Rapid assessment of the ichthyofauna of the southern Guiana Shield tributaries of the Amazonas River in Pará, Brazil

Guilherme M. DUTRA1, Tiago M. S. FREITAS2,3, Bruno S. PRUDENTE4, Gilberto N. SALVADOR3, Manuela D. V. LEÃO5, Luiz A. W. PEIXOTO1, Marina B. MENDONÇA6, André L. NETTO-FERREIRA7, Fabio R. SILVA6, Luciano F. A. MONTAG3, Wolmar B. WOSIACKI6

1 Museu de Zoologia da Universidade de São Paulo. Caixa Postal 42494. CEP 04218-970, São Paulo, SP, Brazil
2 Universidade Federal do Pará, Campus Universitário do Marajó, Faculdade de Ciências Naturais. CEP 68800-000, Breves, Pará, Brazil
3 Universidade Federal do Pará, Laboratório de Ecologia e e Conservação. Caixa Postal 479, CEP 66075-110, Belém, PA, Brazil
4 Universidade Federal Rural da Amazônia. CEP 68650-000, Capitão Poço, Pará, Brazil
5 Museu Nacional, Universidade Federal do Rio de Janeiro, Departamento de Vertebrados. QUINTA DA BOA VISTA, CEP 20940-040, Rio de Janeiro, RJ, Brazil
6 Museu Paraense Emílio Goeldi, Campus de Pesquisa, Coordenação de Zoologia. CEP 66077-830, Belém, Pará, Brazil
7 Universidade Federal do Rio Grande do Sul, Instituto de Biociências, Departamento de Zoologia. CEP 91501970, Porto Alegre, Rio Grande do Sul, Brazil
* Corresponding author. guihermedutr@yahoo.com.br; https://orcid.org/0000-0002-1010-3738

ABSTRACT
The Northern Pará Drainage System encompasses the left-bank tributaries of the Amazonas River in the southern Guiana Shield region of Pará state, Brazil. Five of the region's state protected areas are considered strategic to the conservation of its biodiversity. In the present study, we assessed the ichthyofauna of the five state protected areas of the Northern Pará Drainage System. Seven expeditions were conducted between January 2008 and January 2009, which surveyed stretches of the Cuminá, Cuminapanema, Curuá, Jari, Mapuera, Nhamundá, and Paru rivers. These surveys yielded 286 species belonging to 38 families and eight orders, including seven new records of fish species for Brazil, six of which are also new records for the Amazon basin. Our results provide a valuable database for future research and conservation programs in the protected areas of the region.

KEYWORDS: Northern Pará Drainage System, protected areas, Amazon, inventory, fish

Avaliação rápida da ictiofauna em tributários do Rio Amazonas na porção sul do Escudo das Guianas no Pará, Brasil

RESUMO
O Sistema de Drenagens do Norte do Pará abrange os afluentes da margem esquerda do Rio Amazonas na região sul do Escudo das Guianas no estado do Pará, Brasil. Cinco das áreas estaduais protegidas da região são consideradas estratégicas para a conservação da biodiversidade. No presente estudo, nós acessamos a ictiofauna das cinco áreas de proteção estadual do Sistema de Drenagens do Norte do Pará. Sete expedições foram realizadas entre os meses de janeiro de 2008 e janeiro de 2009, amostrando trechos das bacias dos rios Cuminá, Cuminapanema, Curuá, Jari, Mapuera, Nhamundá e Paru. As expedições resultaram em 286 espécies pertencentes a 38 famílias e oito ordens, incluindo sete novos registros de peixes para o Brasil, seis deles também representando novos registros para a bacia Amazônica. Nossos resultados fornecem uma base sólida para futuros programas de pesquisa e conservação nas áreas de proteção da região.

PALAVRAS-CHAVE: Calha Norte Paraense, áreas protegidas, Amazônia, inventário, peixes

INTRODUCTION
The Northern Pará Drainage System (NPDS) encompasses the left-bank tributaries of the Amazonas River in the southern Guiana Shield region of Pará state, Brazil. This area encompasses five strictly-protected or sustainable-use conservation units, as defined by the Brazilian National System of Conservation Units (Brasil 2000). Together with other types of federal protected areas, such as indigenous lands, the NPDS forms the Northern Pará Biodiversity Corridor, which connects the Central Amazonian Biodiversity Corridor with the Amapá...
Biodiversity Corridor, forming the largest biodiversity corridor found anywhere in the world (SEMA 2011a). This corridor encompasses the world’s largest complex of protected areas, with a total area of almost 22 million hectares, which corresponds to 78% of the total area of the NPDS (SEMA 2010).

The Northern Pará Drainage System includes a number of important left bank tributaries of the Amazonas, such as the Nhamundá, Trombetas, Paru, Cuminapanema, Cuminá, Curiú, and Jari rivers. These rivers drain from the southern border of the Guiana Shield – a region of relatively high altitudes and aquatic ecosystems with characteristic features, such as rapids and streams with rocky beds – to the lowlands of the lower Amazon basin. This altitudinal gradient and the environmental heterogeneity of the region have been interpreted as important biogeographical and ecological factors that contribute to the high biodiversity of Amazonian fish (Lujan et al. 2013; da Costa et al. 2018).

The ichthyofauna of the Guiana Shield was reviewed by Vari et al. (2009), who listed 1148 species. This geographic region comprises four freshwater ecoregions, delimited by Abell et al. (2008), known as the Orinoco Guiana Shield, Essequibo, the Guianas, and the Amazonas Guiana Shield. The latter ecoregion coincides with the southern portion of the Guiana Shield, and most of the NPDS. Vari et al. (2009) noted that the ichthyofauna of northern Pará is known only from the study of Ferreira (1993), who surveyed the Trombetas River basin intensively. Although the NPDS includes a number of other tributaries of the Amazonas River, its ichthyofauna is still poorly known, and has been referred to by Dagosta and de Pinna (2017; 2019) as a under-sampled area that lacks adequate fish inventory data. Given the logistic difficulties of reaching many isolated parts of the Amazon basin, the rapid sampling approach has become an important strategy for the production of preliminary checklists from poorly-known, but potentially diverse ecosystems, such as those of the NPDS, providing essential data for the development of effective conservation policies and management plans (Rapp Py-Daniel et al. 2007; Bernard 2008).

Between 2008 and 2009, the Museu Paraense Emílio Goeldi conducted seven expeditions to the state protected areas located in the NPDS to inventory its fauna and flora. The results were used to develop the management plans of the protected areas (SEMA 2010; 2011a, b, c, d). Here, we present the checklist of the fish species sampled in the principal drainages of the five state protected areas of the Northern Pará Drainage System.

MATERIAL AND METHODS

Sampled areas

The present study focused on five state protected areas (Figure 1): Faro State Forest (FLOTA Faro), Trombetas State Forest (FLOTA Trombetas), Paru State Forest (FLOTA Paru), Grão-Pará Ecological Station (ESEC Grão-Pará), and Maicuru Biological Reserve (REBIO Maicuru). The FLOTA Faro is the smallest of these conservation units, with an area of 635,936 ha, and is drained primarily by the Nhamundá River, which separates the Brazilian states of Amazonas and Pará (SEMA 2011b). The FLOTA Trombetas covers an area of 3,172,978 ha, and is drained, from west to east, by the Trombetas, Cuminá (also known as the Erepecuru or Paru do Oeste), and Cuminapanema rivers (SEMA 2011c). The ESEC Grão-Pará is the largest of the protected areas, with a total area of 4,245,819 ha, which is drained by the headwaters of the Mapuera River, and parts of the Trombetas, Cuminá, Cuminapanema, Curiú, and Maicuru basins (SEMA 2011a). The REBIO Maicuru has an area of 1,151,761 ha, and is drained partly by the Maicuru, Paru, and Jari river basins (SEMA 2011d), while the FLOTA Paru covers a total area of 3,612,914 ha, and is drained primarily by the Paru River basin (SEMA 2010).

With the exception of FLOTA Faro, which is located in the central Amazonian lowlands, the state protected areas of the NPDS are located in the southern Guiana Shield, at altitudes of 100 to 500 m above sea level, with areas of both Amazonian rainforest and savanna vegetation (Vari et al. 2009). The headwater streams and rivers of these foothills have clear water, with visibility of up to 5 m, as observed in the Trombetas River. Most of the study area has a humid tropical climate (subtype Am in the Köppen classification), except for the northern extreme of ESEC Grão-Pará, which is classified as Aw (Peel et al. 2007).

Fish sampling and species inventory

We sampled 76 sites during seven expeditions to the five protected areas between January 2008 and January 2009 (Table 1; see Supplementary Material, Appendix S1 for information on each sampling site). The sampling sites included headwater streams, river channels and margins, and lakes (Figure 2). During the FLOTA Faro expedition, we sampled 11 sites in the Nhamundá River basin, while in the FLOTA Trombetas, we obtained samples from 13 sites in the Cuminá River basin. In REBIO Maicuru, we sampled 10 sites on the Itipintu River, a tributary of the Jari River basin, while in FLOTA Paru, we sampled nine sites in the Paru River basin. Given the enormous size of ESEC Grão-Pará, three expeditions were conducted in this area, including 14 sites in the Curiú River basin, denominated here as the “ESEC G-P South” sector, 11 sites at the headwaters of the Mapuera River (ESEC G-P North sector), and eight sites in the Cuminapanema basin (ESEC G-P Center sector). The number of points sampled in each type of environment (streams, river channels and margins, and lakes) at each locality is shown in Table 1.

Fish specimens were collected using standard fishing gear (hand nets, seine nets, and gill nets). The hand nets were circular, approximately 60 cm in diameter, with a 3- mm mesh. Seine nets of two sizes were used (2 or 5 m long), both 1.50 m high with a 5-mm mesh. The gill nets varied in length.
A range of mesh sizes (20, 40, 50, 60, 70, 80 and 100 mm). Sampling effort was standardized among the different environments and collection methods. Hand and small (2 m) seine nets were used in streams, while the longer (5 m) seine nets were used in lakes and river margins, and the gill nets were set in lakes and rivers. At each stream, a stretch of 30 m was delimited, and four collectors each conducted 200 sweeps within the stretch, and the seine net was deployed 50 times. The lakes and river margins were also sampled with 50 sweeps of the seine net. The gill nets were set for approximately 24 hours, whenever possible, in lakes and river channels.

Once collected, the specimens were euthanized in a solution of clove oil, and fixed in 10% formalin for at
majority of the species (107, 86.3%) recorded in FLOTA Faro were not recorded in any other area within the NPDS. The second most diverse area was FLOTA Paru, where 82 species were recorded (23 families, three orders). Once again, most of the species (55, 67.1%) recorded in FLOTA Paru were not registered at any of the other six sites. The surveys in REBIO Maicuru recorded 64 species (20 families, six orders), exactly half of which (32, 50%) were recorded only in this area of the NPDS. In turn, the surveys in FLOTA Trombetas recorded 28 species, representing 13 families and six orders. Nine of the species were restricted to this area, i.e., Corydoras sp., Paralichthys armillatus Cope 1872, Ancistrus sp.3, Cienloricaria napova Covain and Fisch-Muller 2012, Hemiancistrus sp., Paralichthys sp., Peckoltia sp., Rineloricaria stewarti (Eigenmann 1909), and Anablepsoides sp.3. (Figures 5 and 6).

As already mentioned, ESEC Grão-Pará was surveyed during three expeditions. A total of 47 species were recorded in ESEC G-P South, representing 19 families and five orders. Eighteen of these species (corresponding to 38.3% of the fishes recorded in ESEC G-P South) were collected only in this sector. In ESEC G-P Center, 35 species were recorded, representing 16 families and five orders. Six of these species [Astyanax anterior Eigenmann 1908, Hyphessobrycon cf. agulha Fowler 1913, Jupiaba abramoides (Eigenmann 1909), Moenkhausia chrysargyra (Günther 1864), Bryconops aff. affinis (Günther 1864), and Corydoras baderi Geisler, 1969] were collected only in this sector (Figure 4). Fourteen species were recorded in ESEC G-P North, representing nine families and five orders. Eight of these species [Jupiaba atypindi Zanata 1997, Bryconops cf. coloroja Chernoff and Machado-Allison 1999, Ancistrus sp.1, Ancistrus sp.2, Parotocinclus halloti Lehmann, Lazzarotto and Reis 2014, Hypopomus ariedi Kaup 1856, Anablepsoides sp.1 and “Aequidens” patoensis Eigenmann 1912] were exclusive to this sector (Figures 5 and 6).

In addition to the species recorded in FLOTA Faro, which is located in the lowland Amazon basin, we recorded 179 species from the southern Guiana Shield tributaries of the Amazonas River. These species include 52 (29% of the total) that were recorded in the region for the first time (see Table 2), of which seven had not previously been recorded in Brazil. The species recorded in Brazil for the first time were Hyphessobrycon georgetae Géry 1961, Jupiaba ketthi (Géry, Planquette and Le Bail 1996), J. patoensis (Eigenmann 1909), Phencogaster simulata Lucena and Malabarba 2010, Corydoras guianensis Nijssen 1970, C. oxyrhynchus Nijssen and Isbrücker 1967, and Paralichthys armillatus (Figures 5–6). With the exception of P. armillatus, all these species were also recorded in the Amazon basin for the first time. None of the fish species listed here for the NPDS are classified as endangered, either in the state of Pará (Pará 2007), in Brazil (Brasil 2014) or worldwide (IUCN 2017).
Figure 3. Percentage contribution of the different fish orders (upper graphic) and the most diverse families (lower graphic) to the inventory of the Northern Pará Drainage System (southern Guiana Shield tributaries of the Amazonas River) in the five state protected areas as a whole (Overall), and in FLOTA Faro, REBIO Maicuru, and FLOTA Paru. The blank segments represent families with less than 5% of the total species richness.
Figure 4. Percentage contribution of the different fish orders (upper graphic) and the most diverse families (lower graphic) to the inventories of ESEC Grão Pará and FLOTA Trombetas. The blank segments represent families with less than 5% of the total species richness.
**Table 2.** List of the fish species collected in the southern Guiana Shield tributaries of the Amazonas River in the five state protected areas (seven expeditions) of the Northern Pará Drainage System, in northern Brazil. FF = FLOTA Faro; FT = FLOTA Trombetas; ES = ESEC G-P South; EN = ESEC G-P North; RM = REBIO Maicuru; FP = FLOTA Paru; EC = ESEC G-P Center. * = New record for the Northern Pará Drainage System.

| Order/Family/Species | FF | FT | ES | RM | FP | EC |
|----------------------|----|----|----|----|----|----|
| **CLUPEIFORMES**     |    |    |    |    |    |    |
| Engraulidae           |    |    |    |    |    |    |
| Amazonasprattus scintilla Roberts 1984 | X |
| Anchovia surinamensis (Bleeker 1865) | X |
| Anchovia cayennensis (Puyo 1946) | X |
| Anchovia guianensis (Eigenmann 1912) | X |
| Anchovia floridanus (Eigenmann 1937) | X |
| **Pristigasteridae**  |    |    |    |    |    |    |
| Ilisha amazonica (Miranda Ribeiro 1920) | X |
| Pellona castaneaena Valenciennes 1847 | X |
| Pellona flavipinnis (Valenciennes 1837) | X |
| **CHARACIFORMES**     |    |    |    |    |    |    |
| Acroteriidae           |    |    |    |    |    |    |
| Acroterius falcatus (Bloch 1794) | X |
| Acroterius heterolopus (Cope 1878)* | X |
| Acroterius microlepis (Jardine 1841) | X |
| Acroterius nasutus Eigenmann 1912 | X |
| Gnathochir denticulatus (Fowler 1913) | X |
| Heterochir macrolepis Eigenmann 1912 | X |
| **Anostomidae**        |    |    |    |    |    |    |
| Anostomoides lateralis (Eigenmann 1912) | X |
| Anostomus ternetzi Fernández-Yépez 1949 | X |
| Hypomischus lineomaculatus Brindelli, Peixoto, Wosiacki and Britski 2013 | X |
| Lepomis platycephalus Garman 1890 | X |
| Lepomis taeniatus (Kner 1858) | X |
| Lepomis ocellatus Steindachner 1876 | X |
| Lepomis amazonicus Santos and Zuanon 2008 | X |
| Lepomis neumanni Myers 1950 | X |
| Lepomis cf. cyanorhynchos Borodin 1929 | X |
| Lepomis fasciatus (Bloch 1794) | X |
| Lepomis friderici (Bloch 1794) | X |
| Lepomis cf. grani Eigenmann 1912 | X |
| Lepomis jatunochi Burns, Chatfield, Brindelli and Sidauskas 2017 | X |
| Lepomis cf. megalops (Günther 1863) | X |
| Lepomis melanostictus (Norman 1926) | X |
| Lepomis aff. nijsseni Garavello 1990 | X |
| Lepomis nigrofasciatus Borodin 1929* | X |
| Lepomis sp.1 | X |
| Lepomis sp.2 | X |
| **Bryconidae**         |    |    |    |    |    |    |
| Brycon nov. Müller and Troschel 1845 | X |
| **Chalceidae**         |    |    |    |    |    |    |
| Chalceus macrolepidotus Cuvier 1818* | X |

**Table 2. Continued.**

| Order/Family/Species | FF | FT | ES | RM | FP | EC |
|----------------------|----|----|----|----|----|----|
| **Characidae**        |    |    |    |    |    |    |
| Acestrocephalus sardina (Fowler 1913) | X |
| Aphyocharax sp. | X |
| Astyanax anisits Eigenmann 1908 | X |
| Astyanax bicolor (Linnaeus 1758)* | X |
| Astyanax cf. multidentis (Eigenmann 1908) | X |
| Brachychilus peruvius (Valenciennes 1850)* | X |
| Britanichthys myersi Géry 1965 | X |
| Bryconamericus orinocensis Román-Valencia 2003 | X |
| Charax caudimaculatus Lucena 1987* | X |
| Hemigrammus anisits Géry 1962* | X |
| Hemigrammus bellottii (Steindachner 1882) | X |
| Hemigrammus caeruleus Durbin 1908 | X |
| Hemigrammus gesleri Zarske and Géry 2007* | X |
| Hemigrammus hyaenurus Durbin 1918 | X |
| Hemigrammus lunatus Durbin 1918* | X |
| Hemigrammus micromastus Durbin 1918 | X |
| Hemigrammus ocellifer (Steindachner 1882) | X |
| Hemigrammus schmardae (Steindachner 1882) | X |
| Hemigrammus strictus (Durbin 1909) | X |
| Hemigrammus sp.1 | X |
| Hemigrammus sp.2 | X |
| Hyphessobrycon cf. aguila Fowler 1913 | X |
| Hyphessobrycon diancistrus Weitzman 1977 | X |
| Hyphessobrycon georgii (Géry 1961)* | X |
| Hyphessobrycon socofari Weitzman 1977 | X |
| Jupiabia abramoides (Eigenmann 1911)* | X |
| Jupiabia acanthogaster (Eigenmann 1911) | X |
| Jupiabia atypidi Zanata 1997 | X |
| Jupiabia keithi (Géry, Planquette and Le Bail 1996)* | X |
| Jupiabia meunieri (Géry, Planquette and Le Bail 1996) | X |
| Jupiabia polylepis (Gunther 1864) | X |
| Jupiabia porosa (Eigenmann 1909)* | X |
| Knodus cf. heteresthes (Eigenmann 1908) | X |
| Knodus hypopterus (Fowler 1943)* | X |
| Knodus aff. hypopterus (Fowler 1943) | X |
| Knodus sp.1 | X |
| Knodus sp.2 | X |
| Microschombrycon callaps Böhlke 1953 | X |
| Microschombrycon casiquiare Böhlke 1953* | X |
| Moenkhausia celibata Marinho and Langeani 2010* | X |
| Moenkhausia chrysargyra (Günther 1864)* | X |
| Moenkhausia colletti (Steindachner 1882) | X |
| Moenkhausia cotinina Eigenmann 1908 | X |
| Moenkhausia geitali (Eigenmann 1907) | X |
| Moenkhausia mira marinhu and Langeani 2010 | X |
| Moenkhausia salia (Günther 1864) | X |
| Moenkhausia aff. surinamensis Géry 1965 | X |
| Pheneogaster simulatus Lucena and Malabarba 2010* | X |
| Popetilia brevispina Reis 1989 | X |
| Rhinoptinae | X |
| Roeboexodon guianensis (Puyo 1948)* | X |
| Serpaeoperca gracilis (Géry 1960)* | X |
| Tetragonopterus carvalhoi Melo, Benine, Mariguela and Oliveira 2011 | X |
| Tetragonopterus chalceus Spix and Agassiz 1829 | X |
| Thryssa bohlkii Weitzman 1957* | X |
Table 2. Continued.

| Order/Family/Species | FF FT ES EN RM FP EC |
|----------------------|-----------------------|
| **Chilodontidae**    |                       |
| Caenopterus latyrynchus (Kner 1858) | X |
| **Crenuchidae**      |                       |
| Characidium cf. ethostoma Cope 1872 | X X X |
| Characidium zebrum Eigenmann 1909 | X X X |
| Crenuchus sp. Günther 1863 | X |
| Microcharacidium electroides (Géry 1960)* | X |
| **Crenoboliidae**    |                       |
| Boulemengera cuvieri (Spix and Agassiz 1829) | X X |
| Boulemengera lucius (Cuvier 1816) | X |
| Boulemengera maculata (Valenciennes 1850) | X |
| Boulemengera syngenesia Varí 1995 | X |
| **Curimatidae**      |                       |
| Curimata aneirin Steindachner 1876 | X |
| Curimata ocellataEigenmann and Eigenmann 1889 | X |
| Curimatopsis macrolepis (Steindachner 1876) | X |
| Curimatopsis melanura Dutra, Melo and Netto-Ferreira 2018 | X |
| Cyphocara xamboensis (Kner 1858) | X |
| Cyphocara annaia Wosiacki and Miranda 2013 | X X |
| Cyphocara festivus Varí 1992* | X |
| Cyphocara heleni (Steindachner 1910) | X |
| Cyphocara nigripinnis Varí 1992 | X |
| Cyphocara cf. notatus (Steindachner 1908) | X X |
| Cyphocara spluripap (Eigenmann and Eigenmann 1889)* | X X X X X |
| Cyphocara spluripus (Günther 1864) | X X |
| Steindachnerina amazonica (Steindachner 1911)* | X |
| **Cynodontidae**     |                       |
| Cynodon septentrio Toledo-Piza 2000 | X |
| Hydrolycus armatus (Jardine 1841) | X |
| Hydrolycus tatusaua Toledo-Piza, Menezes and Santos 1999* | X |
| **Erythrinidae**     |                       |
| Erythrinus erythrinus (Bloch and Schneider 1801) | X X X X X X |
| Hoploerythrinus unicolor (Spix and Agassiz 1829) | X X X X X X |
| Hoplias amara (Valenciennes 1847) | X |
| Hoplias curupira Okawaka and Mattos 2009* | X X X X X X |
| Hoplias malabaricus (Bloch 1794) | X X X X X |
| **Gastropelecidae**  |                       |
| Carangella marthae Myers 1927 | X |
| Carangella striata (Günther 1864) | X |
| Gastropelecus sternicula (Linnaeus 1758)* | X |
| **Hemiodontidae**    |                       |
| Argonectes longiceps (Kner 1858) | X |
| Bivibranchia fawleri (Steindachner 1908) | X |
| Hemiodus argenteus Pellegrin 1909* | X X |
| Hemiodus immaculatus Kner 1858 | X |
| Hemiodus irapuana Langeani and Moreira 2013 | X |
| Hemiodus semiternarius Kner 1858 | X |
| Hemiodus unimaculatus (Bloch 1794) | X |
| Micromichthysugiliatus Robert 1971 | X |

Table 2. Continued.

| Order/Family/Species | FF FT ES EN RM FP EC |
|----------------------|-----------------------|
| **Iguanodectidae**   |                       |
| Bryconops aff. affinis (Günther 1864) | X |
| Bryconops albomaculatus Kner 1858 | X |
| Bryconops aff. caudomaculatus (Günther 1864) | X |
| Bryconops aff. colanegra Chernoff and Machado-Allison 1999 | X |
| Bryconops cf. colanegra Chernoff and Machado-Allison 1999 | X |
| Bryconops cf. collettes Chernoff and Machado-Allison 2005 | X |
| Bryconops sp. | X |
| Bryconops sp. | X |
| Bryconops sp. | X |
| **Lebiasinidae**     |                       |
| Copella amoldi (Regan 1912) | X |
| Copella nattereri (Steindachner 1876) | X |
| Nannostomus digrammus (Fowler 1913) | X |
| Nannostomus espinosus Steindachner 1876 | X |
| Nannostomus marginatus Eigenmann 1889 | X |
| Nannostomus trifasciatus Steindachner 1876 | X |
| Nannostomus unimaculatus Steindachner 1876 | X |
| Pyrrhulina cf. maximus Eigenmann and Eigenmann 1889 | X X X |
| Pyrrhulina sp. | X |
| **Parodontidae**     |                       |
| Parodon guayanasis Géry 1960 | X |
| **Prochilodontidae** |                       |
| Prochilodus rubrotaeniatus Jardine 1841 | X X |
| **Serrasalmidae**    |                       |
| Mylossys paraschomburgki Jégu, Santos and Ferreira 1989 | X |
| Myloplus amoldi (Ahl 1936)* | X |
| Myloplus rhamboideal (Cuvier 1818) | X |
| Myloplus rubripinnis (Müller and Troschel 1844) | X |
| Piranichthys biacanthus (Cuvier 1818)* | X |
| Pygopristis denticulatus (Cuvier 1819) | X |
| Serrasalmus altipinnis Marchi, Jégu and Santos 2000 | X |
| Serrasalmus eigenmanni Norman 1929 | X |
| Serrasalmus hastatus Fink & Machado-Allison, 2001* | X |
| Serrasalmus manuelii (Fernández-Yépez and Ramírez 1967)* | X |
| Serrasalmus rhombiceps (Linnaeus 1768) | X |
| Serrasalmus sp. | X |
| **Trichopteridae**   |                       |
| Agonosteus haeleatus Müller and Troschel 1845 | X |
| Triportheus albus Cope 1872 | X |
| **SILURIFORMES**     |                       |
| Auchenipteridae       |                       |
| Auchenipterus inermis (Linnaeus 1766)* | X |
| Auchenipterus lineatus Ribeiro, Rapp-Py-Daniel and Walsh 2017 | X |
| Auchenipterus polystictus Steindachner 1915 | X |
| Auchenipterus longimanus (Günther 1864) | X |
| Auchenipterus brachycephalus Cope 1878 | X |
| Auchenipterus nuchalis (Spix and Agassiz 1829) | X |
| Centromochlus heckelii (De Filippi 1853) | X |
| Tata intermedia (Steindachner 1877) | X |
| Tata nigro Sarmiento-Soares and Martins-Pinheiro 2008 | X |
| Tata orca (Sarmiento-Soares, Lazzarotto, Py-Daniel and Leitão 2017) | X |
| Trachelyopterus decemrimus Mees 1974 | X |
| Trachelyopterus tomentosus (Kner 1858) | X |
| Trachelyopterus galeatus (Linnaeus 1766) | X |
Table 2. Continued.

| Order/Family/Species | FF FT ES EN RM FP EC |
|----------------------|-----------------------|
| **Callichthyidae**    |                       |
| Callichthys callichthys (Linnaeus 1758) | X X X X X |
| Corydoras badeni Geihe 1969 | X          |
| Corydoras guianensis Nijssen 1970* | X          |
| Corydoras aequifilis Nijssen and Isbrucker 1967* | X |
| Corydoras sp. |                       |
| Hoplosternum littorale (Hancock 1828) | X |
| Megalechis picta (Müller and Troschel 1848) | X |
| **Catopteridae**      |                       |
| Helogones marmoratus Günther 1863 | X X X X |
| **Doradidae**         |                       |
| Acanthodoras cataphractus (Linnaeus 1758) | X          |
| Acanthodoras spinosissimus (Eigenmann and Eigenmann 1888) | X |
| Anduza doriana (Valenciennes 1821) | X |
| Nemadoras elongatus (Boulenger 1898) | X |
| Odontobutis niger (Valenciennes 1821)* | X |
| Scopiorhynchus heckeli (Kner 1855) | X |
| Tenellus leporinus (Eigenmann 1912) | X |
| Tetrachaetodon brevis (Kner 1853) | X |
| **Heptapteridae**     |                       |
| Gladiopterus conquistador Lundberg, Bombuschi and Magno-Leccia 1991 | X |
| Imparfinis hasemani Steindachner 1915 | X |
| Panias amplitletus Cope 1872* | X |
| Pimelodella cristata (Müller and Troschel 1849) | X |
| Pimelodella geryi Hoedeman 1961 | X |
| Pimelodella humeralis Stobadian, Akama and Dutra 2017 | X |
| Pimelodella leptoisos (Fowler 1914) | X |
| Rhadam saequier (Quoy and Gaimard 1824)* | X X X |
| **Loricariidae**      |                       |
| Ancistrus sp.1 | X |
| Ancistrus sp.2 | X |
| Ancistrus sp.3 | X |
| Ancistrus sp.4 | X |
| Baryancistrus hadrostomus Oliveira, Py-Daniel and Oyakawa 2019 | X |
| Cheirodoras rapova Cowan and Fisch-Muller 2012 | X |
| Curvelliconchis sp. | X |
| Hemiancistrus sp. |                       |
| Hypostomus carinatus (Steindachner 1881) | X |
| Hypostomus hemachlidon Armbruster 2003* | X |
| Hypostomus sp. |                       |
| Otoconius vittatus Regan 1904* | X |
| Paracheirodon sp. | X |
| Paratocinclus halbothi Lehmann, Lazzarotto and Reis 2014 | X |
| Peckoltia sp. |                       |
| Pseudancistrus sp.1 | X |
| Pseudancistrus sp.2 | X |
| Rinonocara stewarti (Eigenmann 1909)* | X |
| Rinonocara sp. | X X X |
| **Pimelodidae**       |                       |
| Hemisorubim platyrynchus (Valenciennes 1840) | X |
| Hypophthalmus fimbriatus Kner 1858 | X |
| Hypophthalmus marginatus Valenciennes 1840 | X |
| Pimelodus albofasciatus Mees 1974 | X |
| Pimelodus ornatus Kner 1858 | X |
| Pimicichla thalassina (Spix and Agassiz 1829) | X |
| Pseudoplatystoma punctifer (Castelnau 1855) | X |
| Serrasalmus elongatus Lütken, Baur, Schmidt and Isen 2001* | X |

**Table 2. Continued.**

| Order/Family/Species | FF FT ES EN RM FP EC |
|----------------------|-----------------------|
| **Pseudopimelodidae** |                       |
| Batrachoglanis wilsoni (Eigenmann 1912) | X |
| Microglanis poecilus Eigenmann 1912 | X |
| **Triamblychidae**   |                       |
| Iridespis amazonicus (Steindachner 1882)* | X X X X |
| Paracanthopteryx parva Gilbert 1935 | X |
| Stegophilus paneri (Ahl 19) | X |
| Sternoptychus a. hispidus, Coutinho and Montag 2011 | X |
| **Gymnotiformes**    |                       |
| Gymnotidae |                       |
| Eretmochelys vittata de Santana, Wosiacki, Crampton, Sabaj, Dillman, Castro et Castro, Bastos and Yani 2019 | X |
| Gymnotus carapo Linnaeus 1758 | X X X |
| Gymnotus coroidea Hoedeman 1962 | X |
| Gymnotus cf. stenoleucus Magno-Leccia 1994 | X X |
| Gymnotus sp. | X X X |
| **Hypopomidae**      |                       |
| Brachydanorops bbeeber (Schultz 1944) | X |
| Brachydanorops pinna (Hopkins, Comfort, Bastian and Bass 1990)* | X |
| Brachydanorops sullivani Crampton, de Santana, Waddell andLoveday 2017 | X X |
| Hypopomus antreda (Kup 1956)* | X |
| Hypopomus nigricans Hoedeman 1963 | X |
| **Cynodontiformes**  |                       |
| Erythrinidae |                       |
| Acanthostomus sp.1 | X |
| Acanthostomus sp.2 | X |
| Acanthostomus sp.3 | X |
| Laemichromis sp.1 | X |
| Laemichromis sp.2 | X |
| Laemichromis sp.3 | X |
| **Gobioidei**        |                       |
| Macropodus opercularis Myers 1827 | X |
| **Synbranchiformes** |                       |
| Synbranchidae |                       |
| Synbranchus marmoratus Bloch 1792 | X X X |
| **Cichliformes**     |                       |
| Cichlidae |                       |
| Ancistrinus sp.1 | X |
| Ancistrinus sp.2 | X |
| Ancistrinus sp.3 | X |
| Cichlasoma sp. | X |
| Cichlasoma sp.2 | X |
| Cichlasoma sp.3 | X X X |
| Apistogramma agassizii (Steindachner 1875) | X |
| Apistogramma cf. perigaster (Hassans 1911) | X |
| Apistogramma gr. regani Kullander 1980 | X |
| Apistogramma sp. | X |
| Caerulea caerulea (Steindachner 1875) | X |
| Cichlasoma sp. | X X X |
| Cichlasoma sp.2 | X |
| Cichlasoma sp.3 | X X X |
| Apistogramma gr. regani Kullander 1980 | X |
| Apistogramma sp. | X |
| Caerulea caerulea (Steindachner 1875) | X |
| Cichlasoma sp. | X X X |
| Cichlasoma sp.2 | X |
| Cichlasoma sp.3 | X X X |
| Apistogramma gr. regani Kullander 1980 | X |
| Apistogramma sp. | X |
**Table 2.** Continued.

| Order/Family/Species | FF | FT | ES | EN | RM | FP | EC |
|----------------------|----|----|----|----|----|----|----|
| Crenicichla regani    | X  |    |    |    |    |    |    |
| Crenicichla saxatilis (Linnaeus 1758)* | X | X | X | X | X | X | X |
| Geophagus altifrons (Heckel 1840) | X |    |    |    |    |    |    |
| Krobia guianensis (Regan 1905)* | X |    |    |    |    |    |    |
| Mesonauta acora (Castelnau 1855) | X |    |    |    |    |    |    |
| Mesonauta festivus (Heckel 1840) | X | X | X | X | X | X | X |
| Satanoperca acuticeps (Heckel 1840) | X |    |    |    |    |    |    |
| Satanoperca jurupari (Heckel 1840) | X | X | X | X | X | X | X |
| Taniacara candidi Myers 1935 | X |    |    |    |    |    |    |

**PERCIFORMES**

Sciaenidae

Plagioscion squamosissimus (Heckel 1840) | X

**DISCUSSION**

In general, the composition of the fish fauna of the Northern Pará Drainage System was typical of the Neotropical region, with a predominance of otophysians (Characiformes, Siluriformes and Gymnotiformes) and cichlids (Roberts 1972; Lowe-McConnell 1999; Reis et al. 2016). While the data were not analyzed statistically, the clear variation in the fish diversity of the study areas may be accounted for, at least in part, by the positive relationship between fish diversity and the high productivity of the várzea floodplain ecosystems of the lowland Amazon basin (Forsberg et al. 1993), with decreasing diversity coinciding with the altitudinal gradient (Lujan et al. 2013). At one extreme, FLOTA Faro and FLOTA Pará,
which are located in the lowest part of the study area, had the highest fish diversity, whereas the ESEC G-P North, located at the highest altitudes, had the smallest number of fish species. A decline in fish diversity at higher altitudes is typical of the Neotropical region (e.g., Albert et al. 2011; Lima and Ribeiro 2011; da Costa et al. 2018).

In addition to their greater productivity, Dagosta and de Pinna (2019) also discussed the role of the interconnectivity of lowland watercourses, which tend to facilitate the dispersal of taxa with more ample geographic ranges. By contrast, upland areas tend to be more isolated from neighboring watercourses, resulting in higher endemicity and reduced diversity in comparison with lowland areas. The altitudinal gradient may also represent a key environmental filter for the composition of the fish assemblage, reinforcing the complementarity of the features of different aquatic ecosystems in terms of the conservation of fish diversity. For example, loricariid species predominated in areas of higher altitude (FLOTA Trombetas and ESEC G-P North), while these fish were much less diverse in lowland areas. Areas of higher altitude typically have more rocky substrates and faster flowing water, with an abundance of microhabitats, a type of environment that favors some groups of loricariids (Teresa et al. 2016). In the lowland areas, the higher fish diversity recorded in our study may be related to the variety of aquatic ecosystems sampled, including lakes, streams, and large rivers, in contrast with the headwaters streams, that were the only bodies of water available for sampling in the upland areas.

Six species were recorded for the Amazon basin for the first time. Hypsecobrycon georgeta was previously known only from Suriname, while Jupiaba potaroensis and Phenacogaster simulata had only been recorded in Guyana, and J. keithi in French Guiana (Vari et al. 2009). Corydoras guianensis was known to occur in both French Guiana and Suriname, whereas C. oxyrhynchus was previously considered to be endemic to Suriname (Vari et al. 2009). These findings highlight the similarities of the fish faunas of the Northern Pará Drainage System (NPDS) and some of the coastal drainages of the Guiana Shield. This distribution pattern is described as the Guiana Shield (Atlantic and Amazonian versants) pattern, whereas C. oxyrhynchus was previously considered to be endemic to Suriname (Vari et al. 2009). These findings highlight the similarities of the fish faunas of the Northern Pará Drainage System (NPDS) and some of the coastal drainages of the Guiana Shield. This distribution pattern is described as the Guiana Shield (Atlantic and Amazonian versants) pattern, which may have been the result of faunal exchange caused by headwater capture events (Dagosta and de Pinna 2019). This pattern is further supported by the occurrence of the loricariid Parotocinclus halbothi and the heptapterid Pimelodella geryi Hoedeman 1961, which are known from both the NPDS and the Marowijne River in Suriname (Lehmann et al. 2014; Slobodian et al. 2017; Dagosta and de Pinna 2019). On the other hand, Cieniloricaria napora, Cyphocharax aninha, Hypomasticus lineamaculatus and Pimelodella humeralis (Covain et al. 2012; Birindelli et al. 2013; Wosiacki and Miranda 2013; Slobodian et al. 2017) appear to be endemic to the Northern Pará Drainage System.

CONCLUSIONS

The RAP assessment of the ichthyofauna of the Northern Pará Drainage System provided valuable insights into the fish diversity of the region, contributing an important database for future research and conservation programs. Further expeditions to the NPDS may nevertheless reduce gaps in the ichthyological, taxonomic, and geographic knowledge of this megadiverse group in the Amazon basin.

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**SUPPLEMENTARY MATERIAL** (only available in the electronic version)

DUTRA et al. Rapid assessment of the ichthyofauna of the southern Guiana Shield tributaries of the Amazonas River in Pará, Brazil

**Appendix S1.** Metadata of sampling sites of RAP surveys (2008-2009) in five conservation units in the Northern Pará Drainage System in the southern Guiana Shield region of Pará state, Brazil. CS = collection site. FLOTA Faro = Faro State Forest, FLOTA Trombetas = Trombetas State Forest, FLOTA Paru = Paru State Forest, ESEC Grão-Pará = Grão-Pará Ecological Station, REBIO Maicuru = Maicuru Biological Reserve.

| Site     | Conservation unit | Drainage            | Habitat               | Coordinates                  |
|----------|-------------------|---------------------|-----------------------|------------------------------|
| CS01     | FLOTA Faro        | Rio Nhamundá        | River channel         | 1°42'50.3'S 57°14'49.1"W     |
| CS02     | FLOTA Faro        | Rio Nhamundá        | River channel         | 1°43'49.2'S 57°20'55.5"W     |
| CS03     | FLOTA Faro        | Rio Nhamundá        | Lake                  | 1°42'32.1'S 57°15'43.1"W     |
| CS04     | FLOTA Faro        | Rio Nhamundá        | Lake                  | 1°43'11.4'S 57°13'32.5"W     |
| CS05     | FLOTA Faro        | Rio Nhamundá        | Lake                  | 1°42'26.5'S 57°17'36.2"W     |
| CS06     | FLOTA Faro        | Rio Nhamundá        | Lake                  | 1°43'22.3'S 57°11'36.3"W     |
| CS07     | FLOTA Faro        | Rio Nhamundá        | River channel         | 1°42'41.5'S 57°12'38.1"W     |
| CS08     | FLOTA Faro        | Rio Nhamundá        | Stream                | 1°50'43.5'S 57°25'3.6"W      |
| CS09     | FLOTA Faro        | Rio Nhamundá        | Lake                  | 1°47'48.5'S 57°41'4.10"W     |
| Porto Cikel | FLOTA Faro      | Rio Nhamundá        | River channel         | 1°42'23.3'S 57°21'10.1"W     |
| Trail 1  | FLOTA Faro        | Rio Nhamundá        | Stream                | 1°42'23.3'S 57°21'10.1"W     |
| CS10     | FLOTA Trombetas   | Rio Cuminapanema    | River margin          | 0°54'5'S 55°52'9"W           |
| CS11     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°58'18'S 55°34'4"W          |
| CS12     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°55'11.4'S 55°29'42.4"W     |
| CS13     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°56'11.2'S 55°30'3.17"W     |
| CS14     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°56'5'S 55°29'W             |
| CS15     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°57'S 55°30'38.9"W          |
| CS16     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°57'5'S 55°32'W             |
| CS17     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°57'S 55°31'W               |
| CS18     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°57'5'S 55°31'W             |
| CS19     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°57'44.6'S 55°32'13.4"W     |
| CS20     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°57'5'S 55°31'W             |
| CS21     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°57'5'S 55°31'W             |
| CS22     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°57'5'S 55°31'W             |
| CS23     | FLOTA Trombetas   | Rio Cuminapanema    | Stream                | 0°58'S 55°31'59"W            |
| CS24     | ESEC South        | Rio Curuá           | Stream                | 0°09'3.9'S 55°11'2.5"W       |
| CS25     | ESEC South        | Rio Curuá           | Stream                | 0°09'48.2'S 55°11'2.5"W      |
| CS26     | ESEC South        | Rio Curuá           | River channel         | 0°00'58.7'S 55°10'58.2"W     |
| CS27     | ESEC South        | Rio Curuá           | Stream                | 0°01'10.7'S 55°10'28.5"W     |
| CS28     | ESEC South        | Rio Curuá           | Stream                | 0°01'04.3'S 55°10'38.9"W     |
| CS29     | ESEC South        | Rio Curuá           | River channel         | 0°09'52.2'S 55°10'58.2"W     |
| CS30     | ESEC South        | Rio Curuá           | River channel         | 0°09'46.6'S 55°10'27.8"W     |
| CS31     | ESEC South        | Rio Curuá           | Stream                | 0°09'40.7'S 55°10'36.6"W     |
| CS32     | ESEC South        | Rio Curuá           | Stream                | 0°09'47.6'S 55°11'1.2"W      |
| CS33     | ESEC South        | Rio Curuá           | Stream                | 0°09'46.5'S 55°11'2.7"W      |
| CS34     | ESEC South        | Rio Curuá           | Stream                | 0°09'47.5'S 55°11'20.9"W     |
| CS35     | ESEC South        | Rio Curuá           | Lake                  | 0°09'21.3'S 55°58'29"W       |
| CS36     | ESEC South        | Rio Curuá           | River channel         | 0°09'21.3'S 55°58'29"W       |
| CS37     | ESEC South        | Rio Curuá           | Stream                | 0°09'49.4'S 55°11'52.9"W     |
| CS39     | ESEC North        | Rio Mapuera         | Stream                | 1°15'58.2"N 58°41'4.3"W      |
| CS40     | ESEC North        | Rio Mapuera         | Stream                | 1°16'20.8"N 58°41'9.2"W      |
| CS41     | ESEC North        | Rio Mapuera         | Stream                | 1°16'31.6"N 58°41'11.5"W     |
| CS42     | ESEC North        | Rio Mapuera         | Stream                | 1°16'58.8"N 58°42'9.1"W      |
| CS43     | ESEC North        | Rio Mapuera         | Stream                | 1°15'31.9"N 58°42'40.8"W     |
| CS44     | ESEC North        | Rio Mapuera         | Stream                | 1°15'31.9"N 58°42'40.8"W     |
| CS45     | ESEC North        | Rio Mapuera         | Stream                | 1°16'13.1"N 58°42'16.9"W     |
| CS46     | ESEC North        | Rio Mapuera         | Stream                | 1°16'13.1"N 58°42'16.9"W     |
| CS47     | ESEC North        | Rio Mapuera         | Stream                | 1°16'13.1"N 58°42'16.9"W     |
| CS50     | ESEC North        | Rio Mapuera         | Stream                | 1°16'57.8"N 58°41'19.3"W     |
| CS51     | ESEC North        | Rio Mapuera         | Stream                | 1°17'3.4"N 58°41'20.4"W      |
| CS52     | REBIO Maicuru     | Rio Ipitanga        | Stream                | 0°51'13.8"S 53°57'8"W       |
Appendix S1. Continued.

| Site   | Conservation unit | Drainage | Habitat | Coordinates       |
|--------|-------------------|----------|---------|-------------------|
| CS53   | REBIO Maicuru     | Rio Ipitinga | Stream  | 0°49'50.2'S 53°56.7'W |
| CS54   | REBIO Maicuru     | Rio Ipitinga | Stream  | 0°49'48.4'S 53°56.5'W |
| CS55   | REBIO Maicuru     | Rio Ipitinga | Stream  | 0°49'27.5'S 53°56.2'W |
| CS56   | REBIO Maicuru     | Rio Ipitinga | Stream  | 0°49'51.9'S 53°57.1'W |
| CS57   | REBIO Maicuru     | Rio Ipitinga | Stream  | 0°49'43.8'S 53°56.3'W |
| CS58   | REBIO Maicuru     | Rio Ipitinga | Stream  | 0°48'33.7'S 53°55.5'W |
| CS59   | REBIO Maicuru     | Rio Ipitinga | River margin | 0°49'38.3'S 53°55.1'W |
| CS60   | REBIO Maicuru     | Rio Ipitinga | River margin | 0°49'04.5'S 53°54.3'W |
| CS61   | REBIO Maicuru     | Rio Ipitinga | Stream  | 0°49'24.2'S 53°54.6'W |
| CS62   | FLOTA Paru        | Rio Paru  | River channel | 0°55'54.7'S 53°12.5'W |
| CS63   | FLOTA Paru        | Rio Paru  | River channel | 0°56'58.3'S 53°14.3'W |
| CS64   | FLOTA Paru        | Rio Paru  | Stream    | 0°59'21.6'S 53°14.5'W |
| CS65   | FLOTA Paru        | Rio Paru  | Stream    | 0°55'43.5'S 53°15.1'W |
| CS66   | FLOTA Paru        | Rio Paru  | Stream    | 0°55'45.5'S 53°15.1'W |
| CS67   | FLOTA Paru        | Rio Paru  | Stream    | 0°56'7.7'S 53°13.1'W |
| CS68   | FLOTA Paru        | Rio Paru  | Stream    | 0°57'3.21'S 53°15.3'W |
| CS69   | FLOTA Paru        | Rio Paru  | Stream    | 0°55'54.7'S 53°12.5'W |
| CS70   | FLOTA Paru        | Rio Paru  | Stream    | 0°55'54.7'S 53°12.5'W |
| CS71   | FLOTA Paru        | Rio Paru  | Lake      | 0°55'58.3'S 53°12.5'W |
| CS72   | ESEC Centre       | Rio Cuminapanema | Stream  | 0°37'15.8'S 55°43.3'W |
| CS73   | ESEC Centre       | Rio Cuminapanema | Stream  | 0°38'0'N 55°42.5'W |
| CS74   | ESEC Centre       | Rio Cuminapanema | Stream  | 0°38'10.3'N 55°43.2'W |
| CS75   | ESEC Centre       | Rio Cuminapanema | Stream  | 0°39'48.8'N 55°43.1'W |
| CS76   | ESEC Centre       | Rio Cuminapanema | Stream  | 0°39'45.5'N 55°43.5'W |
| CS77   | ESEC Centre       | Rio Cuminapanema | Stream  | 0°39'7.9'N 55°43.4'W |
| CS78   | ESEC Centre       | Rio Cuminapanema | Stream  | 0°38'22.3'N 55°43.3'W |
| CS79   | ESEC Centre       | Rio Cuminapanema | Stream  | 0°38'15.3'N 55°43.1'W |

Appendix S2. Voucher codes of fish collected during RAP surveys (2008-2009) in five conservation units in the Northern Pará Drainage System in the southern Guiana Shield region of Pará state, Brazil.

CLUPEIFORMES. Engraulidae. *Amazonprattus scintilla*: MPEG 15488, *Anchovia surinamensis*: MPEG 14784, *Anchoviella cayennensis*: MPEG 15425, *Anchoviella guianensis*: MPEG 14882, *Anchoviella lepidostotole*: MPEG 15432, *Pristigasteridae. Ilisha amazonspratt*: MPEG 14776, MPEG 14847, *Pellona castelnaeana*: MPEG 14874, *Pellona flavipinnis*: MPEG 14896.

CHARACIFORMES. Aecostrohynchidae. *Aecostrohynchus falcatus*: MPEG 15761, MPEG 15787, MPEG 18187, MPEG 23359, MPEG 23366, MPEG 23367, MPEG 23370, MPEG 23376, *Aecostrohynchus heterolepis*: MPEG 23376, *Aecostrohynchus microlepis*: MPEG 14794, MPEG 14806, MPEG 14830, MPEG 14832, MPEG 14836, MPEG 14895, MPEG 14895, *Aecostrohynchus nasutus*: MPEG 15373, MPEG 15394, *Gnathocharax steindachneri*: MPEG 15349, MPEG 15396, MPEG 15420, *Heterocharax macrolepis*: MPEG 15120, MPEG 15379, *Anostomidae. Anostomus ternetzi*: MPEG 14787, MPEG 14867, *Anostomus ternetzi*: MPEG 15694, MPEG 15725, *Hyphocharax lineomaculatus*: MPEG 15573, MPEG 15589, MPEG 15663, MPEG 15697, MPEG 15729, *Laemolyta proxima*: MPEG 14766, MPEG 14771, *Laemolyta tenuis*: MPEG 14772, *Leporinus agassizii*: MPEG 15400, *Leporinus amazonicus*: MPEG 14812, *Leporinus brunneus*: MPEG 15402, MPEG 15407, *Leporinus cf. cylindroformis*: MPEG 24317, MPEG 24318, *Leporinus fasciatus*: MPEG 14767, MPEG 24320, MPEG 24322, MPEG 33991, *Leporinus friderici*: MPEG 33992, MPEG 33993, MPEG 33994, *Leporinus cf. granti*: MPEG 33995, *Leporinus jatunocci*: MPEG 24319, *Leporinus cf. megalepis*: MPEG 24326, *Leporinus melanostictus*: MPEG 33996, *Leporinus aff. niijensi*: MPEG 33997, MPEG 33998, MPEG 33999, MPEG 34000, *Leporinus tigrinus*: MPEG 24321, *Leporinus sp.1*: MPEG 34005, *Leporinus sp.2*: MPEG 34001, MPEG 34003, MPEG 34004, *Bryconidae. Brycon pese*: MPEG 14770, MPEG 23306, MPEG 23321, MPEG 23334, MPEG 34004, MPEG 34007, MPEG 34008, *Chacalidae. Chalceus macrolepidotus*: MPEG 23307, MPEG 23309, MPEG 23317, MPEG 23325, *Characidae. Aecostrohynchus sardina*: MPEG 14773, *Aphyocharax sp.*: MPEG 15411, *Astyanax anterior*: MPEG 18207, MPEG 18208, MPEG 18209, *Astyanax bimaculatus*: MPEG 15655, MPEG 15808, MPEG 34115, MPEG 34116, MPEG 34117, MPEG 34118, MPEG 34119, MPEG 34120, MPEG 34121, MPEG 34122, MPEG 34123, MPEG 34124, MPEG 34125, MPEG 34126, MPEG 34127, MPEG 34128, MPEG 34129, MPEG 34130, MPEG 34131, MPEG 34132, MPEG 34133, MPEG 34134, MPEG 34135, MPEG 34136, MPEG 34137, MPEG 34138, MPEG 34139, MPEG 34140, MPEG 34141, *Astyanax cf. multidentis*: MPEG 15382, *Brachychalcinus orbicularis*: MPEG
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agulha surinamensis: MPEG 15107, MPEG 15384, MPEG 15435. Hemigrammus bellottii: MPEG 15338, MPEG 15551, MPEG 15599, MPEG 15639, MPEG 15640, MPEG 15708, MPEG 15709, MPEG 15710, MPEG 15711, MPEG 15712, MPEG 15713, MPEG 15714, MPEG 15740, MPEG 15741, MPEG 15742, MPEG 15743, MPEG 15744, MPEG 15745, MPEG 15746, MPEG 15747, MPEG 15748, MPEG 15749, MPEG 15750, MPEG 15751, MPEG 15752, MPEG 15753, MPEG 15754, MPEG 15755, MPEG 15756, MPEG 15757, MPEG 15758, MPEG 15759, MPEG 15760, MPEG 15761, MPEG 15762, MPEG 15763, MPEG 15764, MPEG 15765, MPEG 15766, MPEG 15767, MPEG 15768, MPEG 15769, MPEG 15770, MPEG 15771, MPEG 15772, MPEG 15773, MPEG 15774, MPEG 15775, MPEG 15776, MPEG 15777, MPEG 15778, MPEG 15779, MPEG 15780, MPEG 15781, MPEG 15782, MPEG 15783, MPEG 15784, MPEG 15785, MPEG 15786, MPEG 15787, MPEG 15788, MPEG 15789, MPEG 15790, MPEG 15791, MPEG 15792, MPEG 15793, MPEG 15794, MPEG 15795, MPEG 15796, MPEG 15797, MPEG 15798, MPEG 15799, MPEG 15800, MPEG 15801, MPEG 15802, MPEG 15803, MPEG 15804, MPEG 15805, MPEG 15806, MPEG 15807, MPEG 15808, MPEG 15809, MPEG 15810, MPEG 15811, MPEG 15812, MPEG 15813, MPEG 15814, MPEG 15815, MPEG 15816, MPEG 15817, MPEG 15818, MPEG 15819, MPEG 15820, MPEG 15821, MPEG 15822, MPEG 15823, MPEG 15824, MPEG 15825, MPEG 15826, MPEG 15827, MPEG 15828, MPEG 15829, MPEG 15830, MPEG 15831, MPEG 15832, MPEG 15833, MPEG 15834, MPEG 15835, MPEG 15836, MPEG 15837, MPEG 15838, MPEG 15839, MPEG 15840, MPEG 15841, MPEG 15842, MPEG 15843, MPEG 15844, MPEG 15845, MPEG 15846, MPEG 15847, MPEG 15848, MPEG 15849, MPEG 15850, MPEG 15851, MPEG 15852, MPEG 15853, MPEG 15854, MPEG 15855, MPEG 15856, MPEG 15857, MPEG 15858, MPEG 15859, MPEG 15860, MPEG 15861, MPEG 15862, MPEG 15863, MPEG 15864, MPEG 15865, MPEG 15866, MPEG 15867, MPEG 15868, MPEG 15869, MPEG 15870, MPEG 15871, MPEG 15872, MPEG 15873, MPEG 15874, MPEG 15875, MPEG 15876, MPEG 15877, MPEG 15878, MPEG 15879, MPEG 15880, MPEG 15881, MPEG 15882, MPEG 15883, MPEG 15884, MPEG 15885, MPEG 15886, MPEG 15887, MPEG 15888, MPEG 15889, MPEG 15890, MPEG 15891, MPEG 15892, MPEG 15893, MPEG 15894, MPEG 15895, MPEG 15896, MPEG 15897, MPEG 15898, MPEG 15899, MPEG 15900, MPEG 15901, MPEG 15902, MPEG 15903, MPEG 15904, MPEG 15905, MPEG 15906, MPEG 15907, MPEG 15908, MPEG 15909, MPEG 15910, MPEG 15911, MPEG 15912, MPEG 15913, MPEG 15914, MPEG 15915, MPEG 15916, MPEG 15917, MPEG 15918, MPEG 15919, MPEG 15920, MPEG 15921, MPEG 15922, MPEG 15923, MPEG 15924, MPEG 15925, MPEG 15926, MPEG 15927, MPEG 15928, MPEG 15929, MPEG 15930, MPEG 15931, MPEG 15932, MPEG 15933, MPEG 15934, MPEG 15935, MPEG 15936, MPEG 15937, MPEG 15938, MPEG 15939, MPEG 15940, MPEG 15941, MPEG 15942, MPEG 15943, MPEG 15944, MPEG 15945.
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**Carimiatidae.** Carinima herzi: MPEG 34009, MPEG 34010. Carinima ocellata: MPEG 15106, MPEG 34180. Carinimatosus melanurus: MPEG 15355, MPEG 35300. Cyphocharax atra: MPEG 14883. Cyphocharax anilini: MPEG 15591, MPEG 15767, MPEG 15783, MPEG 15810, MPEG 34174. Cyphocharax festivus: MPEG 34011. Cyphocharax helieri: MPEG 15734. Cyphocharax nigripinnis: MPEG 15334, MPEG 15416. Cyphocharax cf. notatus: MPEG 15104, MPEG 34012. Cyphocharax spilurus: MPEG 15701, MPEG 15732, MPEG 15782, MPEG 34013, MPEG 34014, MPEG 34015, MPEG 34016, MPEG 34017, MPEG 34018, MPEG 34019, MPEG 34020, MPEG 34021. Cyphocharax spilurus: MPEG 15328, MPEG 15372, MPEG 15699, MPEG 15731, MPEG 34022. Steindachnerina amazonica: MPEG 15700, MPEG 15733.

**Cynodontidae.** Cynodon septemarius: MPEG 14793, MPEG 14809, MPEG 14828, MPEG 14850, MPEG 14886. Hydrolycus armatus: MPEG 23363. Hydrolycus tatiana: MPEG 23362, MPEG 23364, MPEG 23374.

**Erythrinidae.** Erythrinus erythrinus: MPEG 15357, MPEG 15401, MPEG 17276, MPEG 17278, MPEG 17281, MPEG 17282, MPEG 17284, MPEG 18137, MPEG 18138, MPEG 18140, MPEG 18142, MPEG 18144, MPEG 18149, MPEG 23260, MPEG 23261, MPEG 23262, MPEG 23263, MPEG 23264, MPEG 23265, MPEG 23269, MPEG 23277, MPEG 23280, MPEG 23288, MPEG 23291, MPEG 23339. Hoplerythrinus unitaeniatus: MPEG 15361, MPEG 15798, MPEG 17279, MPEG 17304, MPEG 23267, MPEG 23271, MPEG 23282, MPEG 23283, MPEG 23284, MPEG 23298, MPEG 33311. Hoplias aimara: MPEG 15727, MPEG 15728 Hoplias curtipinnis: MPEG 15358, MPEG 15362, MPEG 15696, MPEG 15780, MPEG 15799, MPEG 18141, MPEG 18143, MPEG 23266, MPEG 23278, MPEG 23285, MPEG 23297, MPEG 23301, MPEG 23343, MPEG 23344, MPEG 23368, MPEG 23369. Hoplias malabaricus: MPEG 15366, MPEG 15367, MPEG 15368, MPEG 15757, MPEG 15758, MPEG 15764, MPEG 15800, MPEG 15801, MPEG 23272, MPEG 23294, MPEG 23299, MPEG 23302, MPEG 23340. Gasteropelecidae. Carnegiella marthae: MPEG 15348, MPEG 15397. Carnegiella striata: MPEG 15342. Gasteropelecus sternicla: MPEG 15559, MPEG 15587, MPEG 15662, MPEG 15693, MPEG 15724, MPEG 15763, MPEG 15779.

**Hemiodontidae.** Argonetes longiceps: MPEG 14796, MPEG 14827. Bivibranchia fowleri: MPEG 14774. Hemiodus argenteus: MPEG 14879, MPEG 34029, MPEG 34030. Hemiodus immaculatus: MPEG 14785, MPEG 14818, MPEG 14837, MPEG 14853, MPEG 14870, MPEG 14877, MPEG 14971, MPEG 14972, MPEG 15105. Hemiodus iratapuru: MPEG 34023, MPEG 34024, MPEG 34025, MPEG 34026, MPEG 34027, MPEG 34028. Hemiodus semitaeniatus: MPEG 14778, MPEG 14802, MPEG 14804, MPEG 14894. Hemiodus unimaculatus: MPEG 34031, MPEG 34032, MPEG 34033, MPEG 34034, MPEG 34035, MPEG 34036, MPEG 34037. Micromiscobius guillattus: MPEG 14782. Iguanodectidae. Bryconops aff. affinis: MPEG 18149, MPEG 18171. Bryconops alburnoides: MPEG 14790, MPEG 14824, MPEG 14839, MPEG 14856, MPEG 14860, MPEG 34738. Bryconops aff. catus: MPEG 15703. Bryconops aff. colonoge: MPEG 15613, MPEG 15614, MPEG 18162, MPEG 18165, MPEG 18183, MPEG 18184, MPEG 18202. Bryconops cf. colorata: MPEG 17232. Bryconops cf. colletti: MPEG 34188. Bryconops disruptus: MPEG 15112. Bryconops giacopinii: MPEG 34038. Bryconops sp.: MPEG 34189. Iguanodectes cf. geisleri: MPEG 15325. Iguanodectes cf. spilurus: MPEG 15415. Lebiasinidae. Copella arnoldi: MPEG 15557, MPEG 15558, MPEG 15600, MPEG 15619, MPEG 15640, MPEG 15651, MPEG 15652, MPEG 15673, MPEG 15778, MPEG Capella nattereri: MPEG 15108, MPEG 15117, MPEG 15329, MPEG 15429. Nannostomus gignammus: MPEG 15115, MPEG 15381, MPEG 15431. Nannostomus equus: MPEG 15371. Nannostomus marginatus: MPEG 15333, MPEG 15346, MPEG 15417. Nannostomus truscii: MPEG 15413. Nannostomus unifasciatus: MPEG 15110, MPEG 15370, MPEG 15374. Pyrrhulina cf. maxima: MPEG 14873, MPEG 15629, MPEG 15661, MPEG 15672, MPEG 15692, MPEG 18110, MPEG 18111, MPEG 18112, MPEG 18113, MPEG 18114, MPEG 18115, MPEG 18116, MPEG 18117, MPEG 18188, MPEG 18214, MPEG 19110, MPEG 19111, MPEG 19112, MPEG 19113, MPEG 19114, MPEG 19115, MPEG 19116, MPEG 19117, MPEG 19118, MPEG 19119, MPEG 19120, MPEG 19121, MPEG 19122, MPEG 19123, MPEG 19124. Pyrrhulina sp.: MPEG 15330, MPEG 15345. Parodon gysanensis: MPEG 23258, MPEG 23259. Prochilodontidae. Prochilodus rubrotaeniatus: MPEG 15631, MPEG 15759, MPEG 34039, MPEG 34040, MPEG 34041, MPEG 34042. Serrasalmidae. Myloplus peruvius: MPEG 2333. Myloplus arnoldi: MPEG 23335. Myloplus rhomboidalis: MPEG 23303, MPEG 23322, MPEG 23324, MPEG 23326. Myloplus rubripinnis: MPEG 23305. Piaractus brachypomus: MPEG 23308. Pygopristis denticulata: MPEG 15422. Serrasalmus altispinis: MPEG 14861, MPEG 14865, MPEG 14890, MPEG 34004, MPEG 34032. Serrasalmus eigenmanni: MPEG 23314, MPEG 23318, MPEG 23328, MPEG 23336. Serrasalmus hartii: MPEG 23327. Serrasalmus manu: MPEG 14799, MPEG 14801, MPEG 14803, MPEG 14852, MPEG 14862, MPEG 14884, MPEG 15405. Serrasalmus rhomboeus: MPEG 23329. Serrasalmus sp.: MPEG 14808. Tripotheridae. Agonistes baleatus: MPEG 14764, MPEG 14797, MPEG 14816, MPEG 14831, MPEG 14894, MPEG 14895, MPEG 14900. Tripotherus albatus: MPEG 14788, MPEG 14789, MPEG 14811, MPEG 14834, MPEG 14843, MPEG 14849, MPEG 14869, MPEG 14881, MPEG 34196, MPEG 34197, MPEG 34198, MPEG 34199.
SILURIFORMES. Auchenipteridae. Ageneiosus inermis: MPEG 22792. Ageneiosus polystricus: MPEG 14819, MPEG 14840, MPEG 14890. Ageneiosus lineatus: MPEG 14805, MPEG 14822, MPEG 14857. Aucheniptichys longimanus: MPEG 14800, MPEG 14810, MPEG 14821, MPEG 14826, MPEG 14844, MPEG 14846, MPEG 14863, MPEG 15355. Auchenipterus brachyurus: MPEG 14815, MPEG 14833, MPEG 34078, MPEG 34079, MPEG 34080. Auchenipterus nuchalis: MPEG 14777, MPEG 14871, MPEG 14880. Centromochlus heckelii: MPEG 14838, MPEG 14858. Tiatia intermedia: MPEG 23355, MPEG 23356, MPEG 23358. Tiatia nigra: MPEG 14783, MPEG 14820, MPEG 14842, MPEG 14851, MPEG 14887. Tiatia orca: MPEG 14823. Trachelyichys decratadatus: MPEG 15109. Trachelyichysis taeniatus: MPEG 14876. Trachelyopterus galeatus: MPEG 24331, MPEG 24332, MPEG 24334, MPEG 24335, MPEG 24336.

Callichthyidae. Callichysis callichthys: MPEG 15756, MPEG 17295, MPEG 19163, MPEG 19165, MPEG 19168, MPEG 19170, MPEG 19173, MPEG 19175, MPEG 19177, MPEG 19178, MPEG 19179, MPEG 19180, MPEG 19181, MPEG 34081. Corydoras baderi: MPEG 18238. Corydoras guianensis: MPEG 15565, MPEG 15581, MPEG 15715, MPEG 15716, MPEG 15746. Corydoras sp.: MPEG 19126. Hoplosternum littorale: MPEG 15356, MPEG 15359, MPEG 15367. Megalechis picta: MPEG 15343, MPEG 15360, MPEG 15363. Cetopsidae. Helogenes marmoratus: MPEG 14876, MPEG 15605, MPEG 15622, MPEG 18104, MPEG 18105, MPEG 18106, MPEG 18107, MPEG 18108, MPEG 18109, MPEG 18147, MPEG 18218, MPEG 18219, MPEG 23344, MPEG 23345, MPEG 23346, MPEG 23347, MPEG 23348, MPEG 23349, MPEG 23350, MPEG 23351, MPEG 23352, MPEG 23353, MPEG 23354, MPEG 23357. Doradidae. Acanthodoras cataphractus: MPEG 15365. Acanthodoras spinosissimus: MPEG 15116. Anudaeodos oxyrhynchos: MPEG 14841. Nemadours elongatus: MPEG 14889. Oxidoras niger: MPEG 22793. Scorpiodoras heckelii: MPEG 14845, MPEG 15369. Tenellus leporinus: MPEG 14848, MPEG 14864, MPEG 14888. Trachydoras brevis: MPEG 14813.

Heptapteridae. Gladioglanis conquistador: MPEG 15347. Imparfinis hasemani: MPEG 22789, MPEG 22790, MPEG 22791. Pariolius armillatus: MPEG 22784. Pimelodella cristata: MPEG 34142, MPEG 34177. Pimelodella geryi: MPEG 15690, MPEG 15691. Pimelodella numeralis: MPEG 15712, MPEG 15744, MPEG 34994. Pimelodella leptosoma: MPEG 15743. Rhamdia quelen: MPEG 18213, MPEG 34176, MPEG 34178, MPEG 34179, MPEG 34181, MPEG 34182, MPEG 34183, MPEG 34184, MPEG 34185, MPEG 34186. Loricariidae. Ancistrus sp.: MPEG 17298. Ancistrus sp.2: MPEG 17296, MPEG 17297, MPEG 19062. Ancistrus sp.3: MPEG 19068. Baryancistrus hadrostomus: MPEG 19064, MPEG 19065, MPEG 19066. Ceniloricaria napoue: MPEG 34190. Hemiancistrus sp.: MPEG 19061. Curculionichysis: MPEG 15607, MPEG 15714, MPEG 15745. Hypostomus carinatus: MPEG 15103. Hypostomus hemiochlidon: MPEG 22794, MPEG 22796, MPEG 22797, MPEG 34191. Hypostomus sp.: MPEG 22795, MPEG 34192, MPEG 34193. Otopinclus viittatus: MPEG 19063, MPEG 19125, MPEG 19176, MPEG 34194. Paralithoxus sp.: MPEG 19135. Parotocinclus balbothi: MPEG 17299. Peckoltia sp.: MPEG 19136, MPEG 19137, MPEG 19138. Pseudancistrus sp.: MPEG 19067. Pseudanidae. MPEG 34195. Rineloricaria steutarti: MPEG 19140. Rineloricaria sp.: MPEG 15713, MPEG 18123, MPEG 18124, MPEG 18240, MPEG 19141, MPEG 19142, MPEG 19144, MPEG 19145, MPEG 19147, MPEG 19148, MPEG 19149, MPEG 19150, MPEG 19151, MPEG 19152, MPEG 19153, MPEG 19154, MPEG 19155, MPEG 19156, MPEG 19157, MPEG 19158. Pimelodidae. Hemisorubim platyrhynchos: MPEG 23361, MPEG 23371, MPEG 23375. Hypothalmus fimbriatus: MPEG 14829. Hypothalmus marginitus: MPEG 14798. Pelomedus albofasciatus: MPEG 14763, MPEG 14775, MPEG 14778, MPEG 14781, MPEG 14814, MPEG 14899. Pelomedus ornatus: MPEG 23368, MPEG 23372, MPEG 23373. Pinarampus pirinampa: MPEG 23360, MPEG 23369. Pseudoplathistoma punctifer: MPEG 23377. Sorubim elongatus: MPEG 14825, MPEG 14855, MPEG 14902. Pseudoimelodidae. Batroboglanis villosus: MPEG 23365. Microglanis poecilus: MPEG 15487.

Trichomycteridae. Ingaacanthus amazonicus: MPEG 15556, MPEG 15618, MPEG 15639, MPEG 15780, MPEG 17285, MPEG 17286, MPEG 17287, MPEG 18118, MPEG 18122, MPEG 19083, MPEG 19084, MPEG 19085, MPEG 19086, MPEG 19087, MPEG 19088, MPEG 19089, MPEG 19090, MPEG 19091. Paracanthopoma parvus: MPEG 15486. Spegophilus panzeri: MPEG 15718. Stenobolemus sx: MPEG 15101.

GYMNOTIFORMES. Gymnotidae. Electrophorus voltai: MPEG 15529. Gymnotus canapo: MPEG 15680, MPEG 18235, MPEG 22787. Gymnotus coripinae: MPEG 15566, MPEG 15608, MPEG 15609, MPEG 15624, MPEG 15625, MPEG 15647, MPEG 15648, MPEG 15681, MPEG 15682, MPEG 15683, MPEG 15773, MPEG 15774, MPEG 18211, MPEG 18233, MPEG 18234, MPEG 18236, MPEG 18237. Gymnotus cf. stenoleucus: MPEG 18134, MPEG 19130, MPEG 22788. Gymnotus sp.: MPEG 18135, MPEG 19128, MPEG 19129, MPEG 19131. Hypopomidae. Brachyhypopomus beebei: MPEG 15646, MPEG 15336, MPEG 15679. Brachyhypopomus pinnicudatus: MPEG 19126. Brachyhypopomus sullivani: MPEG 15623, MPEG 18125, MPEG 18126, MPEG 18127, MPEG 18133, MPEG 18230, MPEG 18231, MPEG 18232. Hypopomus artedi: MPEG 17301. Rhamphichthyidae. Hyopogus lepturus: MPEG 15119, MPEG 15332, MPEG 15392.

CYPRINODONTIFORMES. Rivulidae. Anablepoides sp.: MPEG 17253, MPEG 17255, MPEG 17256, MPEG 17257, MPEG 17258, MPEG 17259, MPEG 17260, MPEG 17261, MPEG 17262, MPEG 17263, MPEG 17264, MPEG 17265,
MPEG 17266, MPEG 17267, MPEG 17269, MPEG 17270, MPEG 17271, MPEG 17273, MPEG 17274, MPEG 17275, MPEG 17305, Anablepoides sp.2: MPEG 34704, MPEG 34705. Anablepoides sp.3: MPEG 34698, MPEG 34699, MPEG 34700, MPEG 34701, MPEG 34702, MPEG 34703. Laemosemion sp.1: MPEG 15805. Laemosemion sp.2: MPEG 15642, MPEG 15653. Laemosemion sp.3: MPEG 15341, MPEG 15424.

GOBIIFORMES. Eleotridae. Microphilypnus ternetzi: MPEG 15326.

SYNBRANCHIFORMES. Synbranchidae. Synbranchus marmoratus: MPEG 15671, MPEG 18102, MPEG 18103, MPEG 22781, MPEG 22783, MPEG 22785, MPEG 22786.

CICHLIFORMES. Cichlidae. Acarichthys heckeli: MPEG 15485. Acrania nassa: MPEG 15398. “Aequidens” potaroensis: MPEG 17288, MPEG 17289, MPEG 17290, MPEG 17291, MPEG 17292, MPEG 17293, MPEG 17302, MPEG 17303. Aequidens tetramerus: MPEG 15350, MPEG 15364, MPEG 15368. Aequidens sp.1: MPEG 15762, MPEG 15794, MPEG 15804, MPEG 15805, MPEG 18225, MPEG 33954, MPEG 33955. Aequidens sp.2: MPEG 33949, MPEG 33950, MPEG 33951, MPEG 33952, MPEG 33953, MPEG 34706. Aequidens sp.3.: MPEG 18128, MPEG 18129, MPEG 18130, MPEG 18131, MPEG 18132, MPEG 18189, MPEG 18190, MPEG 18191, MPEG 18192, MPEG 18193, MPEG 18221, MPEG 18222, MPEG 18223, MPEG 18224, MPEG 18226, MPEG 18227, MPEG 33946, MPEG 33947. Apistogramma agassizii: MPEG 15494, MPEG 15495. Apistogramma cf. pertensis: MPEG 15491. Apistogramma gr. regani: MPEG 15492. Apistogramma sp.: MPEG 22798. Caquetaia spectabilis: MPEG 15496, MPEG 15497, MPEG 33956. Cichla jariina: MPEG 34731. Crenicichla albopunctata: MPEG 15567, MPEG 15568, MPEG 15650, MPEG 15685, MPEG 15719, MPEG 15748. Crenicichla cf. inpa: MPEG 15569, MPEG 15582, MPEG 15583, MPEG 18120, MPEG 18229, MPEG 18212, MPEG 18222, MPEG 24305, MPEG 24306, MPEG 24307, MPEG 24308, MPEG 24309, MPEG 24310. Crenicichla menezesi: MPEG 18228, MPEG 24311, MPEG 24312. Crenicichla pydanielae: MPEG 24313. Crenicichla regani: MPEG 15489. Crenicichla saxatilis: MPEG 15595, MPEG 17294, MPEG 24314, MPEG 34739. Crenicichla strigata: MPEG 24315. Geophagus altifrons: MPEG 34726, MPEG 34727, MPEG 34730. Krobia guianensis: MPEG 15570, MPEG 15584, MPEG 15596, MPEG 15626, MPEG 15627, MPEG 15635, MPEG 15668, MPEG 15687, MPEG 15720, MPEG 15721, MPEG 15749, MPEG 15750, MPEG 15775. Mesonauta acora: MPEG 15388. Mesonauta festivus: MPEG 15395, MPEG 34729. Satanoperca acuticeps: MPEG 15406. Satanoperca jurupari: MPEG 24328, MPEG 24329, MPEG 24330. Taeniacara candidi: MPEG 15490, MPEG 15493.

PERCIFORMES. Sciaenidae. Plagioscion squamosissimus: MPEG 14875.