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Supplementary Material

Macrophyte banks and fish early stages in a cascade of small hydropower reservoirs (south-eastern Brazil): temporal changes along the reproductive cycle and influence of the limnological and spatial organisation

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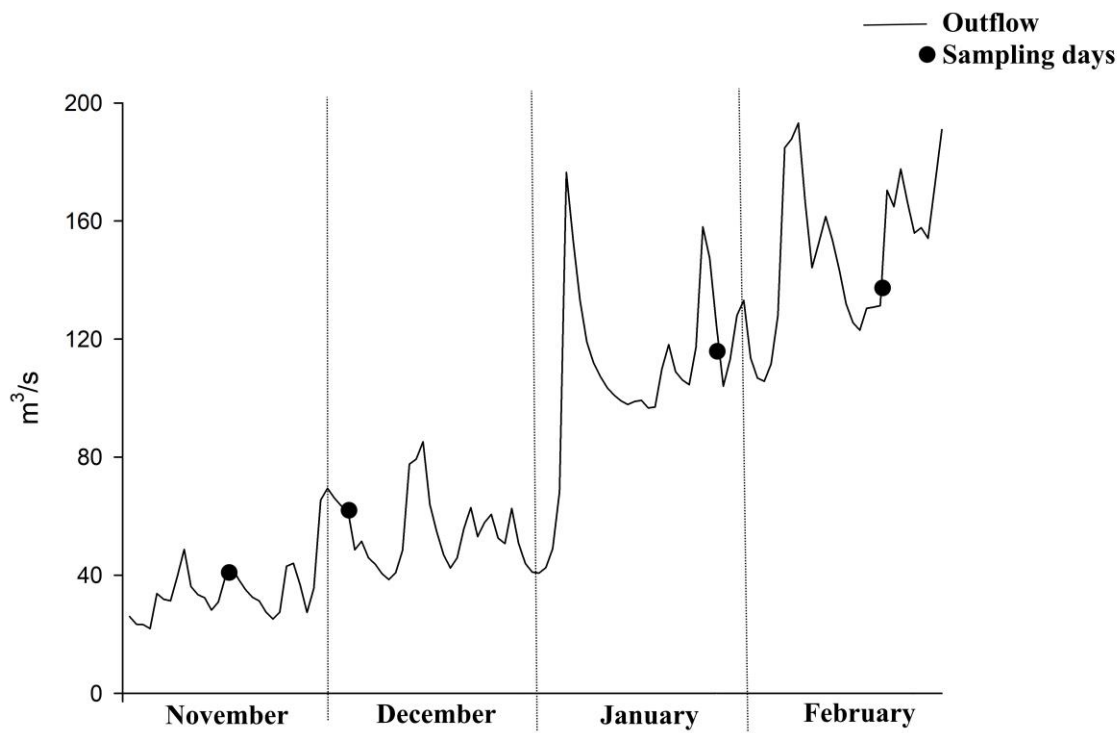


Figure S1. Outflow variation during the sampling period in the Sapucaí-Mirim River sampling stretch (SP, Brazil). Source: Sistema Integrado de Bacias Hidrográficas – Departamento de Água e Energia Elétrica de São Paulo. Dots correspond to the sampling days. Period: November 2019 to February 2020.

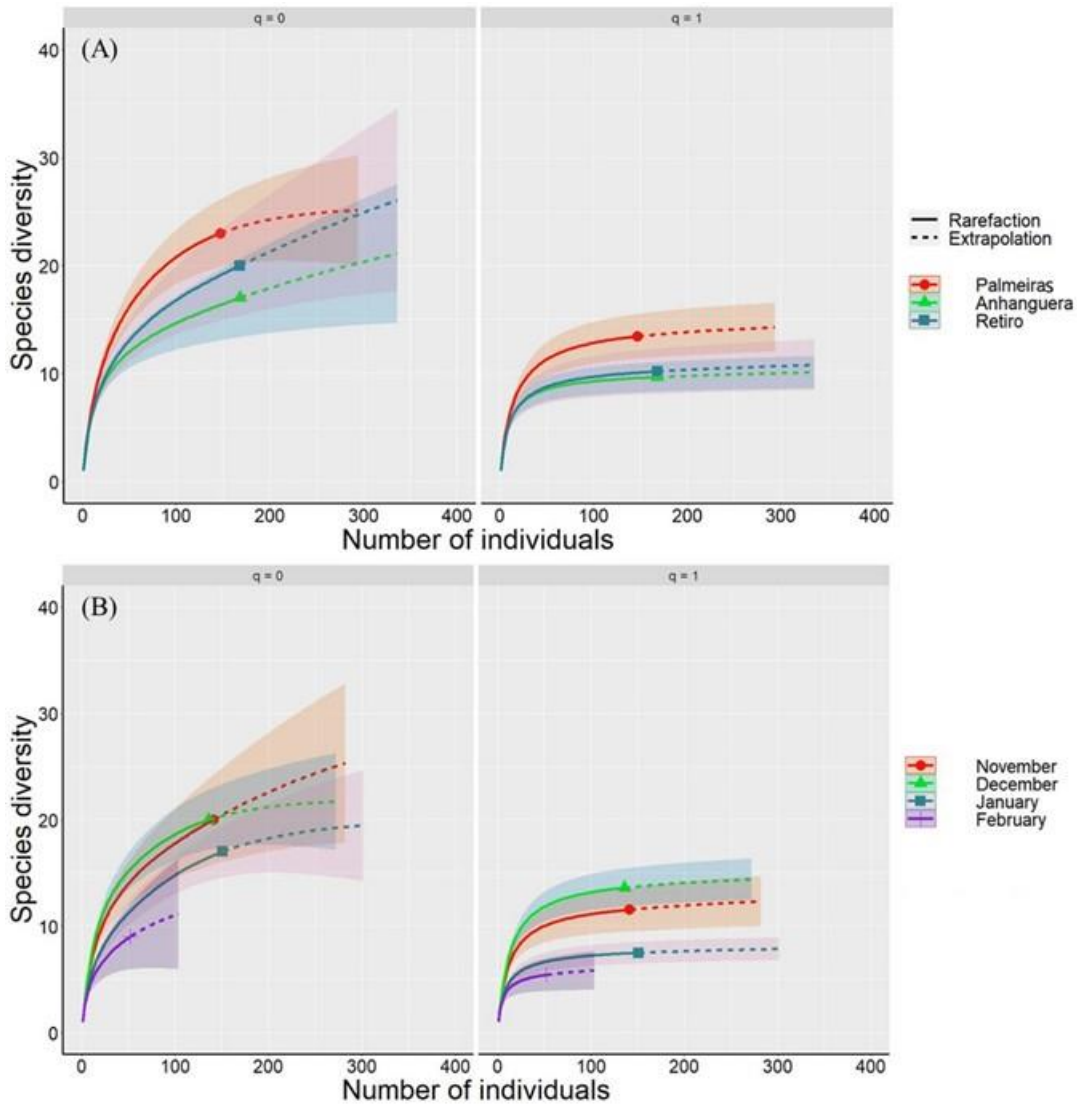


Fig. S2. Graphical representation of the rarefaction and extrapolation curves for reservoirs (A) and months (B) data, Sapucaí-Mirim River (São Paulo, Brazil). $q=0$ indicates richness and $q=1$ Shannon diversity.

Table S1. Geographic coordinates and the main macrophytes species observed in the sampling points located in Palmeiras, Anhanguera and Retiro reservoirs, Sapucaí-Mirim River (SP, Brazil).

Sampling Area	PALMEIRAS		ANHANGUERA		RETIRO	
	Main aquatic macrophytes	Geographic coordinates	Main aquatic macrophytes	Geographic coordinates	Main aquatic macrophytes	Geographic coordinates
Intermediate 1	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp.	20°33'50.2"S 47°47'20.9"W	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp.	20°30'51.7"S 47°50'58.4"W	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., <i>Oxycaryum cubense</i>	20°28'04.7"S 47°52'06.5"W
Intermediate 2	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp.	20°33'51.8"S 47°47'22.9"W	<i>Eichhornia crassipes</i> spp., <i>Salvinia</i> spp., Ciperaceae, <i>Pistia</i> spp.	20°30'52.0"S 47°50'57.7"W	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., <i>Oxycaryum cubense</i>	20°28'05.9"S 47°52'05.6"W
Intermediate 3	<i>Eichhornia crassipes</i>	20°33'52.4"S 47°47'23.9"W	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., Ciperaceae	20°30'53.8"S 47°50'52.5"W	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., <i>Oxycaryum cubense</i> , <i>Pistia stratiotes</i>	20°28'08.7"S 47°52'03.7"W
Lentic 1	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., <i>Oxycaryum cubense</i>	20°32'35.0"S 47°48'10.0"W	<i>Eichhornia crassipes</i> , Ciperaceae	20°29'41.3"S 47°51'52.7"W	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., <i>Oxycaryum cubense</i> , <i>Pistia stratiotes</i>	20°26'08.4"S 47°52'44.0"W
Lentic 2	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., <i>Oxycaryum cubense</i>	20°32'35.6"S 47°48'09.4"W	<i>Eichhornia crassipes</i>	20°29'42.5"S 47°51'53.4"W	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., <i>Oxycaryum cubense</i>	20°26'12.6"S 47°52'45.9"W
Lentic 3	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp.	20°32'36.1"S 47°48'08.3"W	<i>Eichhornia crassipes</i>	20°29'44.8"S 47°51'54.8"W	<i>Eichhornia crassipes</i> , <i>Salvinia</i> spp., <i>Oxycaryum cubense</i>	20°26'16.1"S 47°52'46.7"W

Table S2. Mean values and standard deviations (in parentheses) of limnological variables measured in different compartments of the Palmeiras SHP reservoir, Sapucaí-Mirim River (SP, Brazil).

Month	Compartment	Temp. (°C)	pH	ORP (mV)	Cond. ($\mu\text{S cm}^{-1}$)	Turbidity (NTU)	DO (mg L^{-1})	TDS (g L^{-1})
November	Intermediate	26.49 (0.03)	6.9 (0.08)	234.77 (7.82)	70 (0)	45.46 (1.76)	6.45 (0.87)	0.046 (9.31E-10)
	Lentic	30.75 (0.21)	9.14 (0.26)	163.33 (10.85)	75 (1.8E-03)	43.61 (4.85)	10.96 (1.14)	0.048 (1.32E-03)
December	Intermediate	26.94 (0.06)	6.92 (0.03)	236.44 (26.97)	55 (0)	165.22 (5.19)	6.17 (0.33)	0.035 (3.33E-04)
	Lentic	28.37 (0.30)	7.22 (0.43)	247 (14.81)	56 (0.86)	53.13 (8.58)	4.71 (1.91)	0.036 (5.00E-04)
January	Intermediate	25.55 (0.09)	6.9 (0.13)	296.11 (11.77)	55.66 (0.5)	111.55 (7.17)	6.39 (0.19)	0.036 (5.27E-04)
	Lentic	27.21 (0.22)	6.62 (0.02)	300 (15.01)	46 (0)	49.13 (1.95)	5.45 (0.35)	0.03 (0)
February	Intermediate	24.94 (0.16)	7.38 (0.11)	169.88 (4.88)	56 (6.67E-04)	224.88 (11.66)	6.35 (1.31)	0.037 (6.58E-10)
	Lentic	27.77 (0.15)	7.22 (0.23)	173 (20.95)	47 (6.0E-04)	132 (15.77)	6.92 (0.38)	0.031 (3.33E-04)

Table S3. Mean values and standard deviations (in parentheses) of limnological variables measured in different compartments of the Anhanguera SHP reservoir, Sapucaí-Mirim River (SP, Brazil).

Month	Compartment	Temp. (°C)	pH	ORP (mV)	Cond. ($\mu\text{S cm}^{-1}$)	Turbidity (NTU)	DO (mg L^{-1})	TDS (g L^{-1})
November	Intermediate	28.71 (0.38)	6.42 (0.10)	272.22 (7.69)	73.44 (5.27E-04)	2.9 (4.22)	4.22 (0.67)	0.047 (5.00E-04)
	Lentic	29.36 (0.36)	6.75 (0.22)	237.22 (21.95)	73.55 (1.33E-03)	3.51 (3.95)	3.95 (1.22)	0.048 (8.66E-04)
December	Intermediate	26.84 (0.029)	6.74 (0.086)	276.55 (13.35)	53.66 (0.5)	86.74 (7.4)	4.82 (0.22)	0.035 (0)
	Lentic	26.85 (0.048)	6.64 (0.093)	300.22 (3.73)	56 (0)	57.9 (4.65)	3.81 (0.86)	0.036 (6.58E-10)
January	Intermediate	25.67 (0.36)	5.86 (0.16)	306.87 (25.88)	42 (0.75)	138.12 (5.66)	5.14 (0.15)	0.027 (4.63E-04)
	Lentic	27.31 (0.81)	6.02 (0.13)	208.2 (20.67)	43 (0)	134.8 (5.73)	4.47 (0.37)	0.028 (0)
February	Intermediate	26.34 (0.34)	6.78 (0.44)	180.37 (8.97)	52 (0)	107.87 (4.79)	6.57 (0.18)	0.034 (0)
	Lentic	26.32 (0.25)	7.2 (0.14)	202.1 (10.35)	50.6 (6.99E-04)	102.31 (4.65)	5.89 (0.31)	0.033 (3.16E-04)

Table S4. Mean values and standard deviations (in parentheses) of limnological variables measured in different compartments of the Retiro SHP reservoir, Sapucaí-Mirim River (SP, Brazil).

Month	Compartment	Temp. (°C)	pH	ORP (mV)	Cond. ($\mu\text{S cm}^{-1}$)	Turbidity (NTU)	DO (mg L^{-1})	TDS (g L^{-1})
November	Intermediate	28.31 (0.075)	6.86 (0.06)	235.11 (5.73)	73 (9.31E-10)	21.5 (1.78)	4.35 (0.37)	0.047 (5.27E-04)
	Lentic	27.38 (0.033)	7.91 (0.45)	166.77 (28.63)	83 (0)	18.78 (2.46)	7.28 (0.82)	0.054 (0)
December	Intermediate	26.81 (0.25)	6.9 (0.16)	274.11 (19.25)	60.77 (0.97)	81.72 (2.19)	3.83 (0.41)	0.039 (5.0E-04)
	Lentic	33.64 (0.74)	9.63 (0.11)	160.66 (15.63)	81.33 (3.53)	57.31 (8.37)	11.08 (0.71)	0.052 (2.33E-03)
January	Intermediate	25.87 (0.81)	6.31 (0.05)	326.55 (7.28)	44 (0)	86.47 (3.11)	4.87 (0.42)	0.028 (5.0E-04)
	Lentic	28.37 (0.05)	6.21 (0.17)	308.44 (18.92)	48 (0.86)	104.27 (16.73)	4.73 (0.78)	0.031 (5.0E-04)
February	Intermediate	25.51 (0.005)	7.29 (0.05)	205.77 (6.7)	50.22 (4.41E-04)	102.85 (7.46)	6.87 (0.21)	0.033 (0)
	Lentic	27.51 (0.69)	7.02 (0.25)	196.33 (22.43)	48.22 (1.20E-03)	87.63 (8.03)	6.09 (1.54)	0.031 (0.001)

Table S5. Raw abundance data of larvae in the distinct compartments of Palmeiras, Anhanguera and Retiro SHPs reservoirs, Sapucaí-Mirim River (SP, Brazil).

Taxa	Palmeiras		Anhanguera		Retiro	
	IntemEDIATE	Lentic	IntemEDIATE	Taxa	IntemEDIATE	Lentic
<i>Apareiodon affinis</i>	1	-	-	-	-	-
Cichlidae	-	-	-	1	-	-
<i>Eigenmannia</i> spp.	2	-	1	-	3	-
<i>Gymnotus</i> spp.	1	-	6	-	1	-
<i>Hoplias malabaricus</i>	-	1	1	-	-	1
<i>Hyphessombrycon eques</i>	-	-	1	-	1	1
<i>Rhamdia quelen</i>	-	-	-	1	-	-
<i>Schizodon nasutus</i>	2	-	1	-	-	-
<i>Serrasalmus maculatus</i>	4	2	7	17	12	5
<i>Synbranchus marmoratus</i>	1	-	-	-	-	-

Table S6. Raw abundance data of juvenile in the distinct compartments of Palmeiras, Anhanguera and Retiro SHPs reservoirs, Sapucaí-Mirim River (SP, Brazil).

Taxa	Palmeiras		Anhanguera		Retiro	
	Intermediate	Lentic	Intermediate	Lentic	Intermediate	Lentic
<i>Apareiodon</i> sp.	2	-	-	-	-	-
<i>Astyanax lacustre</i>	1	-	-	-	-	-
<i>Cichla kelberi</i>	-	1	-	-	2	2
<i>Cichlasoma paranaense</i>	-	2	5	8	2	9
<i>Coptodon rendali</i>	-	5	-	-	-	-
<i>Crenicichla britskii</i>	-	7	2	1	8	1
<i>Crenicichla</i> sp.	-	1	-	-	1	-
<i>Eigenmannia trilineata</i>	-	-	-	-	1	-
<i>Galeocharax gulo</i>	9	17	2	-	9	4
<i>Geophagus brasilienses</i>	20	-	-	10	-	2
<i>Gymnotus</i> sp.	1	-	-	-	-	-
<i>Gymnotus sylvius</i>	7	1	9	15	9	26
<i>Hoplias malabaricus</i>	2	-	1	1	-	-
<i>Hoplosternum littorale</i>	-	-	1	-	-	-
<i>Hyphessombrycon eques</i>	-	-	-	-	1	1
<i>Hypostomus</i> spp.	-	-	3	10	-	-
<i>Knodus moenkhausii</i>	3	-	-	-	-	-
<i>Laetacara araguaiaae</i>	-	3	-	-	-	-
<i>Leporinus friderici</i>	2	-	-	-	-	1
<i>Megaleporinus obtusidens</i>	1	-	-	1	-	1
<i>Pimelodus maculatus</i>	-	-	-	-	-	1
<i>Psalidodon bockmanni</i>	9	-	-	-	-	1
<i>Schizodon nasutus</i>	-	6	5	7	4	6
<i>Serrasalmus maculatus</i>	-	1	-	3	2	5
<i>Synbranchus marmoratus</i>	20	7	11	32	10	29