Branco. Até hoje, há apenas um livro publicado em 2007 sobre os peixes do Rio Branco, e apesar de apresentar uma lista bastante completa com pouco mais de 580 espécies conhecidas até então, atualmente as informações estão um pouco desatualizadas e diversas espécies de peixes encontradas em alguns de seus afluentes não constam do livro. Devido a escassez de dados publicados sobre a diversidade de peixes de Roraima e levando em consideração que levantamentos de ictiofauna são ferramentas importantes para mensurar o potencial de conservação dos corpos d'água, nós fizemos um levantamento da ictiofauna da região de Caracaraí (RR) em 18 pontos incluindo sete afluentes das margens esquerda e direita do Rio Branco. Foram registradas ao todo 64 espécies de 41 gêneros e 18 famílias de peixes de cinco ordens que ocorrem na região Neotropical, representando pouco mais de 11% das espécies registradas no livro para toda a bacia do Rio Branco. Doze espécies foram adicionadas à lista apresentada no livro, sendo quatro registradas pela primeira vez neste estudo, uma delas registrada pela primeira vez no Brasil. Duas das 64 espécies representam possíveis espécies

ainda não descritas, necessitando de estudos taxonômicos mais aprofundados. A ordem com maior diversidade foi Characiformes (40 espécies), com destaque para a família Characidae (24 destas espécies), seguida de Cichliformes (11 espécies) e Siluriformes (9 espécies). Os pontos com maior riqueza apresentaram 23 espécies e o com menor riqueza apresentou apenas duas espécies. *Hyphessobrycon bentosi* e *Nannostomus marginatus* ocorreram em mais de 60% dos pontos. Houve diferença significativa na ictiofauna exclusiva entre os afluentes das duas margens do Rio Branco, com o número de espécies exclusivas da margem esquerda sendo aproximadamente cinco vezes maior. Os resultados apresentados aqui complementam os dados presentes na literatura a respeito da ainda pouco estudada ictiofauna de Roraima.

Palavras-chave: Amazônia; Escudo das Guianas; ictiofauna.

Introduction

The Actinopterygii comprises the largest group of vertebrates, with more than 36.000 valid species and many more currently being described (Fricke et al. 2022). The Amazon basin includes the largest freshwater ichthyofauna on the planet, with recent estimates of more than 3.000 species and dozens of others described annually (Van der Sleen & Albert 2018). This vast diversity is mostly included in four orders (Characiformes, Siluriformes, Cichliformes and Cyprinodontiformes) which together comprise more than 90% of the freshwater fish species in the Amazon (Van der Sleen & Albert 2018).

Although the Amazonian ichthyofauna has been studied for more than two centuries (Böhlke et al. 1978, Vanzolini, 1996; Ceriaco, 2021), many gaps still exist nowadays concerning primary information on certain regions and the distribution of many species (e.g., Albert & Reis 2011, Dagosta & de Pinna 2019). One such gap is the Rio Branco basin, Roraima State, Brazil. Until now, there is a single book published on its ichthyofauna (Ferreira et al. 2007) that presents a little more than 580 species for the entire basin, with approximately 150 of these species consolidated two years later (Vari & Ferraris Jr., 2009). Nevertheless, some species have been described in the past 16 years since its publication, and there are many species ranges that have been broadened, so the information presented by this seminal work is a little outdated.

Rio Branco is the main affluent of the Rio Negro and it crosses the State of Roraima from North to South through different environments such as eroded highlands, tropical forests and savannahs (Ferreira et al. 2007, Lemos et al. 2017). Its main tributaries are Rios Uraricoera and Tacutu which drain the Southwestern margin of the Guyana Shield between the Brazilian and Guyana borders. It is in the center of the Amazonas-Orinoco-Guyana (AOG) core, and it is included in the ecoregion 315 (Amazonas Guyana Shield) of Abell et al. (2008). Interestingly, although the Rio Branco directly empties into the Rio Negro, these two drainages have very distinct water features and the ichthyofauna of Rio Branco is more related to the Essequibo River in Guyana with which it shares many rivers captures and flood connections through the Rupununni Portal (Souza et al. 2012, Dagosta & de Pinna 2019).

Recently, one of us organized an expedition to the region of Caracará, Roraima, to sample miniature species. We brought back samples of most species caught in that expedition and present herein an inventory of the fish fauna aiming to complement the knowledge of the ichthyofauna of Rio Branco basin.

Material and Methods

1. Study area

Caracará is one of the largest municipalities of Roraima and the city of Caracará is situated approximately 200km South of the state capital Boa Vista. It is covered by tropical forest, campinarana (i.e., a vegetation ranging between forest and savannah that grows on white sand soils in the Amazon according to Anderson, 1981) and savannah ("cerrado" or "lavrado"), with wide ranges of land transformed into rice, soy, and cattle farms. Nevertheless, some of the Caracará territory is still protected by a mosaic of Federal Conservation Units (Ferreira et al. 2007). Along the water bodies, buriti palm groves (*Mauritia flexuosa* Mart.) were common, as well as vast flooded savannahs covered by water plants such as *Nymphaea* spp., *Montrichardia arborescens* (L.) Schott, 1854, piperaceans, among others.

2. Fish sampling

This study was the result of a single expedition to the municipality of Caracará conducted between December 11th–15th, 2019, during the dry season. All the collection were realized during daylight. Eighteen sampling sites representing seven tributaries of Rio Branco (Igarapé Água Viva, Igarapé das Pedras, Rio Ajarani, Rio Anauá, Rio Barauana, Rio Itã and Rio Viruá) were surveyed for small to middle-sized fishes using hand nets (Table 1, Figures 1 and 2). Twelve of the sampling sites were on the left side of the Rio Branco and six were on the right side. Fish caught were handled with care, put in buckets and trays and at least one specimen for most species promptly recognized in the field was photographed live in a photography tank using a Nikon D3100 camera and Mikkro Lenses (Figures 3, 4 and 5). Fish were then anesthetized using an overdose of eugenol (clove oil) and fixed in buffered formalin for 48 hours. After that period, fishes were rinsed in water and preserved in 70% alcohol. Tissue samples were also preserved in 100% alcohol. All fish and tissue samples are deposited in the Laboratório de Ictiologia de Sorocaba (LISO). The collecting permit was issued by Ministério do Meio Ambiente (MMA/SISBIO 45429-3). In the lab, fishes were sorted and identified to the lowest taxonomic level possible using the keys to families and genera in Van der Sleen & Albert (2018) with additional keys to species published in different journals coupled with photographs available in Ferreira et al. (2007). A simple comparison between the ichthyofauna of tributaries of left and right margins was done including two samples *t*-student test and rarefaction curves.

Table 1. Geographic information of sampling sites, all in the municipality of Caracarái, Roraima, northern Brazil. All references to roads (distance, side of the road) refers to the center of the municipality of Caracarái. Side refers to the side of Rio Branco (L = left; R = right).

Site	Locality	Micro-basin	Latitude	Longitude	Side
1	Rio Barauana	Rio Barauana	01°28'55.70" N	60°51'8.40" W	L
2	Igarapé Seco	Rio Barauana	01°29'0.22" N	60°49'38.00" W	L
3	Igarapé Tamandaré	Igarapé das Pedras	01°18'31.30" N	60°34'12.30" W	L
4	Flooded area next to Rio Dias	Igarapé das Pedras	01°16'43.20" N	60°30'47.80" W	L
5	Marginal lake, Igarapé Tamandaré	Igarapé das Pedras	01°18'28.40" N	60°34'10.50" W	L
6	Marginal lake, Igarapé Caleffi	Rio Itã	01°23'4.95" N	60°38'6.16" W	L
7	Flooded area with Buriti trees, left side of BR-174 road	Rio Viruá	01°39'0.47" N	60°03'19.80" W	L
8	Igarapé Água Viva	Igarapé Água Viva	01°57'0.70" N	61°14'7.13" W	R
9	Flooded area, left side of BR-210 road	Rio Ajarani	01°59'0.49" N	61°20'9.41" W	R
10	Flooded area, right side of BR-210 road	Rio Ajarani	01°57'9.28" N	61°17'2.26" W	R
11	Flooded igarapé, left side of BR-210 road	Rio Ajarani	01°56'7.43" N	61°14'5.25" W	R
12	Igarapé, left side of BR-210 road	Rio Ajarani	01°55'23.15" N	61°08'6.82" W	R
13	Igarapé, both sides of BR-210 road	Rio Ajarani	01°55'0.77" N	61°07'9.95" W	R
14	Igarapé Viruá	Rio Viruá	01°36'8.64" N	61°01'13.80" W	L
15	Igarapé under BR-174 road, km 333	Rio Viruá	01°35'20.40" N	61°00'17.90" W	L
16	Stream bordering right side of Perdida Road	Rio Anauá	01°25'25.20" N	60°59'15.60" W	L
17	Unnamed igarapé affluent of Rio Viruá	Rio Viruá	01°32'8.53" N	60°59'00.60" W	L
18	Igarapé under bridge, Nova Petrolina Village	Rio Viruá	01°33'52.70" N	60°59'6.68" W	L

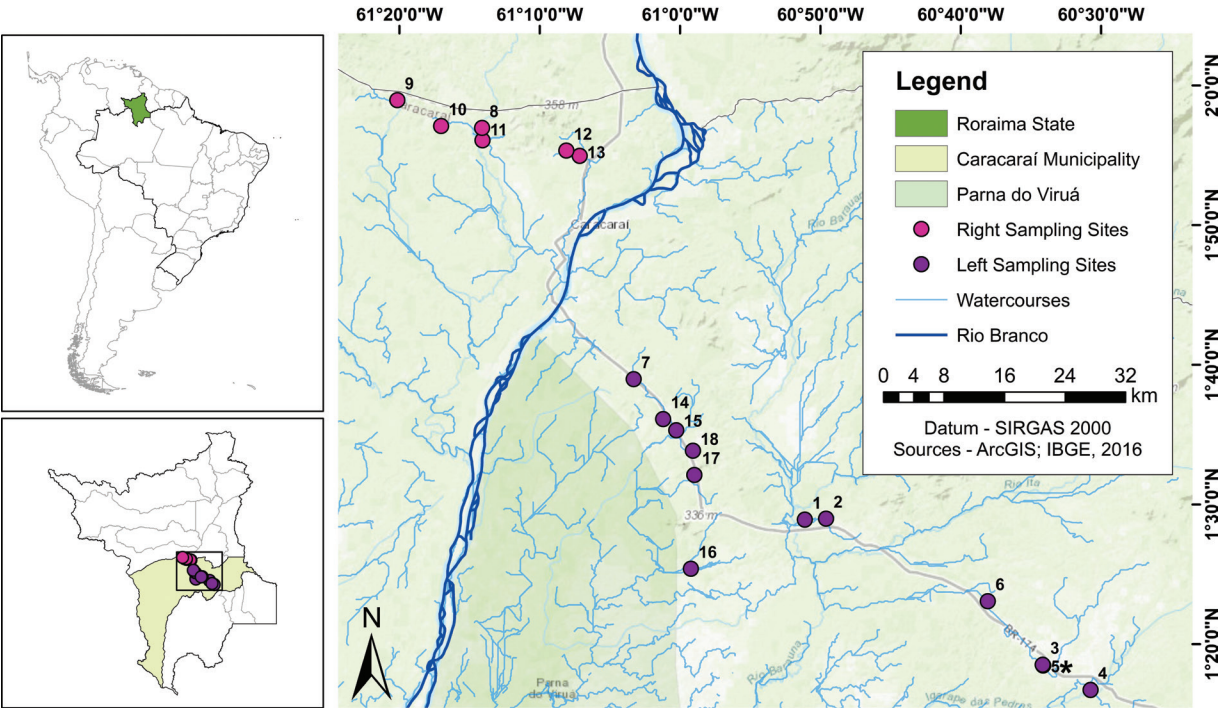


Figure 1. Map of the study area showing the location of the municipality of Caracarái, Roraima State, northern Brazil and sampling sites in the tributaries of Rio Branco. Twelve of the sampling sites were on the left side (purple dots) of the Rio Branco and six were on the right side (pink dots). *Two nearby sampling sites (Igarapé Tamandaré and marginal lake, Igarapé Tamandaré).

Results and Discussion

We sampled 1.055 specimens, representing 64 species belonging to 41 genera and 18 families of five orders usually found in Neotropical freshwater ecosystems (Table 2). The most diverse order was Characiformes (40 species), with 24 species in the Characidae and 5 in

the Lebiasinidae, followed by Cichliformes (11 species of cichlids) and Siluriformes (9 species, 4 of which in the Loricariidae) (Figure 6). Two species were common, occurring in more than 60% of the sampling sites: the characid *Hyphessobrycon bentosi* and the lebiasinid *Nannostomus marginatus*. Two other species were not as common but locally abundant: *Hemigrammus* aff. *rodwayi* and *Hyphessobrycon saizi*.



Figure 2. Photographs of sampling sites in the municipality of Caracarái, Roraima State, northern Brazil. A) Rio Barauana; B) Igarapé Seco; C) Igarapé Tamandaré; D) Flooded area with Buriti trees, left side of BR-174 road; E) Flooded area, left side of BR-210 road; F) Flooded area, right side of BR-210 road; G) Igarapé Viruá; H) Stream bordering right side of Perdida Road. Sites A-D and G-H belong to tributaries of the left margin of Rio Branco, and sites E-F belong to tributaries of the right margin of Rio Branco.

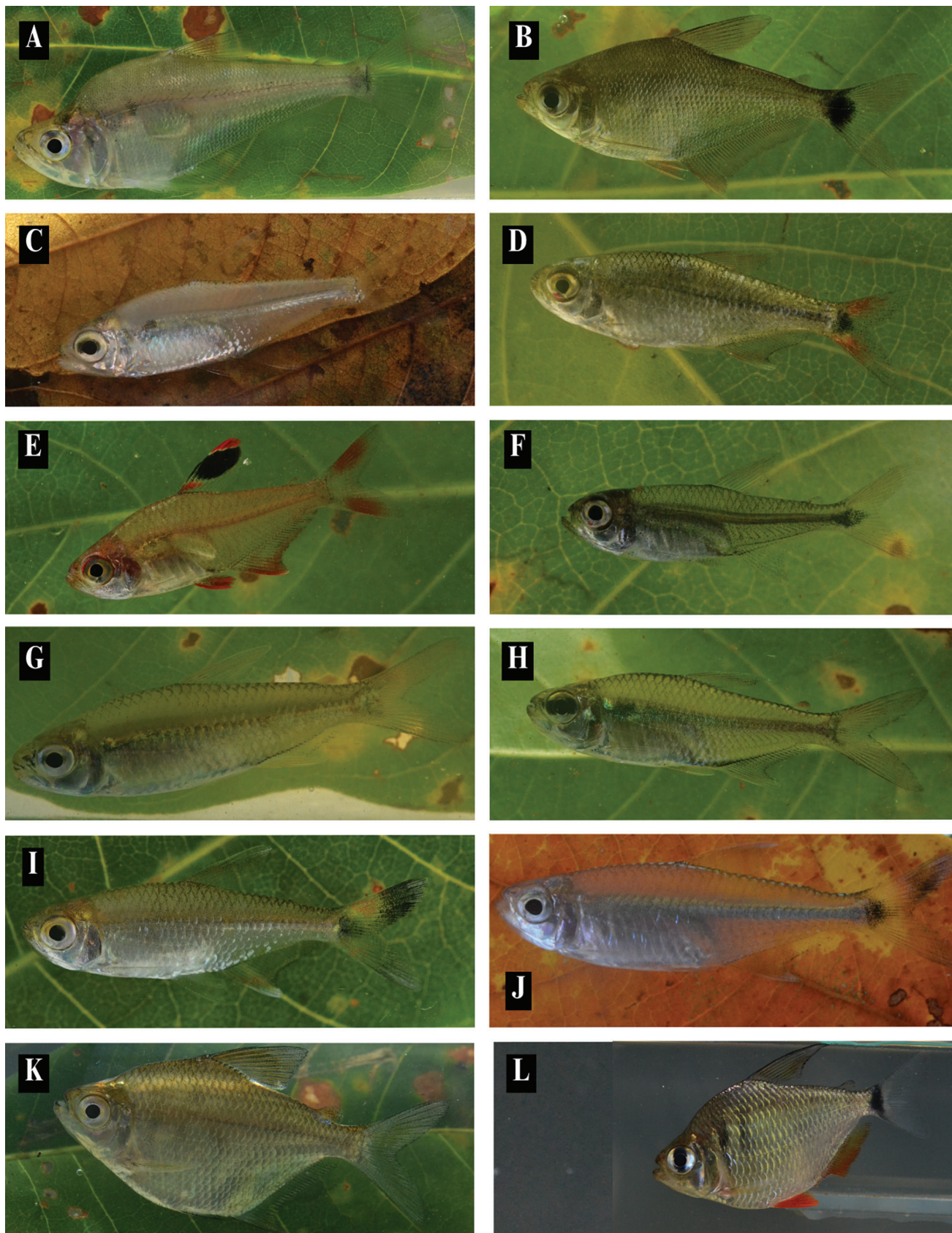


Figure 3. Photographs of some fish species from tributaries of Rio Branco in the municipality of Caracarai, Roraima State, northern Brazil. A) *Charax gibbosus* B) *Ctenobrycon hauxwellianus* C) *Hemigrammus microstomus* D) *Hemigrammus* aff. *rodwayi* E) *Hyphessobrycon bentosi* F) *Hyphessobrycon saizi* G) *Microschemobrycon melanotus* H) *Moenkhausia collettii* I) *Moenkhausia* aff. *dichrourea* J) *Moenkhausia lepidura* K) *Poptella brevispina* L) *Tetragonopterus argenteus*.

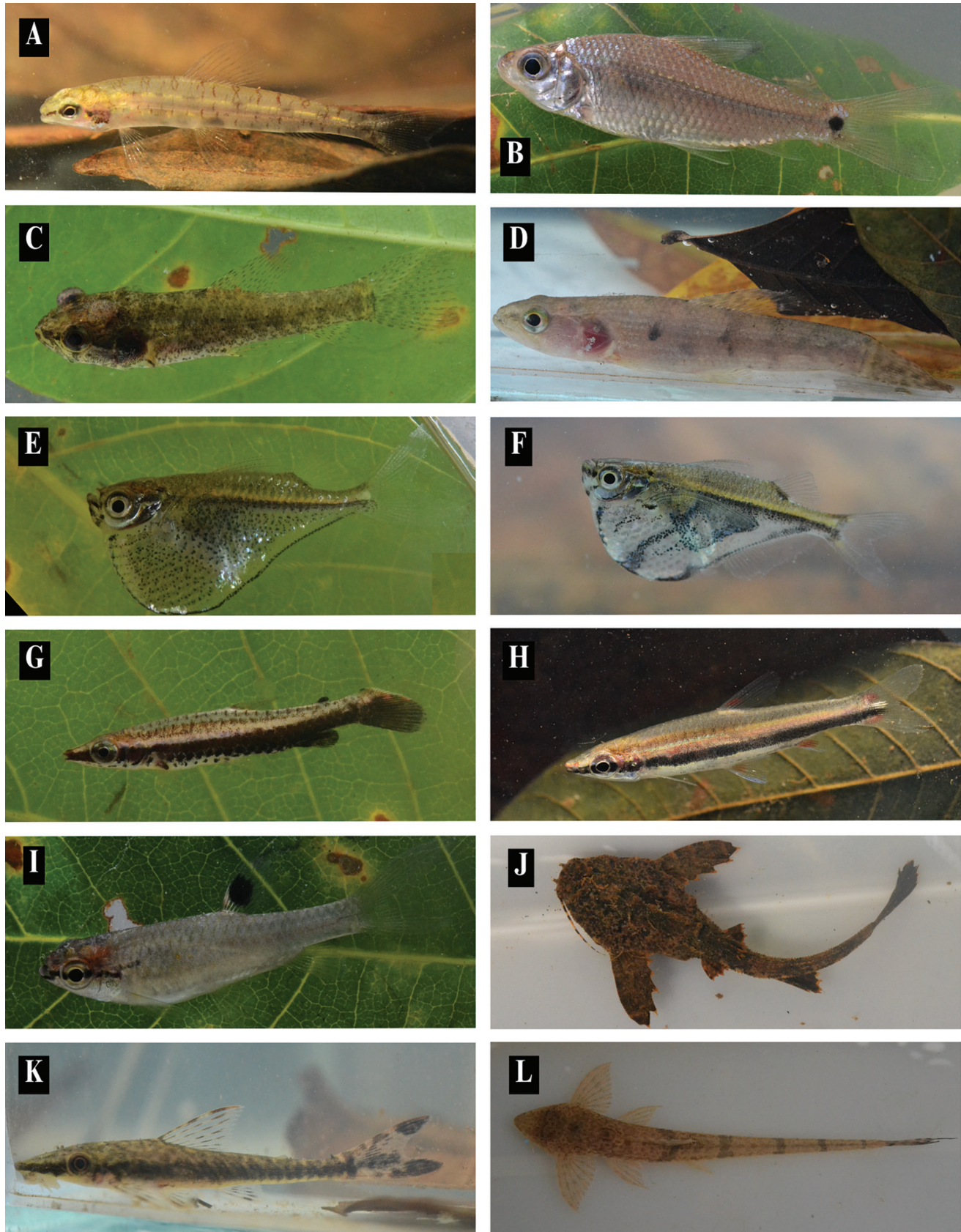


Figure 4. Photographs of some fish species from tributaries of Rio Branco in the municipality of Caracarái, Roraima State, northern Brazil. A) *Characidium pellucidum* B) *Cyphocharax spilurus* C) *Hoplias curupira* D) *Hoplias malabaricus* E) *Carnegiella marthae* F) *Carnegiella strigata* G) *Nannostomus eques* H) *Nannostomus unifasciatus* I) *Pyrrhulina brevis* J) *Bunocephalus verrucosus* K) *Hypoptopoma guianense* L) *Rineloricaria fallax*.

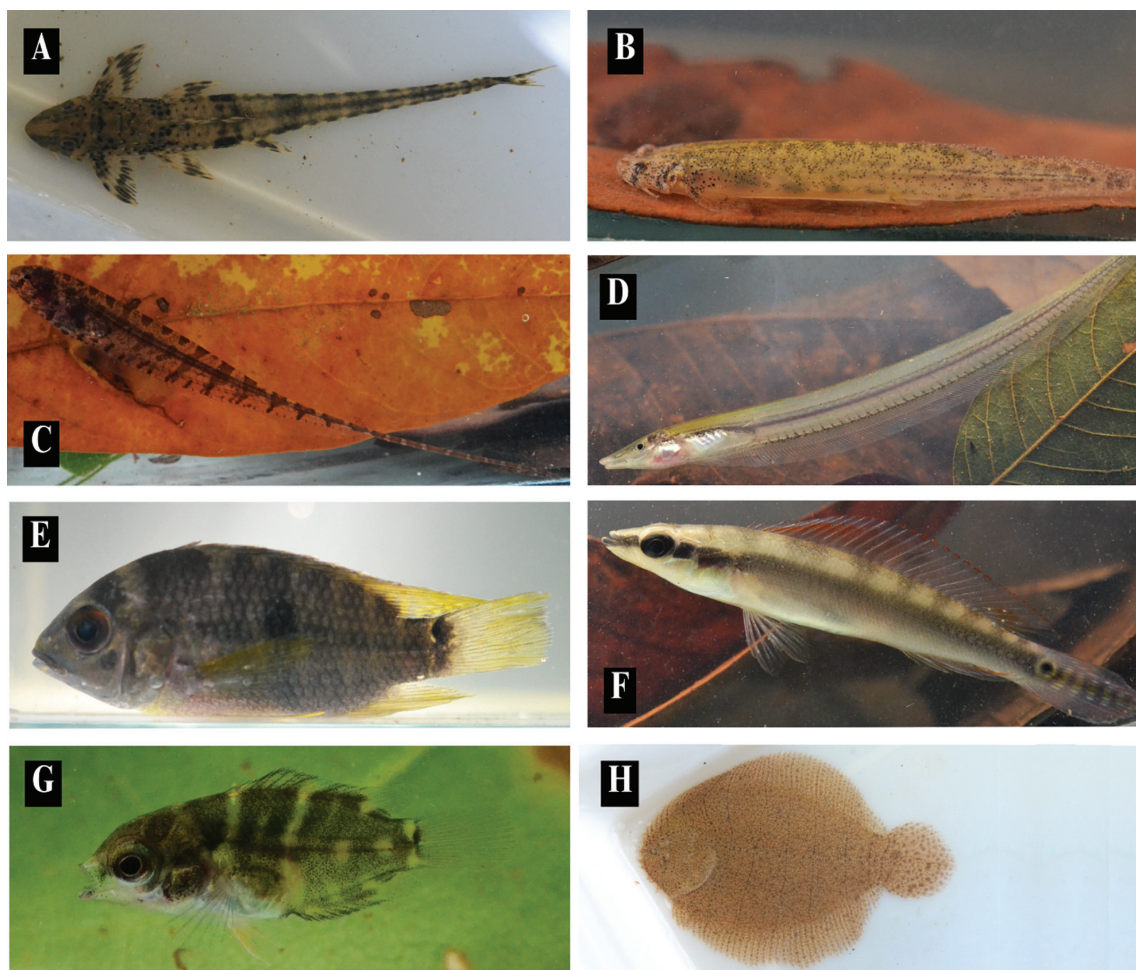


Figure 5. Photographs of some fish species from tributaries of Rio Branco in the municipality of Caracaraí, Roraima, northern Brazil. A) *Rineloricaria lanceolata* B) *Ochmacanthus alternus* C) *Hypopygus lepturus* D) *Gymnorhamphichthys rondoni* E) *Aequidens tetramerus* F) *Crenicichla* cf. *saxatilis* G) *Mesonauta insignis* H) *Hypoclinemus mentalis*.

Seventeen species were rare, each with a single specimen sampled. Two species were identified as miniature fish according to Toledo-Piza et al. (2014): *Hyphessobrycon saizi* and *Tyttobrycon xerui*.

In terms of spatial distribution, two sampling sites were the richest with 23 species each (Rio Barauana and Igarapé Tamandaré), one presented only three species (Igarapé Seco, with *Tetragonopterus argenteus*, *Metynnis hypsauchen* and *Aequidens tetramerus*), and one presented only two species (flooded area with Buriti trees, with *Hyphessobrycon saizi* and *Nannostomus marginatus*). Twenty-two species were found in affluents of both margins of Rio Branco, 36 were found exclusively in affluents of the left margin and 6 were sampled only in affluents of the right margin of Rio Branco. Although the sampling effort was twice on the left side (12 sites) than on the right side (6 sites), the average number of exclusive species found on the left side (5.1, SD = 4.8) was five times higher than on the right side (1.0, SD = 1.3). This may be due to the diversity of meso-habitats available for sampling on the left side of Rio Branco, with sampling sites generally more homogeneous on affluents of the right margin (Fig. 2E-F) than of the left margin (Fig. 2A-D, G-H), in addition to the fact that more micro-basins were sampled on the left side (Table 1). A two samples *t*-student test confirmed the significance of this difference ($F = 13.12$; $t_{0.05;16} = 2.12$).

Rarefaction sampling curves (Figure 7) demonstrate that our sampling effort is still far from reaching the estimated richness in the study area but comparing the rarefaction curves of the whole ichthyofauna (Figure 7A) with the one based on exclusive species only (Figure 7B) reveals a greater influence of species common to both sides of the Rio Branco in the right side ichthyofauna.

Species sampled herein represent a little more than 11% of the total number of species recorded for the entire Rio Branco basin by Ferreira et al. (2007). Still, we were able to sample twelve species that were not recorded by Ferreira et al. (2007), three of which were described concomitantly or after the publication of the book: *Apistogramma wapisana* (Römer et al. 2006), *Hoplias curupira* (Oyakawa & Mattox 2009) and *Potamoglanis wapixana* (Henschel 2016), and a fourth species, *Megalechis picta*, with a junior synonym described from the Rio Branco basin (Reis et al., 2005). Four species were not previously recorded in the Rio Branco basin (*Hemigrammus microstomus*, *Hemigrammus schmardae*, *Hyphessobrycon saizi* and *Serrapinnus micropterus*) despite three of them being widespread in the Amazonas and other basins according to Fricke et al. (2022). *Hyphessobrycon saizi*, whose distribution was restricted to the Orinoco River basin (Colombia) is recorded herein for the first time in Brazil.

Table 2. List of freshwater fish species in tributaries of Rio Branco in the municipality of Caracará, Roraima, northern Brazil. Orders organized systematically; lower categories organized alphabetically within each order. Classification follows Fricke et al. (2022). Occurrence refers to which margin of Rio Branco the species was recorded in the present study (B = both, L = left, R = right). NR = New record [Ferreira et al. (2007), Fricke et al. (2022)]. LISO = voucher specimens deposited in the collection of Laboratório de Ictiologia de Sorocaba, Universidade Federal de São Carlos (UFSCar).

Taxon	Occurrence	NR	LISO
CHARACIFORMES			
Acestrorhynchidae			
<i>Acestrorhynchus microlepis</i> (Jardine 1841)	R		503
<i>Gnathocharax steindachneri</i> Fowler 1913	B		494
Characidae			
<i>Charax gibbosus</i> (Linnaeus 1758)	L		513
<i>Ctenobrycon hauxwellianus</i> (Cope 1870)	B		497
<i>Hemigrammus analis</i> Durbin 1909	L		464
<i>Hemigrammus bellottii</i> (Steindachner 1882)	R		465
<i>Hemigrammus aff. lunatus</i> Durbin 1918	R		460
<i>Hemigrammus microstomus</i> Durbin 1918	B	X	466
<i>Hemigrammus ocellifer</i> (Steindachner 1882)	L		526
<i>Hemigrammus aff. rodwayi</i>	B		522
<i>Hemigrammus schmardae</i> (Steindachner 1882)	L	X	527
<i>Hemigrammus vorderwinkleri</i> Géry 1963	B		523
<i>Hyphessobrycon bentosi</i> Durbin 1908	B		488
<i>Hyphessobrycon saizi</i> Géry 1964	B	X	467
<i>Makunaima guianensis</i> (Eigenmann 1909)	B		499
<i>Microschemobrycon melanotus</i> (Eigenmann 1912)	R		469
<i>Moenkhausia collettii</i> (Steindachner 1882)	B		528
<i>Moenkhausia aff. dichrourea</i>	L		529
<i>Moenkhausia grandisquamis</i> (Müller & Troschel 1845)	L		530
<i>Moenkhausia hemigrammoides</i> Géry 1965	B		531
<i>Moenkhausia lepidura</i> (Kner 1858)	L		463
<i>Phenacogaster microsticta</i> Eigenmann 1909	L		489
<i>Poptella brevispina</i> Reis 1989	L		500
<i>Serrapinnus micropterus</i> (Eigenmann 1907)	B	X	490
<i>Tetragonopterus argenteus</i> Cuvier 1816	L		507
<i>Tyttobrycon xerui</i> Géry 1973	R		524
Crenuchidae			
<i>Characidium pellucidum</i> Eigenmann 1909	L		495
Curimatidae			
<i>Curimatopsis cryptica</i> Vari 1982	L		487
<i>Cyphocharax spilurus</i> (Günther 1864)	L		493
Erythrinidae			
<i>Hoplias curupira</i> Oyakawa & Mattox 2009	B		659
<i>Hoplias malabaricus</i> (Bloch 1794)	B		643
Gasteropelecidae			
<i>Carnegiella marthae</i> Myers 1927	R		646
<i>Carnegiella strigata</i> (Günther 1864)	B		642
Lebiasinidae			
<i>Nannostomus digrammus</i> (Fowler 1913)	L		611
<i>Nannostomus eques</i> Steindachner 1876	B		621
<i>Nannostomus marginatus</i> Eigenmann 1909	B		606
<i>Nannostomus unifasciatus</i> Steindachner 1876	B		615
<i>Pyrrhulina brevis</i> Steindachner 1876	B		675
Serrasalminae			
<i>Metynnis hypsauchen</i> (Müller & Troschel 1844)	L		532
<i>Serrasalmus elongatus</i> Kner 1858	L		511

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Taxon	Occurrence	NR	LISO
SILURIFORMES			
Aspredinidae			
<i>Bunocephalus verrucosus</i> (Walbaum 1792)	L		635
Callichthyidae			
<i>Megalechis picta</i> (Müller & Troschel 1849)	L		609
Loricariidae			
<i>Farlowella amazonum</i> (Günther 1864)	L		610
<i>Hypoptopoma guianense</i> Boeseman 1974	L		639
<i>Rineloricaria fallax</i> (Steindachner 1915)	L		618
<i>Rineloricaria lanceolata</i> (Günther 1868)	L		673
Pseudopimelodidae			
<i>Microglanis poecilus</i> Eigenmann 1912	L		645
Trichomycteridae			
<i>Ochmacanthus alternus</i> Myers 1927	L		652
<i>Potamoglanis wapixana</i> (Henschel 2016)	L		492
GYMNOTIFORMES			
Hypopomidae			
<i>Hypopygus lepturus</i> Hoedeman 1962	L		622
Rhamphichthyidae			
<i>Gymnorhamphichthys rondoni</i> (Miranda Ribeiro 1920)	L		690
Sternopygidae			
<i>Eigenmannia trilineata</i> López & Castello 1966	L		619
CICHLIFORMES			
Cichlidae			
<i>Acaronia nassa</i> (Heckel 1840)	L		624
<i>Aequidens tetramerus</i> (Heckel 1840)	L		638
<i>Apistogramma pulchra</i> Kullander 1980	L		630
<i>Apistogramma regani</i> Kullander 1980	L		687
<i>Apistogramma steindachneri</i> (Regan 1908)	B		656
<i>Apistogramma wapisana</i> Römer, Hahn & Conrad 2006	B		657
<i>Crenicichla alta</i> Eigenmann 1912	L		629
<i>Crenicichla</i> cf. <i>saxatilis</i>	L		486
<i>Mesonauta insignis</i> (Heckel 1840)	B		626
<i>Satanoperca jurupari</i> (Heckel 1840)	B		461
<i>Satanoperca lilith</i> Kullander & Ferreira 1988	R		462
PLEURONECTIFORMES			
Achiridae			
<i>Hypoclinemus mentalis</i> (Günther 1862)	L		672

Two putatively undescribed species (listed with the suffix “aff.”) were sampled. The first putative new species (*Hemigrammus* aff. *lunatus*) is very similar to *Hemigrammus lunatus* but differs from it by the lack of a broad dark longitudinal midlateral stripe across eye and of two humeral blotches typical of the species (Ota et al. 2014). Another putative underscribed species sampled herein, *Hemigrammus* aff. *rodwayi*, a species that resembles *H. rodwayi* but differs from it in the colour patten (specimens sampled here have a smaller caudal peduncle blotch and a more conspicuous lateral stripe than *H. rodwayi*). Whether these two species are indeed new depends on further and broader studies beyond the scope of this paper.

This ichthyofauna inventory resulted in the identification of 64 species while the work by Ferreira et al. (2007) presented a list of 584 fish species for the whole Rio Branco basin. This numerical difference can

be explained by the sampling effort applied in each of the projects. Ferreira et al. (2007) carried out three collection expeditions between November 2004 and November 2005 sampling different stretches of the Rio Branco with the aim of collecting species from different ecological niches. In contrast, the present study was the result of a single 5-day expedition to the municipality of Caracará, which had as its main objective the collection of specimens of the genus *Priocharax*, having, therefore, a focus on the collection of small-sized fishes in a restricted part of the basin. Nevertheless, two putatively undescribed species and four new occurrence records were identified, demonstrating the importance of the present study.

The increase in the deforested area for agricultural production and the growth of mining activities in the Caracará region cause silting of rivers, destruction of important areas for fish reproduction, change in the flooding patterns and pollution of river water, directly

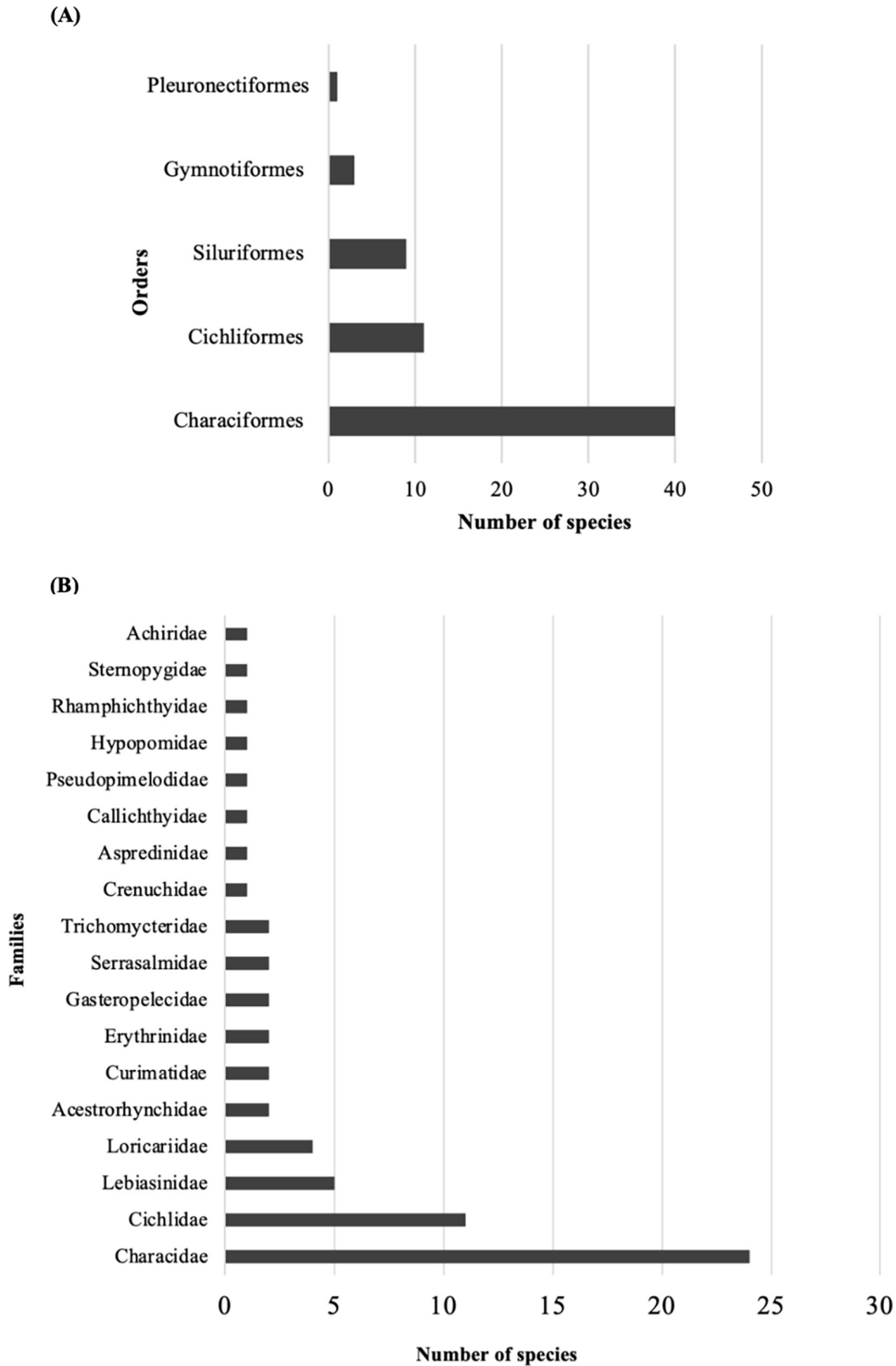


Figure 6. Distribution of number of fish species by orders (A) and families (B) in tributaries of Rio Branco in the municipality of Caracará, Roraima State, northern Brazil.

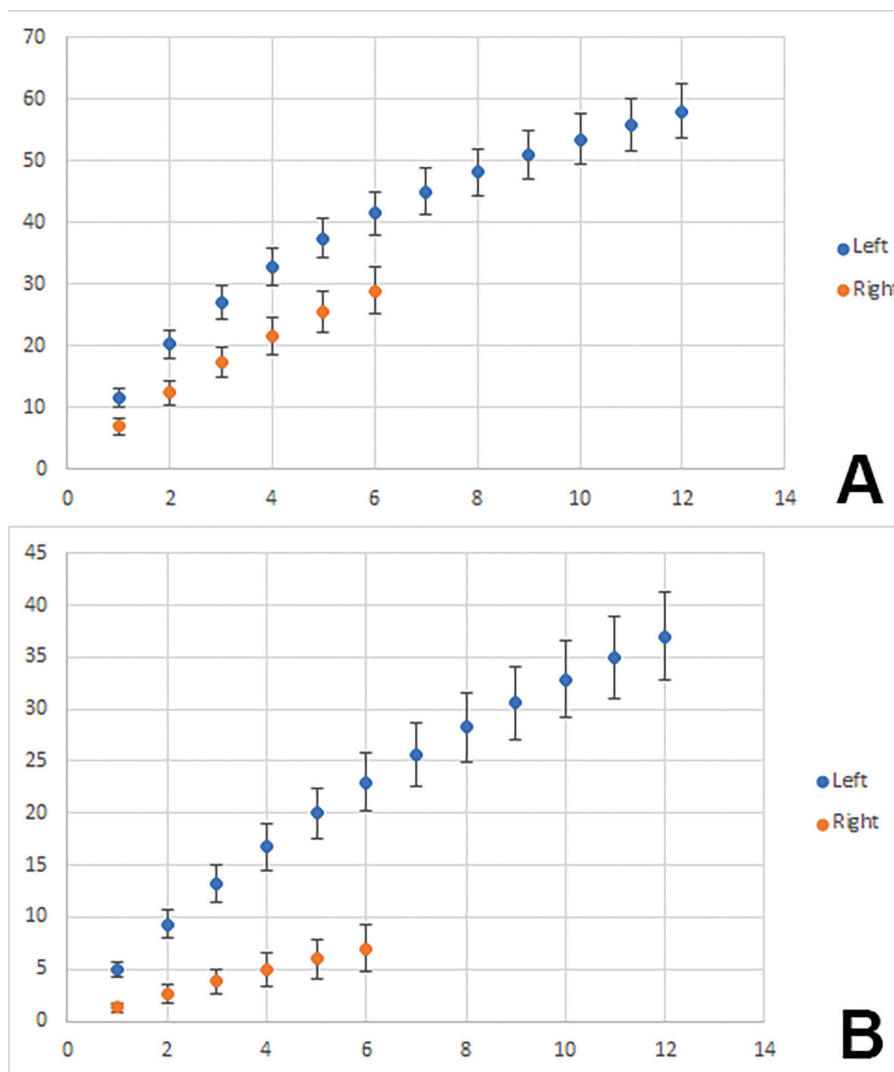


Figure 7. Sample size-based richness rarefaction sampling curves for affluents in the left (blue dots) and right (orange dots) margins of Rio Branco, Caracarái municipality, Roraima State, northern Brazil with (A) all sampled species included and (B) only exclusive species included, and confidence intervals.

impacting the ichthyofauna of the Rio Branco (Ferreira et al. 2007). The data presented herein can be used in future research projects and conservation initiatives in the region.

Acknowledgments

This study was developed in the facilities of Departamento de Biologia (UFSCar Sorocaba). The fieldtrip was part of a project funded by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP 2017/01970-4) to GMTM, which also provided equipment used in species identification. GGSL received a Scientific Initiation grant provided by Programa Institucional de Bolsas de Iniciação Científica (PIBIC), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq 51272/2021-2). Silas Cândido Príncipe de Souza (UFSCar) provided invaluable help during the field works, and Prof. Dr. Carlos Eduardo Freitas Lemos (UFRR) kindly provided formalin and alcohol, and other infrastructure for the fieldtrip. Flávio C. T. Lima (UNICAMP) helped to identify or confirmed the identification of

some of the species listed herein. João Victor Naves (UFSCar) helped in the elaboration of the map in Figure 1. Two anonymous reviewers and Felipe Ottoni (UFMA) provided valuable suggestions to previous versions of the manuscript.

Associate Editor

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Author Contributions

Giovanna Guimarães Silva Lopez: Contribution to data collection; Contribution to data analysis and interpretation; Contribution to manuscript preparation; Contribution to critical revision, adding intellectual content.

Mauricio Cetra: Contribution to data analysis and interpretation; Contribution to manuscript preparation; Contribution to critical revision, adding intellectual content.

George Mendes Taliaferro Mattox: Substantial contribution in the concept and design of the study; Contribution to data collection; Contribution to data analysis and interpretation; Contribution to manuscript preparation; Contribution to critical revision, adding intellectual content.

Conflicts of Interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

Data Availability

Supporting data are available at <<https://repositorio.ufscar.br/handle/ufscar/18166>>.

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Received: 21/06/2023

Accepted: 15/01/2024

Published online: 19/02/2024