ENVIRONMENTAL AND SPATIAL FACTORS ARE POOR PREDICTORS OF FISH BETA DIVERSITY IN CERRADO STREAMS

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Material Suplementar

SPECIES ACCUMULATION CURVES AND SAMPLE COVERAGE

We evaluated whether the sampling effort employed in our study was adequate. For this, we used analysis of the species accumulation curve and sample sufficiency. The species accumulation curve can be obtained through rarefaction and evaluates whether the number of species collected with the sampling effort carried out is close to the expected for that region. Sampling sufficiency indicates whether the collectors were able to cover an adequate sampling area/sites to obtain a good representation of the observed communities.

To perform these analyses, we used the rarefaction and extrapolation (R/E) method (Colwell *et al.* 2012). Analyses were performed with modified presence and absence data from the Hill number series with 95% confidence intervals calculated using the bootstrap method (Hill 1973, Chao *et al.* 2014). The analyses were performed in the R program (R Core Team 2022), and we use the *iNext* function from the *iNext* package (Hsieh *et al.* 2016).

Our results indicated that our sampling effort is adequate, but new species would still be added with increasing effort (Figure S1). Our results indicate that we sampled more than 93% of the expected fish richness. In Lima *et al.* (2021), can find more details on the fish diversity of the upper Araguaia river basin.

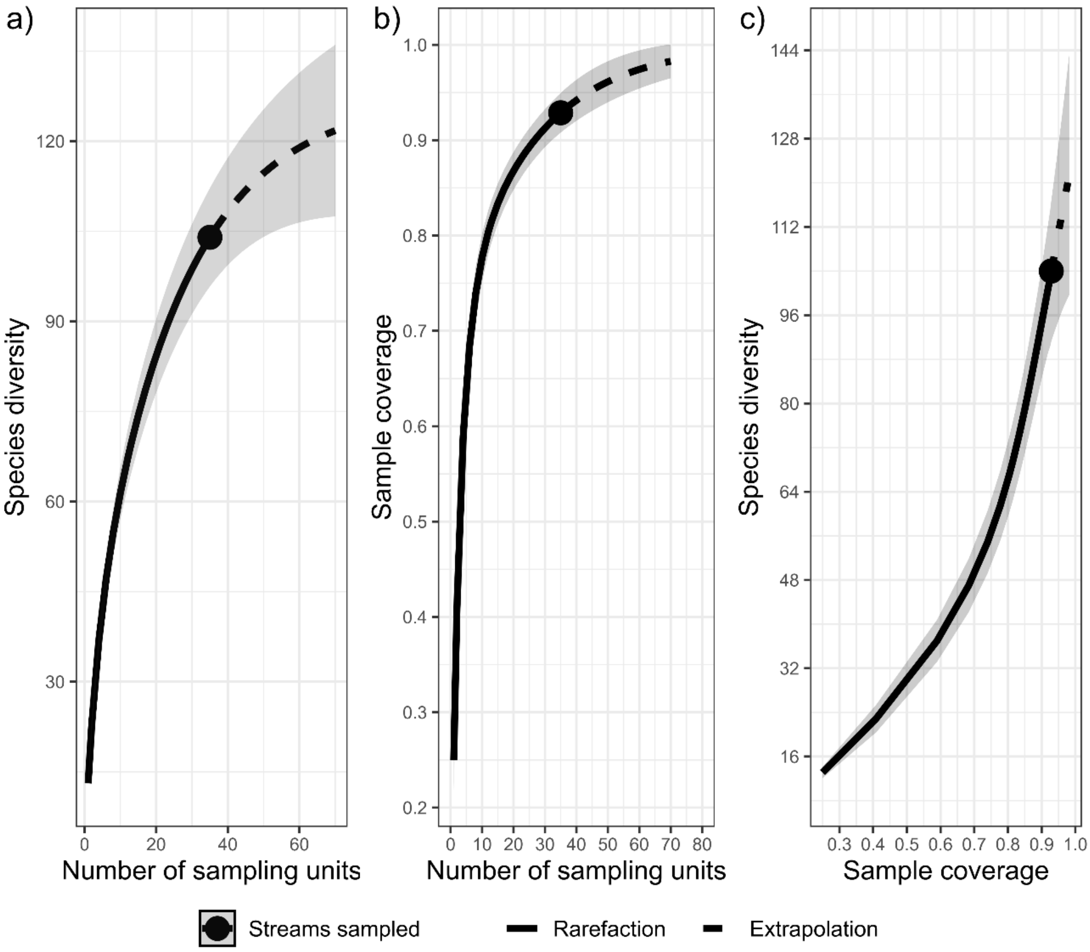

Figure S1. (a) Incidence-based species accumulation curves (*i.e.*, species richness), (b) Sample completeness curves based on the number of sampling sites (c) coverage-based sampling curves based on species richness.

Table S1. Fish abundance, mean total length (TL), mean standard length (SL) and weight (W), and the taxonomic identification collected in streams in the Upper Araguaia River basin.

Ordem/Family/Species	TL	SL	W	Abundance
Characiformes				7.611
Anostomidae				26
Leporinus cf. *klausewitzi* Géry, 1960	18.20	15.00	67.37	1
Leporinus friderici (Bloch, 1794)	8.15	6.61	7.18	3
Leporinus sp.1	8.11	6.56	8.70	22
Bryconidae				1
Brycon falcatus Müller & Troschel, 1844	22.00	18.50	140.50	1
Curimatidae				367

Curimatella immaculata (Fernández-Yépez, 1948)	7.82	6.21	6.94	1
Cyphocharax gouldingi Vari, 1992	6.41	5.12	4.10	63
Steindachnerina amazonica (Steinachner, 1911)	10.93	8.28	16.50	303
Erythrinidae				42
Hoplias cf. malabaricus (Bloch, 1794)	8.85	7.31	20.71	42
Acestrorhynchidae				11
Acestrorhynchus falcatus (Bloch, 1794)	21.40	18.15	66.80	2
Acestrorhynchus microlepis (Schomburgk, 1841)	12.71	10.08	13.69	9
Characidae				6.484
Aphyocharax alburnus (Günther, 1869)	3.85	3.15	0.51	5
Aphyocharax sp. 1	3.83	3.16	0.62	20
Astyanax argyrimarginatus Garutti, 1999	5.62	4.57	2.73	119
Astyanax goyacensis (Eigenmann, 1908)	5.66	4.61	3.44	437
Astyanax elachylepis (Bertaco & Lucinda, 2005)	11.90	10.00	27.27	20
Astyanax sp.	7.42	6.08	4.42	270
Psalidodon xavante (Garutti & Venere, 2009)	4.57	3.79	7.48	511
Creagrutus figueiredoi Vari & Harold, 2001	4.37	3.65	0.95	87
Creagrutus menezesi Vari & Harold, 2001	3.68	2.96	0.65	99
Creagrutus seductus Vari & Harold, 2001	2.99	2.42	0.23	70
Hemigrammus aff. *levis* Durbin, 1908	3.45	2.77	0.46	6
Hemigrammus cf. *rodwayi* Durbin, 1909	3.00	2.43	0.28	210
Hyphessobrycon aff. *tenuis* Géry, 1964	3.41	2.77	1.44	332
Hyphessobrycon sp.	3.49	2.83	0.43	261
Jupiaba polylepis (Günther, 1864)	4.38	3.48	0.887	55
Jupiaba acanthogaster (Eigenmann, 1911)	4.61	3.82	1.26	10
Knodus cf. *breviceps* (Eigenmann, 1908)	3.48	2.85	0.52	1.150
Microschemobrycon sp. 1	2.90	2.36	0.21	8
Microschemobrycon sp. 2	3.85	3.10	0.61	1
Moenkhausia aurantia Jerep & Carvalho, 2011	5.70	4.50	2.59	306
Moenkhausia cf. *comma* Eignmann, 1908	7.70	6.39	7.48	27

Moenkhausia lepidura (Kner, 1858)	5.48	4.45	1.50	136
Moenkhausia venerei Petrolli, Azevedo-Santos & Benine 2016	3.41	2.72	0.45	198
Moenkhausia dichroura (Kner, 1858)	7.28	5.89	3.60	2
Moenkhausia oligolepis (Günther, 1864)	5.92	4.77	4.31	177
Odontostilbe sp.	3.06	2.44	0.30	1.299
Phenacogaster sp.	3.68	2.98	0.49	633
Roeboexodon geryi (Myers, 1960)	6.44	5.24	2.47	22
Tetragnopterus sp.	7.27	6.11	6.10	9
Thayeria boehlkei Weitzman, 1957	4.21	3.26	0.83	4
Crenuchidae				247
Characidium cf. *zebra* Eignmann, 1909	3.23	2.66	0.35	246
Characidium sp. 1	4.07	3.44	0.59	1
Gasteropelecidae				106
Thoracocharax cf. *stellatus* (Kner, 1858)	5.82	4.68	3.64	106
Iguanodectidae				216
Bryconops cf. *melanurus* (Bloch, 1794)	8.01	6.82	5.06	38
Bryconops cf. *giacopinii* (Fernández-Yépez, 1948)	5.57	4.58	2.08	178
Lebiasinidae				15
Pyrrhulina australis Eigenmann & Kennedy, 1903	3.71	2.93	0.46	15
Parodontidae				95
Apareiodon sp. 1	3.85	3.20	0.51	2
Apareiodon sp. 2	2.56	2.03	0.16	88
Parodon pongaensis (Allen, 1942)	4.02	3.27	0.58	5
Serrasalmidae				1
Serrasalmus spilopleura (Kner, 1858)	6.39	5.48	3.10	1
Cyprinodontiformes				92
Poeciliidae				3
Pamphorichthys araguaiensis Costa, 1991	2.09	1.69	0.61	3
Rivulidae				89

Melanorivulus zygonectes Myers, 1927	2.62	2.13	0.21	89
Gymnotiformes				199
Gymnotidae				25
Gymnotus cf. *carapo* Linnaeus, 1758	15.16	-	13.50	15
Gymnotus sp.	5.42	-	0.63	10
Apteronotidae				10
Apteronotus albifrons (Linnaeus, 1766)	12.21	-	5.45	10
Rhamphichthyidae				45
Gymnorhamphichthys petiti (Géry & Vu-Tân-Tuê,1964)	12.10	-	1.25	45
Sternopygidae				119
Eigenmannia cf. *trilineata* López & Castello, 1966	11.86	-	2.82	112
Sternopygus macrurus (Bloch & Schneider, 1801)	18.88		12.87	7
Cichliformes				63
Cichlidae				63
Aequidens tetramerus (Heckel, 1840)	8.36	6.49	16.19	28
Apistogramma sp.	2.74	2.12	0.37	5
Biotodoma aff. *cupido* (Heckel, 1840)	8.79	6.94	10.41	2
Cichlasoma sp.	4.55	3.54	1.95	1
Crenicichla labrina (Spix & Agassiz, 1831)	6.92	5.57	3.73	8
Crenicichla reticulata (Heckel, 1840)	7.26	6.11	4.17	2
Crenicichla sp.	8.09	6.76	5.91	5
Heros aff. *efasciatus* (Heckel, 1840)	9.84	7.54	20.72	1
Laetacara araguaiae Ottoni & Costa, 2009	4.78	3.63	1.95	1
Retroculus sp.	9.83	8.23	18.19	8
Satanoperca jurupari (Heckel, 1840)	11.26	9.09	23.84	2
Siluriformes				1275
Trichomycteridae				3
Ituglanis macunaima Datovo & Landim, 2005	4.75	4.17	0.71	2
Stegophilus sp.	3.06	2.62	0.41	1
Asprendinidae				1

Bunocephalus sp.	6.12	4.95	1.65	1
Callichthyidae				415
Aspidoras poecilus Nijssen & Isbrücker, 1976	2.99	2.33	0.57	354
Callichthys callichthys (Linnaeus, 1758)	9.24	7.51	14.68	4
Corydoras maculifer Nijssen & Isbrücker, 1971	5.40	4.16	3.19	7
Corydoras araguaiensis Sands, 1990	4.57	3.58	2.41	50
Cetopsidae				4
Cetopsis sp.	4.14	3.73	1.07	4
Heptapteridae				356
Cetopsorhamdia sp.	3.01	2.12	0.185	6
Imparfinis mirini Haseman, 1911	5.14	4.27	1.099	147
Imparfinis sp.	5.21	4.26	1.03	12
Mastiglanis asopos Bockmann, 1994	3.37	2.79	0.29	30
Phenacorhamdia somnians (Mees 1974)	4.29	3.46	0.53	52
Pimelodella sp. 1	7.80	6.51	4.05	30
Pimelodella sp. 2	7.06	5.66	2.42	4
Pimelodella sp. 3	5.44	4.36	1.25	70
Rhamdia quelen (Quoy & Gaimard, 1824)	11.76	10.06	14.10	5
Loricariidae				452
Ancistrus sp.	6.76	5.17	5.14	8
Farlowella aff. *oxyrryncha* (Kner, 1853)	10.58	9.90	1.04	49
Farlowella aff. *schreitmuelleri* (Ahl, 1937)	8.89	8.16	0.62	28
Hisonotus sp.	2.48	1.97	0.17	19
Hypostomus faveolus Zawadzki, Birindelli & Lima, 2008	19.26	14.58	123.09	5
Hypostomus sp. 1	8.11	6.18	15.76	16
Hypostomus sp. 2	6.59	5.03	3.42	1
Hypostomus sp. 3	5.52	4.24	2.81	109
Hypostomus sp. 4	3.44	2.70	1.21	33
Hypostomus sp. 5	3.99	3.06	0.80	3
Hypostomus aff. *cochliodon* Kner, 1854	6.32	5.73	5.52	1

Loricaria sp. 1	9.57	8.35	3.36	2
Loricaria sp. 2	10.60	9.48	6.43	34
Loricaria sp. 3	17.6	14.93	22.73	4
Otocinclus sp.	2.33	1.92	0.15	1
Parancistrus sp.	9.62	7.57	13.76	1
Parotocinclus britskii Boeseman, 1974	2.43	1.96	0.15	55
Parotocinclus sp.	2.37	1.93	0.14	39
Rineloricaria hasemani Isbrücker & Nijssen, 1979	6.59	5.71	1.37	36
Aphanotorulus emarginatus (Valenciennes, 1840)	5.04	3.76	1.03	1
Sturisoma aff. *nigrirostrum* Fowler, 1940	8.44	7.43	1.04	7
Pseudopimelodidae				44
Microglanis sp.	3.02	2.45	0.38	44
Synbranchiformes				7
Sternopygidae				7
Synbranchus marmoratus Bloch, 1975	13.98	-	6.85	7
Total				9246

Table S2. List of individual abundances and species richness.

	Abundance	**Richness**
Stream 01	511	1
Stream 02	97	9
Stream 03	48	12
Stream 04	76	16
Stream 05	269	12
Stream 06	410	25
Stream 07	52	13
Stream 08	360	14
Stream 09	27	9
Stream 10	407	31
Stream 11	741	48
Stream 12	526	12
Stream 13	1234	39
Stream 14	214	8
Stream 15	677	31
Stream 16	683	23
Stream 17	163	23
Stream 18	78	7
Stream 19	94	18
Stream 20	73	2
Stream 21	46	13
Stream 22	88	10
Stream 23	253	4
Stream 24	120	4
Stream 25	12	3
Stream 26	363	9
Stream 27	141	8
Stream 28	25	9

Stream 29	92	3
Stream 30	126	27
Stream 31	306	23
Stream 32	67	9
Stream 33	364	18
Stream 34	46	15
Stream 35	457	20

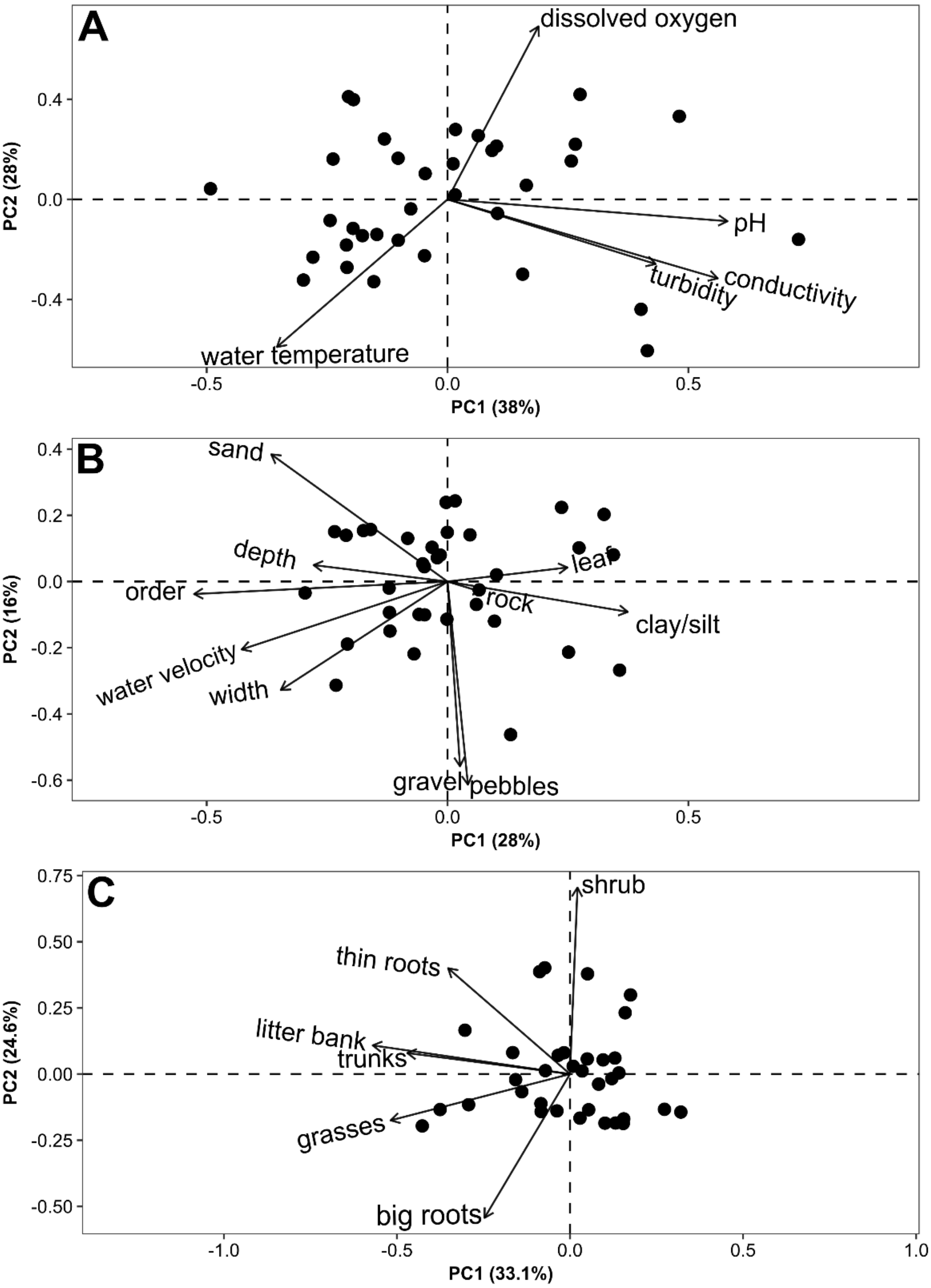

Figure S2. Ordination of environmental variables groups with principal components analysis (PCA) of streams (n = 35 sites). A: limnological variables; B: within stream variables; C: stream bank variables.

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