Freshwater fishes of the Bahia State, Northeastern Brazil

André Teixeira Silva1*, Ricardo Jucá Chagas1, Alexandre Clistenes de Alcântara Santos1, Carolina Maria Zanata1, Beatric Kawamura Rodrigues3, Carla Natacha Marcolino Polaz1, Carlos Bernardo Mascarenhas Alves2, Cristiana Souza Vieira4, Fabiane Barreto Souza4, Fábio Vieira2, Francisco Alexandre Costa Sampaio2, Haridon Ferreira9, Hilda Susele Rodrigues Alves9, Luisa Maria Sarmento-Soares10, Marriana Pinho10, Ronaldo Fernado Martins-Pinheiro10, Sergio Maia Queiroz Lima10, Sofia Campiolo9 & Priscila Camelier3

1Universidade Estadual do Sudoeste da Bahia, Departamento de Ciências Biológicas, Av. José Moreira Sobrinho, s/n, Jequié, 45205-490, Jequié, BA, Brasil.
2Universidade Estadual de Feira de Santana, Departamento de Ciências Biológicas, Av. Universitária s/n, Novo Horizonte, 44036-900, Feira de Santana, BA, Brasil.
3Universidade Federal da Bahia, Instituto de Biologia, Programa de Pós-Graduação em Biodiversidade e Evolução, Rua Barão de Geremoabo, 147, Ondina, 40170–290, Salvador, BA, Brasil.
4Instituto Chico Mendes de Conservação da Biodiversidade, Centro Nacional de Pesquisas e Conservação da Biodiversidade Aquática Continental, Rodovia Prefeito Eúber Nemésio Pereira de Godoy (SP 201), km 6,5, Cachoeira de Emas, 3630-970, Pirassununga, SP, Brasil.
5Universidade Federal de Minas Gerais, Av. Antônio Carlos, 6627, Pampulha, 31270-901, Belo Horizonte, MG, Brasil.
6Secretaria de Ciência Tecnologia e Inovação do Estado da Bahia, 5ª Avenida, Plataforma II, Aflu B – 1º andar, CAB, 41745-004, Salvador, BA, Brasil.
7Instituto Federal de Educação, Ciência e Tecnologia Baiano, Campus Santa Inês, BR 420, Rodovia Santa Inês, Ubirajara, Zona Rural, 45320-000, Santa Inês, BA, Brasil.
8Universidade Federal de Minas Gerais, Instituto de Ciências Biológicas, Departamento de Zoologia, Av. Pres. Antônio Carlos, 6627, Pampulha, 31270-901, Belo Horizonte, MG, Brasil.
9Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Rod. Ilhéus-Itabuna Km16, Salobrinho, 45600-000, Ilhéus, BA, Brasil.
10Universidade Federal do Espírito Santo (UFES), Programa de Pós-Graduação em Biologia Animal (PPGBAN), Campus de Goiabeiras, 29043–900, Vitória, ES, Brasil.
11Instituto Nacional da Mata Atlântica, Laboratório de Zoologia, Av. José Ruschi, 4, Centro, 29650-000, Santa Teresa, ES, Brasil.
12Universidade Federal do Rio Grande do Norte, Departamento de Botânica e Zoologia, Av. Senador Salgado Filho 3000, Lagoa Nova, 56078-970, Natal, RN, Brasil.

*Corresponding author: André Teixeira Silva, e-mail: silva.at@gmail.com

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Abstract: This work was carried out to assess the conservation status of the freshwater ichthyofauna from Bahia State. The inventory data and species distribution were obtained from the specialized scientific literature and representative ichthyological collections. A total of 281 native species was recorded in Bahia State, distributed in the Northeastern Mata Atlantica (NMA) and São Francisco (SFR) freshwater ecoregions. There was a larger number of species in the NMA (187 spp.), composed by several coastal basins, than in the SFR (134 spp.), composed by São Francisco river basin. Among the 30 families recorded, Characidae and Rivulidae were the most representative, with 53 and 48 species, respectively. The conservation status of 214 species was assessed and 33 of them (15%) were included in the IUCN threat categories. Of these, 11 species were classified as vulnerable (VU), 12 as endangered (EN), and 10 as critically endangered (CR). Most threatened species (n = 14) belongs to the family Rivulidae. The larger number of threatened species in the NMA (n = 23) is mainly related to the high endemism of restricted-range species associated with the human occupation impacts along the coastal regions. In the SFR, most of threatened species are annual killifishes, which are locally disappearing due to increasing degradation of their temporary habitats.

Keywords: biodiversity, threatened species, endemism, Northeastern Mata Atlantica ecoregion, São Francisco river basin.
Peixes de água doce do Estado da Bahia, Nordeste do Brasil

Resumo: Este trabalho foi realizado a partir da avaliação do estado de conservação da ictiofauna de água doce do Estado da Bahia. Os dados de inventário e distribuição das espécies foram obtidos a partir da literatura científica especializada e de coleções ictiológicas representativas. Um total de 281 espécies nativas foi registrado no Estado da Bahia, distribuídas nas ecorregiões de água doce Mata Atlântica Nordeste (NMA) e São Francisco (SFR). A riqueza de espécies foi maior na NMA (187 spp.), composta por diversas bacias costeiras, do que na SFR (134 spp.), composta pela bacia do rio São Francisco. Das 30 famílias registradas, as mais representativas foram Characidae e Rivulidae, com 53 e 48 espécies, respectivamente. O estado de conservação de 214 espécies foi avaliado e 33 (15%) destas foram classificadas em alguma categoria de ameaça da IUCN. Destas, 11 foram classificadas como vulneráveis (VU), 12 em perigo (EN) e 10 criticamente em perigo (CR). A maioria das espécies ameaçadas (n = 14) pertence à família Rivulidae. O elevado número de espécies ameaçadas na NMA: (n = 23) está associado ao alto endemismo das espécies com distribuição restrita e aos impactos da ocupação humana ao longo da região costeira. Na SFR, a maioria das espécies ameaçadas é de peixes anuais, que estão localmente desaparecendo devido à degradação crescente de seus habitats temporários. Palavras-chave: biodiversidade, espécies ameaçadas, endemismo, Ecorregião Mata Atlântica Nordeste, bacia do rio São Francisco.

Introduction

The Neotropical region harbors the most diverse freshwater fish fauna in the world, with more than 5,700 described species, although the final number may exceed 8,000 species (Albert et al. 2011, Reis 2013, Bertaco et al. 2016, Reis et al. 2016). Putting this number into perspective, Neotropical freshwater fishes account for about one in five of the world’s fish species, or approximately 10% of all vertebrate species (Albert & Reis 2011). According to Ribeiro (2006), the reasons for such a marked diversity are likely to be both historical and ecological, a result of millions of years of evolution from the breakup of Gondwana to the present day.

It is often claimed that freshwater ecosystems are the most endangered in the world (Sala et al. 2000, Dudgeon et al. 2006, Nogueira et al. 2010). As in other freshwater regions, South American fishes are threatened by overexploitation, flow modification, habitat destruction, species invasion, pollution, eutrophication, and siltation (Lévêque et al. 2008). Several fish conservation initiatives are underway in South America, including an ambitious program that assesses the conservation status of all Brazilian fish species (Reis 2013). This program resulted in the Brazilian list of threatened fishes and aquatic invertebrates, known as the Brazilian Red List (MMA 2014). Along with this national task, some parallel regional projects of conservation assessment of continental fishes have also been conducted (e.g., Rosa et al. 2003, Alves & Leal 2010, Reis et al. 2016).

In 2013, one of these regional initiatives was carried out in Bahia State, northeastern Brazil, and the Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) in collaboration with the Secretaria do Meio Ambiente do Estado da Bahia (SEMA), and several ichthyologists completed a comprehensive conservation assessment of the freshwater ichthyofauna in the state. It is important to highlight that the results of this regional workshop became the basis for the publishing of the list of threatened freshwater fish species reported from Bahia state (SEMA 2017). Bahia, one of the 27 federative units of Brazil, is the fifth largest state by area, with more than 564,000 km² and 417 municipalities (IBGE 2019).

This state partially encompasses two freshwater ecoregions as proposed by Abell et al. (2008), the São Francisco (SFR, ecoregion 327) and Northeastern Mata Atlantica (NMA, ecoregion 328) ecoregions (Figure 1). According to these authors, a freshwater ecoregion is defined as a large area encompassing one or more freshwater systems with a distinct assemblage of natural freshwater communities and species. Although political geographic boundaries are useless for biological organisms, national or regional species lists are important for monitoring and conservation planning efforts (Silveira et al. 2010, Hortal et al. 2015). In this sense, any conservation initiative starts from the identification of the species that will be protect by such initiative. However, that apparently simple and basic information is absent or incomplete for diverse regions of Brazil. For example, the procedure of compilation of fish species that occur in rivers that drain Bahia state to evaluation of conservation status took several weeks of hard work previously to 2013 workshop, and involved the participation of several experts.
Before that effort, the knowledge about the species that occur in Bahia rivers was dispersed in some studies which focused on description of new species (e.g., Garavello 1977, Malabarba et al. 2004, Costa 2007, Zanata & Serra 2010), or representing the fish species inventory of some basins or part of them (e.g., Sato & Godinho 1999, Godinho & Godinho 2003, Rosa et al. 2003, Santos 2005, Sarmento-Soares et al. 2007, Barbosa & Soares 2009, Burger et al., 2011).

To make available the results of the list of threatened freshwater fishes of Bahia State elaborated during the aforementioned 2013 workshop, we report here the first checklist of freshwater fish species of the Bahia state. This list includes species from the SFR and NMA ecoregions described at present, as well the conservation status for those evaluate in 2013 Workshop. Without the pretense of being a definitive list, it is a starting point that should be broadened and updated in order to compile the scattered information available.

Material and methods

1. Study area

Freshwater fish species from stretches and tributaries in the SFR and NMA ecoregions of Bahia State (Figure 1) were analyzed. The SFR ecoregion is equivalent to the São Francisco basin, the third largest Neotropical hydrographic basin which is enclosed in an area of more than 630,000 km² (Sato & Godinho 1999, Kohler 2003, Langeani et al. 2009). The São Francisco is the longest river running entirely in Brazil, corresponding to more than 7.5% of the Brazilian territory (Godinho & Godinho 2003, Pompeu & Godinho 2006). With more than 2,500 km of extension (Godinho & Godinho 2003, Langeani et al. 2009), the São Francisco river and its tributaries drain three biomes (Caatinga, Cerrado and, peripherally, Atlantic Forest) crossing six states (from its source to mouth: Minas Gerais, Goiás, Bahia, Pernambuco, Alagoas, and Sergipe) plus the Federal District (Paiva 1982, Godinho & Godinho 2003, Langeani et al. 2009). From its headwaters in the Serra da Canastra, located in the central-western part of Minas Gerais State (at about 1,200-1,500 m above sea level), to its mouth, between Alagoas and Sergipe, the river drains more than 500 municipalities (Kohler 2003, Sato & Godinho, 2003). Although not entirely located in Bahia State, the São Francisco is the largest and one of the most important rivers of the state.

The NMA, in turn, comprises all coastal drainages in eastern Brazil, from the Sergipe river in the north to the Itapapoana river in the south (Camelier & Zanata 2014a). To the west, the NMA ecoregion is limited by the watershed border with the São Francisco river basin, along the Serra do Espinhaço up to the north, and by the Paraiba do Sul river basin in the south (Hales & Petry 2013). This ecoregion includes more than 25 isolated basins (Camelier & Zanata 2014a), draining the eastern slopes of the Brazilian crystalline shield directly into the Atlantic Ocean. From north to south, the main drainages of the NMA in Bahia State are: Vaza-Barris, Real, Itapicuru, Inhambupe, Pojuca, Paraguacu, Jequiriçá, Contas, Cachoeira, Almada, Una, Pardo, Jequitinhonha, Buranhém, Frades, Jucuruçu, Itanêm, Peruípe, and Mucuri (Langeani et al. 2009, Camelier & Zanata 2014a).

These drainages, along with several other smaller isolated basins of the NMA, are separated by the scarped, mountainous landscapes of the eastern margin of the Brazilian shield (Ribeiro 2006). The NMA is mainly inserted in the Atlantic Forest biome, although the northern drainages from the upper Contas to the Vaza-Barris river basins are partially under the influence of the semiarid Caatinga (Rosa et al. 2003, Camelier & Zanata 2014a, Lima et al., 2017).

2. Species inventory and list compilation

The species inventory and information about their distributions were obtained by consulting different sources in the reliable specialized scientific literature (i.e. original descriptions, taxonomic reviews, phylogenetic studies, and species catalogues) and representative ichthyological collections such as Instituto Nacional da Mata Atlântica (formerly Museu de Biologia Professor Mello Leitão-MBML), Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul (MCP), Museu Nacional do Rio de Janeiro (MNRJ), Museu de Zoologia da Universidade de São Paulo (MZUSP), Museu de História Natural da Bahia (UFBA), and Universidade Federal do Rio Grande do Norte (UFRN). Data were obtained from these fish collections or by searches in the national system of information on ichthyological collections (e.g., SIBIP/NEODAT III 2019, CRIA 2019) and, eventually, checked by consulting specialists. Taxonomic classification and species naming were determined mainly according to Fricke et al. (2020); for the species of Characidae, according to Mirande (2010).

To elaborate the list supporting this study, only freshwater fish species formally described until December 2019 were considered. Despite the fact that freshwater species were defined as those known to spend a significant part of their life cycle in low salinity (<0.5 ppt) continental waters (Myers 1949; Berra 2001), in the present study only primary freshwater fishes were considered.

The International Union for Conservation of Nature (IUCN) criteria were used to assess the conservation status of the species (IUCN 2012). The conservation status of species already evaluated according to these criteria was updated to the state of Bahia, which represented the regional assessment. Since the regional workshop for the evaluation of endangered freshwater fish species in Bahia occurred in November 2013, species described after this period did not have their conservation status assessed. The only exception is Rhamdiopsis sp., an undescribed troglobitic species whose description process is well advanced (M. E. Bichuette pers. comm.). Subterranean ecosystems and their biota pose special problems for conservation due to their intrinsic fragility and the distinctive features of subterranean communities, such as a high degree of endemism and morphological, ecological and behavioral specialization (Trajano & Bichuette 2010). Therefore, the assessment of the conservation status of Rhamdiopsis sp. has become necessary.

Species whose known distribution is restricted to the stretches of the basins draining Bahia State were classified as endemic. It should be noted that endemic species from the ecoregions analyzed (SFR or NMA), which are known to occur in other states (e.g., Sergipe, Minas Gerais, Espírito Santo), were not classified as endemic. Non-native species recorded in basins of the Bahia State were included in the list, but their conservation status was not evaluated.
Results

1. Ichthyofauna composition

A total of 281 native freshwater fish species was recorded along the drainages of Bahia State (Table 1), accounting for about 9% of all species (3,116) known to occur in Brazil (ICMBio 2014). Of the taxa listed in this study, one subfamily (Copionodontinae), nine genera (Copionodon, Glaphyropoma, Hirtella, Kalypodoras, Mucurlebias, Myxiops, Ophthalmolebias, Prorivulus, and Pseudotatia), and 126 species are only known from river basins draining Bahia State. Most of the native species are from the NMA, with 187 species occurring in Bahia. In stretches of the SFR draining the state, 134 native species were listed (Table 1).

Table 1. List of freshwater fish species of Bahia State and their conservation status according to state (SEMA 2017) and national assessments (MMA 2014), IUCN criteria and ecoregion (NMA, Northeastern Mata Atlantica; SFR, São Francisco), as well as their respective indication of origin (X, native species but not endemic to the Bahia part of the ecoregion; END, endemic to the Bahia part of the ecoregion; NNA, non-native species).

| ORDER/Family/Species | SEMA 2017 | MMA 2014 | SFR | NMA | Voucher / Source |
|----------------------|-----------|-----------|-----|-----|-----------------|
|                      | Status    | IUCN Criteria | Status | IUCN Criteria |     |
| CLUPEIFORMES         |           |           |     |     |                 |
| Engraulidae          |           |           |     |     |                 |
| Anchoviella vaillanti| LC        | LC        | X   |     | MZUSP 54604, MCP 16611 |
| (Steindacher 1908)   |           |           |     |     |                 |
| CHARACIFORMES        |           |           |     |     |                 |
| Acestrorhynchidae    |           |           |     |     |                 |
| Acestrorhynchus britskii| LC   | LC        | X   |     | MZUSP 83828, MZUSP 54683 |
| Menezes 1969         |           |           |     |     |                 |
| Acestrorhynchus falcatus| LC   | LC        | X   |     | MNJR 21754, MZUSP 10248, MZUSP 102557, UFBA 4507 |
| (Bloch 1794)         |           |           |     |     |                 |
| Acestrorhynchus lacustris| LC | LC        | X   |     | MZUSP 57172, MZUSP 28770, UFBA 2647, UFBA 4946 |
| (Lütken 1875)        |           |           |     |     |                 |
| Anostomidae          |           |           |     |     |                 |
| Hypomasticus mormyrops| VU       | B1 ab(iii)| LC | X   | UFBA 4827, UFBA 5665 |
| (Steindacher 1875)   |           |           |     |     |                 |
| Leporellus pictus    | NE        | NE        | X   |     | UNT 13927, UNT 9561 |
| (Kner 1850)          |           |           |     |     |                 |
| Leporellus vittatus  | LC        | LC        | X   |     | MZUSP 54659, UFBA 833 |
| (Valenciennes 1850)  |           |           |     |     |                 |
| Leporinus bahiensis  | LC        | LC        |     |     | UFBA 2645, UFBA 2954, UFBA 1946, UFBA 4456, UFBA 4582, UFBA 4483 |
| Steindacher 1875     |           |           |     |     | UFBA 5123, UFBA 5666 |
| Leporinus copelandii | LC        | LC        | X   |     | MZUSP 57172, UFBA 28770, UFBA 2647, UFBA 4946 |
| Steindacher 1875     |           |           |     |     | UFBA 5123, UFBA 5666 |
| Leporinus melanopleura| LC      | LC        |     |     | BMNH 1863, MZUSP 111246, UFBA 4282, UFBA 5103, UFBA 8052 |
| Günther 1864         |           |           |     |     |                 |
| Leporinus melanopleurodes| NT    | NT        |     | END | MZUSP 100987, MZUSP 109769, MZUSP 111227 |
| Birindelli, Britski & Garavello 2013 |               |           |     |     |                 |
| Leporinus piau Fowler 1941 | LC | LC | X   |     | MZUSP 54667, MZUSP 14470, UFBA 4231 |
| Leporinus steindachneri| LC   | LC        | X   |     | MZUSP 63464, MZUSP 87868, UFBA 4415, UFBA 4715, UFBA 5056 |
| Eigenmann 1907       |           |           |     |     |                 |
| Leporinus taeniatus  | LC        | LC        | X   |     | MZUSP 83818, MZUSP 54662, UFBA 1948, UFBA 3564 |
| Lütken 1875          |           |           |     |     |                 |
| Megapleurorhinus brinco| LC       | LC        |     | END | MZUSP 105166, MZUSP 109762, UFBA 4843 |
| (Birindelli, Britski & Garavello 2013) |               |           |     |     |                 |
| Megapleurorhinus conirostris| LC | LC |     |     | MZUSP 63463, UFBA 5038 |
| (Steindacher 1875)   |           |           |     |     |                 |
| Megapleurorhinus elongatus| NE  | NE    |     | X   | MZUSP 2823, MZUSP 28773 |
| (Valenciennes 1850)  |           |           |     |     |                 |
| Megapleurorhinus garmani| DD | LC |     |     | MZUSP 87848, UFBA 5238 |
| (Borodin 1929)       |           |           |     |     |                 |
| Megapleurorhinus obtusidens| LC | LC |     | X   | UFBA 200, UFBA 280, UFBA 835, UFBA 836, UFBA 966, UFBA 1005 |
| (Valenciennes 1837)  |           |           |     |     |                 |

continue...
| Species | Status | IUCN | Location | Collection |
|---------|--------|------|----------|------------|
| Megaleporinus reinhardtii | LC | LC | X | X | MZUSP 54670, MZUSP 58224, UFBA 2868, UFBA 3386 |
| Schizodon knerii | NE | NE | X | MZUSP 54676, MCP 16747, UFBA 6582 |

**Bryconidae**

| Species | Status | IUCN | Location | Collection |
|---------|--------|------|----------|------------|
| Brycon devillei (Castelnau 1855) | EN | B1 ab(i,iii) | EN | B1 ab(i,iii) | X | MNHN 4517 |
| Brycon ferox Steindachner 1877 | DD | LC | X | MZUSP 53305, MZUSP 93920, UFBA 5039, UFBA 5060, UFBA 5095 |
| Brycon orthotaenia Günther 1864 | LC | LC | X | MZUSP 70220, MCP 16676 |
| Brycon vonoi Lima 2017 | NE | NE | X | MCZ 2416 |
| Henochilus wheatlandii Garman 1890 | NE | NE | X | HU-Zoo 21109 |
| Salminus franciscanus Lima & Briski 2007 | LC | LC | X | MZUSP 28797, UFBA 6577 |

**Characidae**

| Species | Status | IUCN | Location | Collection |
|---------|--------|------|----------|------------|
| Astyanax aff. bimaculatus (Linnaeus 1758) | LC | LC | X | MZUSP 54839, MZUSP 54840, MCP 17920, MCP 36779, MBML 6407, MBML 4055, MHNCI-Peixes 11468 |
| Astyanax braciatus Zanata, Lima, di Dario & Gerhard 2017 | NE | NE | END | ZUEC 12765, MZUSP 120743, UFBA 8167 |
| Astyanax burgerai Zanata & Camelier 2009 | DD | DD | END | MZUSP 101245, UFBA 4346 |
| Astyanax epiagos Zanata & Camelier 2008 | DD | DD | END | MZUSP 89568, UFBA 2792 |
| Astyanax fasciatus (Cuvier 1819) | LC | LC | X | MZUSP 28768, MZUSP 58823, MZUSP 28789, MZUSP 47378, MZUSP 80106, MBML 5357, MBML 6530, MBML 4103 |
| Astyanax hamatilis Camelier & Zanata 2014 | NE | NE | END | MZUSP 49232, MCP 47663, UFBA 3675, UFBA 6987, MZUSP 89570, UFBA 2793 |
| Astyanax jacobinae Zanata & Camelier 2008 | DD | DD | END | MZUSP 89567, UFBA 2789 |
| Astyanax lacustris (Lütken 1875) | LC | LC | X | MZUSP 58840, MZUSP 80125, MZUSP 80128 |
| Astyanax loric Zanata, Burger & Camelier 2018 | NE | NE | END | MZUSP 123398, UFBA 5393, UFBA 8109, UFBA 8359 |
| Astyanax peleus Bertaco & Lucena 2006 | LC | LC | END | UFBA 5634, UFBA 5638 |
| Astyanax rivularis (Lütken 1875) | LC | LC | X | MZUSP 85967, MZUSP 38537, MCP 53156, UFBA 2789 |
| Astyanax rupestris Zanata, Burger & Camelier 2018 | NE | NE | END | MZUSP 120747, MNJR 48346, UFBA 8201 |
| Astyanax sincora Burger, Carvalho & Zanata 2019 | NE | NE | END | MZUSP 121062, MCP 54205, UFBA 7046 |
| Astyanax vari Zanata, Burger, Vita & Camelier 2019 | NE | NE | END | MZUSP 101243, UFBA 4343 |
| Astyanax vermilion Zanata & Camelier 2009 | LC | LC | END | MZUSP 101243, UFBA 4343 |
| Compsura heterura Eigenmann 1915 | LC | LC | X | MZUSP 54626, MZUSP 58801, UFBA 3005, UFBA 3301 |
| Hasemaniania piatan Zanata & Serra 2010 | EN | B1 ab(iii,v) | EN | B1 ab(iii,v) | END | MZUSP 104538, MZUSP 104539, UFBA 4298 |

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| Species                                      | Status | IUCN | Code 1 | Code 2 | Code 3 | Code 4 | Code 5 | Code 6 | Code 7 | Code 8 | Code 9 | MZUSP 84072 | UFBA 3081 | UFBA 2866 | UFBA 1942 | UFBA 4127 | UFBA 5079 | UFBA 101246 | UFBA 4340 | UFBA 4341 | UFBA 114030 | UFBA 4618 | UFBA 5454 | UFBA 7558 | UFBA 2843 | UFBA 58425 | UFBA 2843 |
|---------------------------------------------|--------|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| *Hasemania nana* (Lütken 1875)              | NE     | NE   | X      |        |        |        |        |        |        |        |        | MZUSP 84072   |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hemigrammus brevis* Ellis 1911             | LC     | LC   | X      | X      |        |        |        |        |        |        |        | MZUSP 58922, UFBA 3081 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hemigrammus gracilis* (Lütken 1875)        | LC     | LC   | X      |        |        |        |        |        |        |        |        | MZUSP 84102, MZUSP 84035, UFBA 2866 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hemigrammus marginatus* Ellis 1911         | LC     | LC   | X      | X      |        |        |        |        |        |        |        | MZUSP 28802, UFBA 1942, UFBA 2721, UFBA 4127 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon bifasciatus* Ellis 1911     | LC     | LC   | X      |        |        |        |        |        |        |        |        | MZUSP 54792, UFBA 4971, UFBA 5079 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon brumado* Zanata & Camelier 2010 | LC | LC | END |        |        |        |        |        |        |        |        | MZUSP 101246, UFBA 4340, UFBA 4341 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon diastatos* Dagosta, Marinho & Camelier 2014 | NE | NE | X |        |        |        |        |        |        |        |        | MZUSP 114030 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon itaparicensis* Lima & Costa 2001 | LC | LC | X      |        |        |        |        |        |        |        |        | UFBA 4618, UFBA 5454, UFBA 7558, UFRN 207 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon micropterus* (Eigenmann 1915) | LC | LC | X      | X      |        |        |        |        |        |        |        | MZUSP 58425, UFBA 2843 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon negodagua* Lima & Gerhard 2001 | DD | DD | END |        |        |        |        |        |        |        |        | MZUSP 53898, UFBA 4360, UFBA 5392 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon parvulus* Ellis 1911         | LC     | LC   | X      |        |        |        |        |        |        |        |        | UFBA 2897, UFBA 3128, UFBA 3334, UFBA 3418, UFBA 4320 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon santisae* (Eigenmann 1907)   | LC     | LC   | X      |        |        |        |        |        |        |        |        | UFBA 40178 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Hyphessobrycon vinaeus* Bertaco, Malabarba & Dergam 2007 | LC | LC | END |        |        |        |        |        |        |        |        | UFBA 4607, UFBA 4608 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Kolpotocheirodon figuereidoi* Malabarba, Lima & Weitzman 2004 | CR | B2 ab(iii) | CR | B2 ab(iii) | END |        |        |        |        |        |        | MNJ 37509, MZUSP 160499, UFBA 7816 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Lepidocharax diamantina* Ferreira, Menezes & Quagio-Grassioto 2011 | EN | B2 ab(iii,iv) | EN | B2 ab(iii,iv) | END |        |        |        |        |        |        | MNJ 37509, MZUSP 160499, UFBA 7816 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Mimagoniates microlepis* (Steindachner 1877) | LC | LC | X      |        |        |        |        |        |        |        |        | MZUSP 9386, MZUSP 55012, USNM 249895 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Mimagoniates sylvicola* Menezes & Weitzman 1990 | EN | B1 ab(iii,iv) | EN | B1 ab(iii,iv) | END |        |        |        |        |        |        | MZUSP 93867, UFBA 3040, UFBA 4819, UFBA 5780, UFBA 7004 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Moenkhausia costae* (Steindachner 1907)    | LC     | LC   | X      | X      |        |        |        |        |        |        |        | MNHN 1907, UFBA 2837, UFBA 3571 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Moenkhausia diamantina* Benine, Castro & Santos 2007 | LC | LC | X      |        |        |        |        |        |        |        |        | MZUSP 49233, MZUSP 49233, UFBA 3664 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Moenkhausia sanctaefilomenae* (Steindachner 1907) | LC | LC | X      |        |        |        |        |        |        |        |        | MZUSP 49233, MZUSP 49233, UFBA 3664 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Moenkhausia vittata* (Castelnau 1855)         | LC     | LC   | X      |        |        |        |        |        |        |        |        | MZUSP 58294, MZUSP 58272 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Myxiops aphos* Zanata & Akama 2004           | LC     | LC   | X      |        |        |        |        |        |        |        |        | MZUSP 81026, UFBA 7798 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Nematocharax vari* Barreto, Silva, Batalha-Filho, Affonso & Zanata 2018 | NE | NE | END |        |        |        |        |        |        |        |        | MZUSP 123176, MCP 53336, UFBA 8439, |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Nematocharax venustus* Weitzman, Menezes & Britski 1986 | LC | LC | X      |        |        |        |        |        |        |        |        | UFBA 3762, UFBA 4259, UFBA 4494, UFBA 4280, UFBA 3823, UFBA 4378, UFBA 4913 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
| *Oligosarcus acutirostris* Menezes 1987       | LC     | LC   | X      |        |        |        |        |        |        |        |        | UFBA 5117, UFBA 4911 |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
Freshwater fishes of the Bahia State

| Species                                                                 | Status | Conservation | Collection Data |
|------------------------------------------------------------------------|--------|--------------|-----------------|
| Oligosarcus macrolepis (Steindachner 1877)                             | LC     | LC           | X               |
| Orthospinus franciscensis (Eigenmann 1914)                              | LC     | LC           | X               |
| Phenacogaster francescensis Eigenmann 1911                              | LC     | LC           | X X             |
| Phenacogaster juliae Lucena & Lucena 2019                               | NE     | NE           | X               |
| Piabina argentea Reinhardt 1867                                        | LC     | LC           | X               |
| Psellogrammus kennedyi (Eigenmann 1903)                                 | LC     | LC           | X X             |
| Rachoviscus graciliceps Weitzman & Cruz 1981                           | EN     | B2 ab(iii,iv)| EN B2 ab(iii,iv)|
| Roeboides xenodon (Reinhardt 1851)                                      | LC     | LC           | X               |
| Serrapinnus heterodon (Eigenmann, 1915)                                 | LC     | LC           | X X             |
| Serrapinnus piaba (Lütken 1875)                                        | LC     | LC           | X X             |
| Tetragonopterus franciscoensis Silva, Melo, Oliveira & Benine 2016      | NE     | NE           | X X             |
| Crenuchidae                                                             |
| Characidium aff. zebra Eigenmann 1909                                   | LC     | LC           | X               |
| Characidium bahiensense Almeida 1971                                    | DD     | DD           | X X             |
| Characidium clistenesi Melo & Espíndola 2016                            | NE     | NE           | END             |
| Characidium cricarense Malanski, Sarmento-Soares, Silva-Malanski, Lopes, Ingenito & Buckup 2019 | NE | NE | X | MBML 12879, MBML 3846 |
| Characidium deludens Zanata & Camelier 2015                             | NE     | NE           | END             |
| Characidium helmeri Zanata, Sarmento-Soares & Martins-Pinheiro 2015      | NE     | NE           | END             |
| Characidium kamakan Zanata & Camelier 2015                              | NE     | NE           | END             |
| Characidium samurai Zanata & Camelier 2014                              | NE     | NE           | END             |
| Curimatidae                                                             |
| Curimatella lepidura (Eigenmann & Eigenmann 1889)                       | LC     | LC           | X X             |
| Cyphocharax gilbert (Quoy & Gaimard 1824)                               | LC     | LC           | X X             |
| Cyphocharax pinnilepis Vari, Zanata & Camelier 2010                     | LC     | LC           | END             |
| Family                  | Species                              | Status | Status | Locus | Locus | Locus | Locus | Locus | Locus |
|------------------------|--------------------------------------|--------|--------|-------|-------|-------|-------|-------|-------|
| Erythrinidae           | *Erythrinus kessleri* Steindachner 1877 | DD     | DD     | END   | MZUSP 93891, MZUSP 44018 |
|                        | *Hoploerythrinus unitaeniatus* (Spix & Agassiz 1829) | LC     | LC     | X     | X     | MZUSP 57392, MZUSP 38539, MZUSP 2801, UFBA 2899, UFBA 2966, UFBA 3044 |
|                        | *Hoplias brasiliensis* (Spix & Agassiz 1829) | LC     | LC     | X     | MZUSP 45483, MZUSP 40174, MZUSP 40170, MZUSP 40270, UFBA 5429 |
|                        | *Hoplias intermedius* (Günther 1864) | LC     | LC     | X     | MZUSP 94050, MZUSP 94434 |
|                        | *Hoplias malabaricus* (Bloch 1794) | LC     | LC     | X     | MZUSP 62574, MZUSP 84071, UFBA 3020, UFBA 384, UFBA 3104, UFBA 2947, UFBA 1985, UFBA 3839, UFBA 3717, UFBA 4916, UFBA 4808 |
| Iguanodectidae         | *Bryconops affinis* (Günther 1864) | LC     | LC     | X     | MZUSP 57922, MZUSP 54641, MZUSP 57924 |
| Lebiasinidae           | *Nannostomus beckfordi* Günther 1872 | DD     | DD     | X     | UFBA 1855, UFBA 1887, UFBA 1890, UFBA 1897, UFBA 3742, UFBA 4675, UFBA 4680, UFBA 7412 |
| Parodontidae           | *Apareiodon hasemani* Eigenmann 1916 | LC     | LC     | X     | MCP 17045 |
|                        | *Apareiodon itapicuruensis* Eigenmann & Henn 1916 | LC     | LC     | END   | UFBA 0234, UFBA 4156 |
|                        | *Parodon hilari* Reinhardt 1867 | LC     | LC     | X     | MZUSP 58286, MZUSP 28780 |
| Prochilodontidae       | *Prochilodus argenteus* Spix & Agassiz 1829 | LC     | LC     | X     | MZUSP 28778, MZUSP 2040 |
|                        | *Prochilodus brevis* Steindachner 1875 | LC     | LC     | X     | UFBA 3436, UFBA 1947, UFBA 5669, UFBA 4628, UFBA 4629 |
|                        | *Prochilodus costatus* Valenciennes 1850 | LC     | LC     | X     | MZUSP 54756, MZUSP 21549, UFBA 2825 |
|                        | *Prochilodus hartii* Steindachner 1875 | LC     | LC     | X     | MZUSP 42677, UFBA 5272 |
|                        | *Prochilodus vimboides* Kner 1859 | LC     | LC     | X     | UFBA 5094, UFBA 5061, UFBA 5181 |
| Serrasalmidae          | *Colossoma macropomum* (Cuvier 1816) | -      | -      | NNA   | Bezerra et al. 2008 |
|                        | *Metynnis maculatus* (Kner 1858) | -      | -      | NNA   | Rodrigues et al. 2018; MCP 36973 |
|                        | *Myleus micans* (Lütken 1875) | LC     | LC     | X     | MZUSP 58277, MZUSP 20460 |
|                        | *Pygocentrus piraya* (Cuvier 1819) | LC     | LC     | X     | MZUSP 57552, MZUSP 58296, MZUSP 57550, MZUSP 49254, MZUSP 57508, UFBA 3018, UFBA 2823 |
|                        | *Serrasalmus brandii* Lütken, 1875 | LC     | LC     | X     | MZUSP 58296, MZUSP 57550, MZUSP 49254, MZUSP 57508, UFBA 3018, UFBA 2823 |
**Triportheidae**

| Species | Conservation | Source | Collection(s) |
|---------|--------------|--------|---------------|
| Lignobrycon myersi (Miranda Ribeiro 1956) | NT | NT | END | UFBA 4260, UFBA 5179 |
| Triportheus guentheri (Garman 1890) | LC | LC | X | MCP 16706, MCP 16680 |
| Triportheus signatus (Garman 1890) | DD | LC | X | UFBA 3173, UFBA 4836 |

**GYMNOTIFORMES**

**Gymnotidae**

| Species | Conservation | Source | Collection(s) |
|---------|--------------|--------|---------------|
| Gymnotus bahianus Campos-da-Paz & Costa 1996 | LC | LC | END | MZUSP 102453, MZUSP 48949, UFBA 4452, |
| Gymnotus capitiimaculatus Rangel-Pereira 2014 | NE | NE | END | UFRJ 9785, UFRJ 9964 |
| Gymnotus carapo Linnaeus 1758 | LC | LC | X | MBML 6548, MZUSP 86104, UFBA 3041, UFBA 2651, UFBA 4455 |
| Gymnotus cf. pantherinus (Steindachner 1908) | NE | NE | X | MZUSP 104746 |
| Gymnotus interruptus Rangel-Pereira 2012 | DD | DD | END | UFRJ 8218 |

**Hypopomidae**

| Species | Conservation | Source | Collection(s) |
|---------|--------------|--------|---------------|
| Brachyhypopomus menezesi Crampton, Santana, Waddell & Lovejoy 2016 | NE | NE | X | MZUSP 87147, MZUSP 40190 |

**Sternopygidae**

| Species | Conservation | Source | Collection(s) |
|---------|--------------|--------|---------------|
| Eigenmannia besouro Peixoto & Wosiacki 2016 | NE | NE | END | MZUSP 57890 |
| Eigenmannia virensens (Valenciennes 1836) | LC | LC | X | MZUSP 84036, MZUSP 57891 |
| Sternopygus macrurus (Bloch & Schneider 1801) | LC | LC | X | MZUSP 2644, MZUSP 84045 |

**SILURIFORMES**

**Auchenipteridae**

| Species | Conservation | Source | Collection(s) |
|---------|--------------|--------|---------------|
| Glanidium botocudo Sarmento-Soares & Martins-Pinheiro 2013 | DD | DD | X | MNRJ 32538 |
| Pseudauchenipterus affinis (Steindachner 1877) | LC | LC | X | MZUSP 51762, MZUSP 51750 |
| Pseudauchenipterus jequitinhonhiae (Steindachner 1877) | LC | LC | X | MZUSP 51735, UFBA 05398 |
| Pseudotatia parva Mess 1974 | NE | NE | END | FMNH 70580 |
| Tatia bockmanni (Sarmento-Soares & Buckup 2005) | DD | LC | X | MZUSP 82351 |
| Trachelyopterus galeatus (Linnaeus 1766) | LC | LC | X | MZUSP 90280, UFBA 93, UFBA 130, UFBA 163, UFBA 848, UFBA 872, UFBA 2819, UFBA 3046, UFBA 05119, UFBA 6648 |
| Trachelyopterus striatulus (Steindachner 1877) | LC | LC | X | MZUSP 52627, MZUSP 93912, UFBA 4712, UFBA 4992, |

**Callichthyidae**

| Species | Conservation | Source | Collection(s) |
|---------|--------------|--------|---------------|
| Aspidoras kiriri Oliveira, Zanata, Tencatt & Britto 2017 | NE | NE | END | MNRJ 47400, UFBA 7352 |

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| **Aspidoras maculosus** (Nijssen & Isbrücker 1976) | DD | DD | END | MZUSP 88170, UFBA 3291 |
| **Aspidoras psammatides** (Britto, Lima & Santos 2005) | DD | DD | END | MZUSP 67194 |
| **Aspidoras virgulatus** (Nijssen & Isbrücker 1980) | LC | LC | X | MZUSP 39124, MBML 2030 |
| **Callichthys callichthys** (Linnaeus 1758) | LC | LC | X | UFBA 159, UFBA 2650, UFBA 3422, UFBA 5262, |
| **Corydoras costai** (Ottoni, Barbosa & Katz 2016) | NE | NE | X | UFRJ 7790, MCP 48169 |
| **Corydoras garbei** (Ihering 1911) | LC | LC | X | MZUSP 5319, MZUSP 5324 |
| **Corydoras lacerdai** (Hieronymus 1995) | EN | B1 ab(iii) | EN | B1 ab(iii) | END | MZUSP 47682, MZUSP 47683 |
| **Corydoras lynnades** (Tencatt, Vera-Alcaraz, Britto & Pavanelli 2013) | DD | LC | X | MNRJ 22370 |
| **Corydoras multimaculatus** (Steindachner 1907) | LC | LC | END | MZUSP 57405, MZUSP 57404 |
| **Corydoras nattereri** (Steindachner 1876) | LC | LC | X | MZUSP 51796, UFBA 4728, UFBA 2839 |
| **Hoplosternum litorale** (Hancock 1828) | LC | LC | X | MZUSP 57551, UFBA 1611 |
| **Scleromystax prionotos** (Nijssen & Isbrücker 1980) | LC | LC | X | MCP 23650, MBML 1470, MBML 1546, UFBA 5073 |

**Clariidae**

| **Clarias gariepinus** (Burchell 1822) | - | - | NNA | Rocha et al 2008, MNRJ 28363 |

**Doradidae**

| **Franciscodoras marmoratus** (Lütken 1874) | LC | LC | X | MZUSP 2201, UFBA 208 |
| **Kalyptodoras bahiensis** (Higuchi, Britski & Garavello 1990) | EN | B2 ab(iii) | EN | B2 ab(iii) | END | MZUSP 38565, UFBA 3171, UFBA 7108, UFBA 7455 |
| **Wertheimeria maculata** (Steindachner 1877) | LC | LC | X | UFBA 5667 |

**Heptapteridae**

| **Acentronichthys leptos** (Eigenmann & Eigenmann 1889) | EN | B1 ab(iii) | LC | X | MZUSP 93856, UFBA 6019 |
| **Cetop sorhamdia itherigi** (Schubart & Gomes 1959) | LC | LC | X | UFBA 4370, UFBA 5121, UFBA 6097 |
| **Imparfinis borodini** (Mees & Cala 1989) | NE | NE | X | X | MBML 10327, MBML 10729 |
| **Imparfinis minutus** (Lütken 1874) | LC | LC | X | UFBA 935, UFBA 4958, UFBA 5071, UFBA 4987, UFBA 5053 |
| **Phenacorhamdia tenebrosa** (Schubart 1964) | DD | LC | X | MCP 36935, MCP 36723, UFBA 7114 |
| **Pimelodella harttii** (Steindachner 1877) | DD | DD | X | MZSUP 5141, UFBA 5647 |
| **Pimelodella itapicuruensis** (Eigenmann 1917) | DD | LC | X | MZUSP 88169 |
| **Pimelodella lateristriga** (Lichtenstein 1823) | LC | LC | X | MZUSP 93864, MZUSP 54763, MZUSP 51798, UFBA 4973, UFBA 4984, |
| **Rhamdia enfurnada** (Bichuette & Trajano 2005) | LC | LC | END | LIRP 5643 |

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| Species                                      | Status   | Threaten. | Genus          | Collection Sites                                                                 |
|----------------------------------------------|----------|-----------|----------------|----------------------------------------------------------------------------------|
| Rhamdia jequitinhonha                        | DD VU    | X         | Rhamdia        | MZUSP 102718                                                                      |
| Rhamdia quelen (Quoy & Gaimard 1824)         | LC LC    | X         | Rhamdia        | MCP 16658, MZUSP 83796, MZUSP 93851, MZUSP 54006, MZUSP 101358, UFBA 3006, UFBA 2894, UFBA 03353, UFBA 4263, UFBA 4858, UFBA 4909, UFBA 4956 |
| Rhamdiopsis kragi Bockmann & Castro 2011     | VU B1ab(iii) VU B1ab(iii) | END | LIRP 5929, LIRP 5931, LIRP 5930 |
| Rhamdiopsis sp.                              | VU D2    | D2        | Loricariidae   | M. E. Bichuette (comm. pers.)                                                     |
| Hartitia longipinna Langeani, Oyakawa & Montoya-Burgos 2001 | DD DD | END | DZSRP003666, MZUSP 57168 |
| Hirtella carinata Pereira, Zanata, Cetra & Reis 2014 | NE NE | END | ANSP 198032, MCP 48127, UFBA 5655 |
| Hypostomus brevicauda (Günther 1864)         | DD DD    | X         | Hypostomus     | BMNH1864                                                                         |
| Hypostomus francisci (Lütken 1874)           | LC LC    | X         | Hypostomus     | UFBA 4191, UFBA 6641                                                              |
| Hypostomus jaguar Zanata, Sardeiro & Zawadzki 2013 | LC LC | END | MZUSP 110603, UFBA 6501 |
| Hypostomus johnii (Steindacher 1877)         | NE NE    | X         | Hypostomus     | MCZ 7863, NMW 44192                                                              |
| Hypostomus leucophaeus Zanata & Pitanga 2016 | NE NE | END | MZUSP 119822, UFBA 2993 |
| Hypostomus lima (Lütken 1874)                | NE NE    | X         | Hypostomus     | UFBA 2046                                                                         |
| Hypostomus macrops (Eigenmann & Eigenmann 1888) | NE NE | X         | MBML 11304, MBML-10813, NUP 20383                                                |
| Hypostomus unae (Steindachner 1878)          | DD LC    | X         | Hypostomus     | BMNH 1861, NMW 44259                                                             |
| Hypostomus vaillanti (Steindachner 1877)     | NE DD    | X         | Hypostomus     | NMW 4427                                                                         |
| Hypostomus velhochico Zawadzki, Oyakawa, Britski 2017 | NE NE | X         | MCP 16689, MZUSP 94586, MZUSP 120452                                              |
| Hypostomus wuchereri (Günther 1864)          | DD LC    | X         | Hypostomus     | BMNH 1863                                                                        |
| Megalancistrus barrae (Steindachner 1910)    | LC LC    | END       | Megalancistrus | NMW 48019                                                                        |
| Otocinclus xakriaba Schaeffer 1997           | LC LC    | X         | Otocinclus     | MZUSP 51103, MCP 16877                                                            |
| Otothyris travassosi Garavello, Britski & Schaefer 1998 | LC LC | X         | Otothyris      | MZUSP 94020, MZUSP 51435, MZUSP 94021, MZUSP 39095, MZUSP 51439, MZUSP 51438, MZUSP 51803, UFBA 4931 |
| Pareiorhaphis bahianus (Gosline 1947)         | LC LC    | END       | Pareiorhaphis  | UFBA 4486, UFBA 4555, UFBA 5100                                                   |
| Pareiorhaphis lophia Pereira & Zanata 2014   | NE NE    | END       | Pareiorhaphis  | MCP 47711, MCP 47712, MCP 48004, MZUSP 86089, MZUSP 86154, MZUSP 88163, UFBA 6188, UFBA 7026, UFBA 7063, UFBA 7350 |
| Parotocinclus adamanteus Pereira, Santos, de Pinna & Reis, 2019 | NE NE | END | MZUSP 124560, MCP 54151, MZUSP 93274                                              |
| Parotocinclus arandai Sarmento-Soares, Lehmann & Martins-Pinheiro 2009 | LC LC | END | MBML 2135, MBML 1486 |

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Parotocinclus bahiensis  
(Miranda Ribeiro 1918)  
LC  LC  END  MZUSP 99753, UFBA 2978, UFBA 3103, UFBA 3349, UFBA 3118
Parotocinclus cristatus  
Garavello 1977  
LC  LC  END  MZUSP 102611, MZUSP 102634, UFBA 4451
Parotocinclus jimi  
Garavello 1977  
LC  LC  END  MZUSP 24531, UFBA 3875
Parotocinclus minutus  
Garavello 1977  
DD  DD  END  MCP 40034
Pogonopoma wertheimeri  
(Steindachner 1867)  
LC  LC  X  MZUSP 51779
Ptterygoplichthys chrysostiktos  
(Birindelli, Zanata & Lima 2007)  
LC  LC  END  MZUSP 88157
Ptterygoplichthys etentaculatus  
(Spix & Agassiz 1829)  
LC  LC  X  MCP 16709
Rhinelepis aspera  
(Spix & Agassiz 1829)  
DD  LC  X  MZUSP 83660, MZUSP 2219

Pimelodidae
Bergjaria westermanni  
(Lütken 1874)  
NE  LC  X  UNT 12428, UNT 12470
Conorhynchos conirostris  
(Valenciennes 1840)  
EN  A2ac  EN  A2ac  X  X  MNHN A-9413
Duopalatinus emarginatus  
(Valenciennes 1840)  
LC  LC  X  MZUSP 24871, MZUSP 2287
Pimelodus fur (Lütken 1874)  
LC  LC  X  MZUSP 1078
Pimelodus maculatus  
Lacepède 1803  
LC  LC  X  MZUSP 54637, MZUSP 57549
Pimelodus pohli  
Ribeiro & Lucena 2006  
LC  LC  X  MCP 16661, MCP 16671
Pseudoplatystoma corruscans  
(Spix & Agassiz 1829)  
NT  NT  X  UFBA 268

Pseudopimelodidae
Cephalosilurus fowleri  
Haseman 1911  
DD  LC  X  FMNH 54254
Lophiosilurus alexandri  
Steindachner 1876  
VU  A2 cd  VU  A2 cd  X  MZUSP 1160, MZUSP 53261
Microglanis pataxo  
Sarmento-Soares, Martins-Pinheiro, Aranda & Chamon 2006  
LC  LC  X  MZUSP 51790, UFBA 4985

Trichomycteridae
Ammoglanis multidentatus  
Costa, Mattos & Santos 2019  
NE  NE  END  MNRJ 51340, UFRJ 12088
Copionodon elysiim  
Pinna, Burger & Zanata 2018  
NE  NE  END  MZUSP 120631, UFBA 8100
Copionodon exotaticeps  
Pinna, Abrahão, Reis & Zanata 2018  
NE  NE  END  MZUSP 123522, MZUSP 121656
Copionodon lianae  
Campanario & de Pinna 2000  
NT  NT  END  MZUSP 81034
Copionodon orthocarminatus de Pinna 1992  
NT  NT  END  MZUSP 42463, UFBA 3688
Copionodon pecten de Pinna 1992  
NT  NT  END  MZUSP 42461, UFBA 5289
Glaphyropoma rodriguesi  
de Pinna 1992  
DD  DD  END  MZUSP 42465
Glaphyropoma spinosum  
Bichuette, de Pinna & Trajano 2008  
VU  B1 ab(iii)  VU  B1 ab(iii)  END  MZUSP 99742

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| Species                                           | IUCN Status | Population | Institution(s)                      | Reference(s)                       |
|--------------------------------------------------|-------------|------------|-------------------------------------|------------------------------------|
| **Ituglanis agreste** Lima, Neves & Campos-Paiva 2013 | LC          | LC         | END                                 | MNRJ 40196, UFRN 29                |
| **Ituglanis cahyensis** Sarmento-Soares, Martins-Pinheiro, Aranda & Chamon 2006   | EN          | B1 ab(iii) | EN B1 ab(iii) X                     | MNRJ 28404, MNRJ 28406              |
| **Ituglanis paraguassuensis** Campos-Paiva & Costa 2007 | DD          | DD         | END                                 | MZUSP 63138                         |
| **Microcambeva draco** Mats & Lima 2010           | EN          | B1ab(iii)  | EN B1ab(iii) END                    | MCP 17796, MCP 47695                |
| **Stegophilus insidiosus** Reinhardt 1859         | LC          | LC         | X                                   | MBML 9078                           |
| **Trichomycterus bahianus** Costa 1992             | LC          | LC         | END                                 | MZUSP 38636, MBML 1580              |
| **Trichomycterus payaya** Sarnento-Soares, Zanata & Martins-Pinheiro 2011 | DD          | DD         | END                                 | MBML 2560, UFBA 5284                |
| **Trichomycterus praedensis** Sarmento-Soares, Martins-Pinheiro, Aranda & Chamon 2005 | LC          | LC         | X                                   | MBML 1480, MBML 1520                |
| **Trichomycterus rubbioli** Bichuette & Rizzato 2012 | VU          | D2         | VU D2 END                           | MZUSP 110977, MZUSP 110978, MZUSP 110984 |
| **Trichomycterus tete** Barbosa & Costa 2011      | LC          | LC         | END                                 | UFRJ 7774, UFRJ 7775, UFRJ 7776, UFRJ 8082 |
| **CYPRINODONTIFORMES**                            |             |            |                                     |                                    |
| **Poeciliidae**                                   |             |            |                                     |                                    |
| **Pamphorichthys hollandi** (Henn 1916)           | LC          | LC         | X X                                 | MZUSP 58869, MZUSP 57507, UFBA 2892, UFBA 3037, UFPA 5370, UFPA 2688 |
| **Phalloceros mikrommatos** Lucinda 2008          | DD          | DD         | END                                 | UFBA 3416, UFBA 7726                |
| **Phalloceros ocellatus** Lucinda 2008            | LC          | LC         | X                                   | MZUSP 93985, MZUSP 51794            |
| **Phalloptychus eigenmanni** Henn 1916            | CR          | B2 ab(iii,iv) | CR B2 ab(iii,iv) END             | UFRJ 6597                           |
| **Poecilia reticulata** Peters 1859               | -           | -          | NNA NNA                            | MZUSP 86110, MZUSP 58884, MCP 18128, MBML 5380, UFBA 5402 |
| **Poecilia vivipara** Bloch & Schneider 1801      | LC          | LC         | X X                                 | MZUSP 93991, MZUSP 51810, UFBA 3021, UFBA 2860, UFBA 3331, UFBA 3121, UFBA 4165, UFBA 4257, UFBA 4239, UFBA 4382, |
| **Rivulidae**                                     |             |            |                                     |                                    |
| **Anablepsoides bahianus** (Huber 1990)           | DD          | DD         | END                                 | UFBA 3423, UFBA 2951                |
| **Atlantirivulus depressus** (Costa 1991)         | NT          | NT         | END                                 | UFPA 2213, UFRJ 2118                |
| **Atlantirivulus unaensis** (Costa & de Luca 2009)| DD          | DD         | END                                 | UFRJ 6597                           |
| **Cynolebias altus** Costa 2001                   | LC          | LC         | END                                 | MZUSP 62564, MZUSP 62565            |
| **Cynolebias attenuatus** Costa 2001              | DD          | DD         | END                                 | MZUSP 62566, MZUSP 62567            |
| **Cynolebias elegans** Costa 2017                 | NE          | NE         | END                                 | UFRJ 9431, UFRJ 6890                |
| **Cynolebias gibbus** Costa 2001                  | DD          | DD         | END                                 | MZUSP 62568, UFRJ 4796              |
| **Cynolebias gibertoi** Costa 1998                | DD          | DD         | END                                 | MZUSP 52304, MZUSP 52305            |
| **Cynolebias tatiscuarensis** Costa 2001          | DD          | DD         | END                                 | UFBA 2626                           |

...continue...
| Species                          | Status | Range | Date | ZU1 | MZUSP | UFRJ | END |
|---------------------------------|--------|-------|------|-----|-------|------|-----|
| *Cynolebias leptocephalus*      | DD     | DD    | END  |     | MZUSP 43676, UFRJ 687 |
| Costa & Brasil 1993             |        |       |      |     |       |      |     |
| *Cynolebias obscurus* Costa 2014| NE     | NE    | END  |     |       | UFRJ 6774 |
| *Cynolebias ochraceus* Costa 2014| NE     | NE    | END  |     |       | Costa 2014 |
| *Cynolebias oticus* Costa 2014  | NE     | NE    | END  |     |       | UFRJ 9437 |
| *Cynolebias paraguassuensis*    | DD     | DD    | END  |     | UFRJ 6454, UFRJ 6455 |
| Costa, Suzart & Nielsen 2007   |        |       |      |     |       |      |     |
| *Cynolebias porosus*            | DD     | DD    | END  |     | MZUSP 41378, MZUSP 41379 |
| Steindachner 1876               |        |       |      |     |       |      |     |
| *Cynolebias rectiventer* Costa 2014| NE     | NE    | END  |     | UFRJ 8896 |
| *Cynolebias roseus* Costa 2014  | NE     | NE    | END  |     | UFRJ 9330, UFRJ 9331 |
| *Cynolebias vazabarrisensis*    | DD     | DD    | END  |     |       |      |     |
| Costa 2001                      |        |       |      |     |       |      |     |
| *Hypsolebias adornatus* (Costa 2000) | VU  | D2    | VU   | D2  | END  | MZUSP 54563, UFRJ 4805 |
| (Costa & Nielsen 2004)          |        |       |      |     |       |      |     |
| *Hypsolebias carlettoi* Costa 2004| CR  | B2ab(i,i,ii,iii,iv) | CR   | B2ab(i,i,ii,iii,iv) | END  | MCP 34089, UFRJ 5945 |
| (Costa & Nielsen 2004)          |        |       |      |     |       |      |     |
| *Hypsolebias caeruleus* Costa 2013| NE  | LC    | END  |     | UFRJ 6855 |
| *Hypsolebias faouri* Britzke, Nielsen & Oliveira 2016| NE | NE | END |     | ZUEC 10796 |
| *Hypsolebias flagellatus* Costa 2003| NE | NA    | X    |     | MCP 28578, UFRJ 4788 |
| (Costa & Brasil 1993)           |        |       |      |     |       |      |     |
| *Hypsolebias fulminantis*       | CR     | B2ab(i,i,ii,iii,iv) | CR   | B2ab(i,i,ii,iii,iv) | END  | MZUSP 43674, UFRJ 685 |
| Costa 2001                      |        |       |      |     |       |      |     |
| *Hypsolebias gardneri* Costa, Amorim & Mattos 2018| NE | NE | X    |     | UFRJ 11859 |
| *Hypsolebias ghisolfii* (Costa, Cyrino & Nielsen 1996) | CR | B2ab(i,i,ii,iii,iv) | CR | B2ab(i,i,ii,iii,iv) | END  | MZUSP 49403, UFRJ 3526 |
| *Hypsolebias gilbertobrasili* Costa 2012 | NE | NT | END  |     | UFRJ 8325 |
| *Hypsolebias guanambi* Costa & Amorim 2011 | NE | D2 | VU  | D2  | END  | UFRJ 6861 |
| *Hypsolebias harmonicus*        | NE     | D2    | VU   | D2  | END  | UFRJ 6696 |
| Costa 2010                      |        |       |      |     |       |      |     |
| *Hypsolebias igneus* Costa 2000 | CR     | B2ab(i,i,ii,iii,iv) | CR | B2ab(i,i,ii,iii,iv) | END  | MZUSP 56254, UFRJ 4857 |
| *Hypsolebias lopesi* Nielsen, Shibatta, Suzart & Martin 2010 | NE | D2 | VU  | D2  | END  | MZUSP 103102 |
| *Hypsolebias mediopapillatus*   | VU     | D2    | VU   | D2  | END  | UFRJ 5406, MCP 40139 |
| (Costa 2006)                    |        |       |      |     |       |      |     |
| *Hypsolebias nitens* Costa 2012 | NE     | LC    | END  |     | UFRJ 8289 |
| *Hypsolebias nudiorbitatus* Costa 2011 | NE | DD | END  |     | UFRJ 6837 |
| *Hypsolebias picturatus* (Costa 2000) | VU | D2 | VU  | D2  | END  | MZUSP 59228, UFRJ 5053 |
| *Hypsolebias pterophyllus* Costa 2012 | NE | LC | END  |     | UFRJ 8376 |
| *Hypsolebias shibattai* Nielsen, Martins, Araujo & Suzart 2014 | NE | NA | END  |     | ZUEC 7648 |
| *Hypsolebias trifasciatus* Nielsen, Martins, Araujo, Lira & Four 2014 | NE | NA | END  |     | ZUEC 8302 |
| *Kryptolebias hermaphroditus* Costa 2011 | NE | NE | X    |     | UFRN 4344 |
| *Melanorivulus decoratus* (Costa 1989) | NT | NT | END  |     | MZUSP 39982, MZUSP 39983 |
| continue...                     |        |       |      |     |       |      |     |

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| Species                                | IUCN Status | Conservation Status | Collection Numbers |
|----------------------------------------|-------------|---------------------|--------------------|
| *Mucurilebias leitaoi* (Cruz & Peixoto 1992) | CR B2       | B2 (ii,iii,iv, v)  | END MNRJ 11646, MNRJ 11647 |
| *Ophthalmolebias bokermanni* (Carvalho & Da Cruz 1987) | CR B2       | B2 (iii)            | END MZUSP 91519  |
| *Ophthalmolebias ilheusensis* (Costa & Lima 2010) | CR B1       | ab (ii,iii,iv, v)  | END UFRJ 6690, UFBA 5297 |
| *Ophthalmolebias perpendicularis* (Costa, Nielsen & de Luca 2001) | CR B2       | ab (ii,iii,iv, v)  | END MZUSP 62570  |
| *Ophthalmolebias rosaceus* (Costa, Nielsen & de Luca 2001) | VU D2       | ab (i,ii,iii,iv, v) | END MZUSP 62572  |
| *Ophthalmolebias suzarti* (Costa 2004) | DD          | DD                 | END UFRJ 5932, UFRJ 5933 |
| *Xenurolebias myersi* (Carvalho 1971) | EN B2 ab (iii) | EN B2 ab (iii) | X UFRJ 249, UFRJ 377, UFRJ 1921 |
| *SYBRANCHIFORMES*                      |             |                     |                    |
| *Synbranchidae*                        |             |                     |                    |
| *Synbranchus marmoratus*               | LC          | LC                 | X X MZUSP 83815, MZUSP 2667, UFBA 3010, UFBA 2832, UFBA 4009, UFBA 5646 |
| *PERCIFORMES*                          |             |                     |                    |
| *Cichlidae*                            |             |                     |                    |
| *Astronotus ocellatus* (Agassiz 1831)  | -           | -                  | NNA NNA MBML 7173, UFBA 5458 |
| *Cichla spp.*                          | -           | -                  | NNA NNA MBML-Peixes 10405, UNT 10429, MZFS 13845, MZFS 11497 |
| *Cichlasoma sanctifringescense*        | LC          | LC                 | X X MZUSP 58926, MZUSP 84085, UFBA 2977, UFBA 386, UFBA 3444, UFBA 3131, UFBA 4457 |
| *Crenicichla lacustris* (Castelnau 1855) | LC          | LC                 | X UFBA 4709, UFBA 4824 |
| *Crenicichla lepidota* Heckel 1840     | LC          | LC                 | X X MZUSP 84229, MZUSP 57903, UFBA 388 |
| *Geophagus brasiensis* (Quoy & Gaymard 1824) | LC          | LC                 | X MZUSP 87890, MZUSP 39110, MZUSP 54850, MZUSP 49240 |
| *Geophagus diamantinensis* Matsos, Costa & Santos 2015 | NE          | NE                 | END UFRJ 8833 |
| *Geophagus itapicuruensis* Haseman 1911 | DD          | DD                 | END FMNH 54365, FMNH 54204 |
| *Geophagus multiocellus* Matsos & Costa 2018 | NE          | NE                 | X UFRJ 11764, MNHRJ32263 |
| *Geophagus obscurus* (Castelnau 1855)  | DD          | DD                 | END MNHN A-9511 |
| *Geophagus rufomarginatus* Matsos & Costa 2018 | NE          | NE                 | X UFRJ 9994, UFRJ 9519 |
| *Geophagus santosi* Matsos & Costa 2018 | NE          | NE                 | X UFRJ 11765, UFRJ 10336 |
| *Oreochromis niloticus* (Linnaeus 1758) | -           | -                  | NNA MNHRJ 28647, LIRP 5724, MCP 36707 |
| *Copotodon rendalli* (Boulenger 1897)   | -           | -                  | NNA NNA MZUSP 86156, Rodrigues et al 2018 |
| *Sciaenidae*                           |             |                     |                    |
| *Pachyurus adspersus* Steindachner 1879 | DD          | DD                 | X LIRP 1150, LIRP 1149 |
| *Pachyurus francisci* (Cuvier 1830)    | LC          | LC                 | X MZUSP 2498, MCP 16632 |
| *Pachyurus squamipennis* Agassiz 1831   | LC          | LC                 | X UNT 12455 |
| *Plagioscion squamosissimus* (Heckel 1840) | -           | -                  | NNA MZUSP 75093 |

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Only 40 (14%) native species are shared between the two ecoregions. Eleven non-native species were listed in Bahia, which accounted for less than 5% of all species analyzed. Among the 30 families recorded (excluding those related only to non-native species), the most representative were Characidae and Rivulidae, with 53 and 48 species, respectively, followed by Loricariidae with 28 species (Figure 2). Many species were described in the last 20 years, 75 from the NMA and 41 from the SFR, corresponding to 27% and 15% of all species listed in this study, respectively (Table 1).

Most of the threatened species are in the NMA (23 species, 69.7%), while 10 (30.3%) endangered species are found in the SFR (Figure 3). Most of these belong to the family Rivulidae, with 14 species (42.4% of threatened species), seven in each ecoregion. In addition, several small fish species of the Characidae, Heptapteridae, and Trichomycteridae families were also representative in the list of endangered species. These fishes are typical of first- and second-order streams, which may suffer more intensely from the effects of human activities (Oliveira & Bennemann 2005). Among tricomicterids and heptaperids, three troglobitic species (Glaphyropoma spinosum, Rhamdiopsis krugi, and Rhamdiopsis sp.) stand out among all others because of their low population density and restricted distribution in some caverns (Bockmann & Castro 2010, Bichuette et al. 2008, M. E. Bichuette pers. comm.), which are not protected in any conservation unit. Taken together, these factors can chronically devastate these populations and compromise species survival.

Discussion

1. Species composition

In this study, 281 native freshwater fish species were recorded in Bahia State, distributed in coastal drainages of the NMA ecoregion and the São Francisco river basin draining the state. The composition of the Bahia State species partially agrees with the overall pattern of the Brazilian fish fauna, in which most species belong to Characidae, followed by Loricariidae (Bizzerril 1994, Gonçalves & Braga 2012, Camelier & Zanata 2014a, Ferreira et al. 2014). Curiously, Bahia is one of the Brazilian states with the largest records of Rivulidae in its basins (see Frick & Eschmeyer 2020). Among the remaining families occurring in the state, more than half are represented by five or fewer species.

The number of Rivulidae species is higher in the SFR ecoregion, mainly due to the presence of several annual fish species of the genera Hypsolebias and Cynolebias that inhabit temporary pools in the tributaries at the right margin of the middle São Francisco river basin (Costa 2014, Costa et al. 2014). In the drainages of the NMA ecoregion, Rivulidae is mainly represented by the annual fish species of the genus Ophiathalmolebias, most of them endemic to Bahia, presenting a narrow distribution, usually restricted to a single basin (Costa & Lima 2010). In this ecoregion, Rivulidae and Loricariidae have almost the same number of species, differing from the general pattern found in the other Brazilian coastal drainages cited above.

The river basins included in the NMA and SFR freshwater ecoregions which draining the state of Bahia exhibit a distinct composition, with only 40 native species shared between them. Most species from the NMA are characterized by a small size, possibly related to the large number of small streams of this ecoregion. According to several authors (e.g., Weitzman & Vari 1988, Castro 1999, Casatti et al. 2001, Abilhoa et al. 2011), the ichthyofauna of these freshwater ecosystems is mainly composed of small-sized species. In the São Francisco river basin, in addition to small fish species, larger species, most of them important for artisanal fisheries, are found, including migratory species such as Conorhynchos conirostris, Prochilodus argenteus, Pseudoplatystoma corruscans, and Salminus franciscanus (Sato & Godinho 2003, Godinho & Kynard 2006).

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However, the number of species gathered in the present study is likely underestimated due to a range of factors. Some undescribed species were not counted, the only exception being *Rhamdiopsis* sp. from the Chapada Diamantina region (SFR). Some nominal widespread species may represent species complexes that need revisionary studies to solve the confusing taxonomy and the definition of the new species described (e.g., *Aystanax bimaculatus*, *A. fasciatus*, *Hoplias malabaricus*, *Geophagus brasiliensis*, *Rhamdia quelen*). In addition, some sub-basins were not sampled (e.g., most tributaries of the middle São Francisco in southwestern Bahia and headwaters of various river basins of the NMA).

More than 20 years ago, Menezes (1996a, b) cited the lack of knowledge about the fish fauna of drainages in Brazil’s Northeastern region. Although a series of studies increasing that knowledge were conducted at that time, the results were far from satisfactory and Northeast Brazil is still pointed out as a region of scarce available information about freshwater fish records in a global database compilation (Tedesco et al. 2017). Current evidence of the lack of knowledge about the ichthyofauna in this region is the large number of taxa considered “sp.” or accompanied by the terms “cf.” or “aff.” in taxonomic inventories (e.g., Sarmento-Soares et al. 2009a, Cetra et al. 2010, Burger et al. 2011, Ramos et al. 2014). Although numerous freshwater fish species from the Bahia river basins have been described in the last two decades (e.g., Bertaco & Lucena 2006, Ribeiro & Lucena 2006, Lima & Britski 2007, Benine et al. 2007, Zanata & Camelier 2008, 2009, 2010, 2014, 2015, Bichuette et al. 2008, Sarmento-Soares et al. 2009b, Sarmento-Soares et al. 2011, Ferreira et al. 2014, Varí et al. 2010, Bichuette & Rizzotto 2012, Oliveira et al. 2013, Sarmento-Soares & Martins-Pinheiro 2013, Camelier & Zanata 2014h, Zanata et al. 2015, 2017, 2018, Mattos et al. 2015, Peixoto & Wosiacki 2016, Zanata & Pitanga 2016, Zawadzki et al., 2017; Barreto et al. 2018, Mattos & Costa, 2018, Burger et al. 2019, Lucena & Lucena 2019), ichthyological explorations continue to reveal unknown species, especially in small tributaries and in upper drainage areas. The increase in the number of species recently described from the São Francisco river basin has already been documented in the literature (see Alves et al. 2011 and Barbosa et al. 2017).

2. Conservation concerns

Overall, the results of the state and national conservation status assessments were remarkably similar, with divergences only for two species: *Acentronichthys leptos* and *Hypomastus mormyrops*. In Bahia State, both species were included in threatened categories (VU and EN, respectively) since they occur at few impacted localities with continuing decline in the habitat quality. However, these species were classified as LC in the national assessment (MMA 2014) since their total distribution was considered wider, including river basins outside Bahia where these species are more abundant and are not threatened (e.g., Paraíba do Sul, Doce, plus small drainages in the states of São Paulo and Rio de Janeiro).

The conservation status of some species which occur in Bahia State changed in the last years. Some examples are the catfish ‘pacamá’ *Lophiosilurus alexandri* and the killifish *Hypsolebias adornatus*, both endemic to the SFR ecoregion, which were classified before as LC (MMA 2004) are now VU in both lists (SEMA 2017, MMA 2014). Several subpopulations of *L. alexandri* were probably locally extinct, reducing their population size by at least 30% (ICMBio 2018). On the other hand, *L. alexandri* was introduced in the Doce river, where became an important resource for artisanal fishing (Alves et al. 2007). Additionally, this species is cultivated in tanks as a commercial species for food near Colatina, Espírito Santo State (L. M. Sarmento-Soares pers. obs.). Nowadays, *H. adornatus* is also VU because one of its few known localities were destroyed, leading to local extinction. Moreover, this species is much appreciated as an aquarium fish, posing an additional and severe threat to this species. The category of three other annual killifishes, *Hypsolebias fulminantis*, *H. ghisolfi*, and *Ophthalmolebias perpendicularis* changed from VU (MMA 2004) to CR (MMA 2014). The first two, endemic to Bahia (SFR), are sympatric and were commonly found in temporary floodplain pools of Rio das Rãs, a tributary of the São Francisco basin (Costa 2007). However, their distribution is now restricted to a few localities as a consequence of the agricultural development and potteries established in the region. The case of *O. perpendicularis* is even more concerning since the species is currently classified as CR, the highest extinction risk category. In fact, this annual rivulid species may already be extinct since it was only known from the type locality in the Jequitinhonha river basin (NMA ecoregion), which was destroyed, and there has been no record of this species since 2000 (ICMBio 2018).

The large number of threatened freshwater fish species in the NMA ecoregion (23) is possibly due to the remarkable endemism of its ichthyofauna (Bizzerril 1994, Ribeiro 2006, Camelier & Zanata 2014a) associated with the significant human occupation and alteration of the coastal region (Langearini et al. 2009). In the SFR ecoregion, most threatened species are annual killifishes, whose populations are disappearing due to the strong degradation and groundling of their habitats (see Costa 2002, ICMBio 2018). Eight species were classified as NT and may soon move to the list of endangered species if no conservation measures are adopted. In addition to the increasing human exploitation, the relatively small number of conservation units and protected areas in Bahia may be insufficient for the preservation of its fish fauna. Only 11.6% of the state area is protected as Conservation Units and less than 20% of these areas are in the higher protective level (Allen 2015). Additionally, we point out that most of these protect areas act as biodiversity islands, since they are surrounded by diverse monocultures, pastures and urban centers. One way to reduce these negative effect is the adoption of public polices that favor more environmentally appropriate agricultural practices in the buffer zones of Conservation Units, such as agroforestry systems (Sarmento-Soares & Martins-Pinheiro, 2017; Ewert et al. 2013).

The National Action Plans (Planos de Ação Nacional, PANs, in Portuguese) coordinated by the ICMBio, which have as main mission conserving Brazilian biodiversity, are public policies identifying and guiding priority actions to combat threats that endanger populations of species or environments (Polaz 2014). Therefore, the success of the PAN depends of both taxonomic information and data of the assessment of the conservation status of the species, such as provided in the present study. There are three PAN designed for freshwater fishes whose actions directly affect the conservation of the ichthyofauna in the state of Bahia: (1) Action Plan for the threatened species from the São Francisco watershed (Ordinance ICMBio nº 34, 27 May 2015), aiming mainly to improve the knowledge about threatened species and mitigate human impacting activities, to promote the conservation and recovery of aquatic fauna in the São Francisco river in five years (2015-2020);
(2) Action Plan for the threatened fish species from the Atlantic Forest rivers (Ordinance ICMBio nº 370, 1 August 2019), objecting to increase the conservation status and popularization of fishes, rivers, and streams of the Atlantic Forest in five years (2019-2024); and (3) Action Plan for the threatened species of Rivulidae family, with the general objective of establishing mechanisms to protect the rivulids and canceling the loss of habitat of the focal species, in five years (2013-2018); the second cycle of this PAN (2020-2025) was approved and it is in preparation, awaiting publication of the new ordinance.

Finally, it is expected that these joint actions (e.g., taxonomic studies, lists of species, conservation status of species, public policies) will contribute not only to the increase of the knowledge of the fish fauna but also to the conservation of these species and the environments inhabited by them.

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Authors Contributions

André Teixeira Silva: Substantial contribution in the concept and design of the study; Contribution to manuscript preparation; Contribution to data analysis and interpretation.

Ricardo Jucá Chagas: Substantial contribution in the concept and design of the study.

Alexandre Clistenes Santos: Contribution to data analysis and interpretation.

Angela Maria Zanata: Contribution to critical revision, adding intellectual content.

Beatriz Kawamura Rodrigues: Contribution to data analysis and interpretation.

Carla Natacha Marcolino Polaz: Contribution to critical revision, adding intellectual content.

Carlos Bernardo Mascarenhas Alves: Contribution to critical revision, adding intellectual content.

Cristiana Souza Vieira: Contribution to data collection.

Fabiane Barreto Souza: Contribution to data collection.

Fábio Vieira: Contribution to critical revision, adding intellectual content.

Francisco Alexandre Costa Sampaio: Contribution to data analysis and interpretation.

Harilond Ferreira: Contribution to data collection.

Hilda Susle Rodrigues Alves: Contribution to data collection.

Luiza Maria Sarmento-Soares: Contribution to critical revision, adding intellectual content.

Marianna Pinho: Contribution to data collection.

Ronaldo Fernando Martins-Pinheiro: Contribution to data analysis and interpretation.

Sergio Maia Queiroz Lima: Substantial contribution in the concept and design of the study; Contribution to critical revision, adding intellectual content.

Sofia Campiolo: Contribution to data analysis and interpretation.

Priscila Camelier: Substantial contribution in the concept and design of the study; Contribution to manuscript preparation; Contribution to data collection; Contribution to data analysis and interpretation.

Conflicts of Interest

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

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