

SUPPLEMENTAL INFORMATION

**ASSOCIATION BETWEEN LAND USE AND COMPOSITION OF
AMPHIBIAN SPECIES IN TEMPERATE BRAZILIAN FOREST HABITATS**

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TABLE S1. Description of waterbodies sampled in the tadpole collection in Atlantic Forest habitats in southern Brazil from October 2018 to March 2019. VV = Parque Estadual de Vila Velha; RG = Parque Estadual Rio Guarani; RE = Reserva Privada Enele; PA = Parque Estadual das Araucárias; QQ = Reserva Privada Quebra-Queixo; FP = Parque Estadual Fritz Plaumann; PT = Parque Estadual do Turvo

Waterbody	Study area	Area	State	Geographic coordinates	Sample point	Description of the place
1	1	VV	PR	25°13'44.23"S 50° 2'8.87"O	Pond	Pond, with grassy and aquatic vegetation, in intermittent forest and close to a road, inside protected area.
2	1	VV	PR	25°14'43.39"S 50° 0'59.01"O	Stream	Stream, with grassland and shrub formation, inside the protected area.
3	1	VV	PR	25°14'52.85"S 49°59'30.90"O	Stream	Stream, with grassland and shrub formation, inside protected area.
4	1	VV	PR	25°15'33.85"S 50° 1'26.77"O	Pond	Pond, with landscape of exposed soil, grass and shrubs close to intermittent vegetation, outside the protected area.

Waterbody	Study area	Area	State	Geographic coordinates	Sample point	Description of the place
6	2	RG	PR	25°26'25.73"S 53° 9'52.66"O	Pond	Artificial pond, with the presence of intermittent forest, at forest border, inside the protected area.
7	2	RG	PR	25°26'20.44"S 53° 9'10.23"O	Stream	Stream, with the presence of forest in an advanced process of succession, inside the protected area.
8	2	RG	PR	25°26'19.53"S 53°10'11.56"O	Pond	Artificial pond, with the presence of pasture and agriculture in the surroundings, outside the protected area.
10	3	RE	SC	26°22'3.39"S 52°50'28.57"O	Pond	Artificial pond, with the presence of pasture, grass and aquatic plants, inside the private reserve.
11	3	RE	SC	26°21'57.65"S 52°50'1.40"O	Stream	Second-order stream, with the presence of forest in an advanced process of succession, inside the private reserve.

Waterbody	Study area	Area	State	Geographic coordinates	Sample point	Description of the place
13	3	RE	SC	26°22'0.88"S 52°49'40.87"O	Stream	Stream spring, with the presence of pasture, grasses and shrubs, close to urban area, outside the private reserve.
15	4	PA	SC	26°27'28.93"S 52°33'45.54"O	Stream	Stream, with the presence of intermittent forest, inside the protected area.
16	4	PA	SC	26°28'8.27"S 52°34'17.88"O	Stream	Stream, with the presence of forest in an advanced process of succession, inside the protected area.
17	4	PA	SC	26°29'1.15"S 52°33'18.43"O	Pond	Pond, with the presence of aquatic vegetation, grasses and intermittent forest in the surroundings, pasture and crops, outside the protected area.
18	4	PA	SC	26°27'6.36"S 52°33'34.69"O	Stream	Stream, with the presence of shrubby riparian forest and crops, outside the protected area.

Waterbody	Study area	Area	State	Geographic coordinates	Sample point	Description of the place
19	5	QQ	SC	26°39'7.80"S 52°32'30.37"O	Pond	Artificial pond, with the presence of aquatic vegetation, grasses, pastures in intermittent forest and lake, outside the private reserve.
21	6	FP	SC	27°17'29.56"S 52° 6'42.63"O	Stream	Stream, with the presence of forest in an advanced process of succession, inside the protected area.
22	6	FP	SC	27°17'21.45"S 52° 6'5.13"O	Pond	Artificial pond, with the presence of aquatic vegetation, grasses and intermittent forest in the surroundings, pasture and crops, outside the protected area.
23	6	FP	SC	27°17'37.40"S 52° 6'15.14"O	Stream	Stream spring, with the presence of grasses and shrubs, outside the protected area.
24	6	FP	SC	27°17'30.69"S 52° 5'32.35"O	Stream	Stream, with the presence of grasses and intermittent riparian forest, outside protected area.

Waterbody	Study area	Area	State	Geographic coordinates	Sample point	Description of the place
25	7	PT	RS	27°13'46.71"S 53°51'1.07"O	Pond	Pond with aquatic vegetation, surrounded intermittent forest and close to road. inside protected area.
26	7	PT	RS	27°13'28.07"S 53°51'6.13"O	Pond	Pond with aquatic vegetation, surrounded intermittent forest and close to road, inside protected area.
27	7	PT	RS	27°13'58.52"S 53°51'17.21"O	Stream	Lotic water, on the edge of intermittent forest, inside protected area.
28	7	PT	RS	27°15'4.95"S 53°56'20.40"O	Pond	Semi-temporary artificial pond, surrounded by grassy vegetation. Outside protected area, in agriculture.
29	7	PT	RS	27°14'30.90"S 53°50'24.61"O	Pond	Semi-temporary artificial pond, surrounded by grassy vegetation. Outside protected area, in agriculture.

Waterbody	Study area	Area	State	Geographic coordinates	Sample point	Description of the place
30	7	PT	RS	27°14'15.39"S 53°50'49.56"O	Stream	Lotic water, on the edge of intermittent forest, outside protected area, in agriculture.

TABLE S2. Tadpole abundance and observed and rarefied richness for the 25 waterbodies (breeding sites) of Atlantic Forest habitats in southern Brazil, recorded from October 2018 to March 2019. P = Pond; S = Stream. Species listed are Common Name: Striped Toad (*Rhinella henseli*); Cururu Toad (*Rhinella icterica*); Green Treefrog (*Aplastodiscus perviridis*); Forest Treefrog (*Boana curupi*); *Boana* cf. *curupi*; Gladiator Treefrog (*Boana faber*); Striped Treefrog (*Boana leptolineata*); Burmeister's Treefrog (*Boana prasina*); Montevideo Treefrog (*Boana pulchella*); Nova Friburgo Treefrog (*Dendropsophus microps*); Swamp Treefrog (*Dendropsophus minutus*); Snouted Treefrog (*Scinax fuscovarius*); Granulated Snouted Treefrog (*Scinax granulatus*); Perereca Snouted Treefrog (*Scinax perereca*); Schmidt's Spinythumb Frog (*Crossodactylus schmidtii*); Criolla Frog (*Leptodactylus latrans*); Barker Frog (*Physalaemus cuvieri*); *Physalaemus* cf. *carrizorum*; Two-colored Oval Frog (*Elachistocleis bicolor*); Avelino's Smooth Horned Frog (*Proceratophrys avelinoi*); Monkey Treefrog (*Phyllomedusa tetraploidea*); American Bullfrog (*Lithobates catesbeianus*).

Family/Species	1	2	3	4	6	7	8	10	11	13	15	16	17
	P	S	S	P	P	S	P	P	S	S	S	S	P
BUFONIDAE													
<i>Rhinella henseli</i> (Lutz, 1934)	0	0	0	0	0	0	0	0	12	0	0	0	0
<i>Rhinella icterica</i> (Spix, 1824)	0	0	0	0	400	1	0	0	0	0	0	0	0
HYLIDAE													
<i>Aplastodiscus perviridis</i> Lutz 1950	0	0	0	0	0	1	0	0	0	0	0	0	0
<i>Boana</i> cf. <i>curupi</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Boana curupi</i> (Garcia, Faivovich and Haddad 2007)	0	0	0	0	0	0	0	0	0	0	50	98	0
<i>Boana faber</i> (Wied-Neuwied, 1821)	0	0	0	0	0	0	11	53	1	0	1	0	14

<i>Boana leptolineata</i> (Braun and Braun, 1977)	0	0	0	0	0	0	0	0	0	0	3	6	0
<i>Boana prasina</i> (Burmeister, 1856)	0	67	16	0	0	0	0	0	0	0	0	0	0
<i>Boana pulchella</i> (Duméril and Bibron, 1841)	0	9	4	0	0	0	0	0	0	0	0	0	0
<i>Dendropsophus microps</i> (Peters, 1872)	0	0	0	0	0	0	0	1	4	9	0	0	0
<i>Dendropsophus minutus</i> (Peters, 1872)	5	0	0	0	0	0	21	0	0	14	1	0	0
<i>Scinax fuscovarius</i> (Lutz, 1925)	0	0	0	3	0	0	28	0	0	9	0	0	0
<i>Scinax granulatus</i> (Peters, 1871)	0	0	3	0	0	0	3	0	0	9	2	0	0
<i>Scinax perereca</i> Pombal, Haddad and Kasahara, 1995	0	0	0	8	0	0	1	0	2	0	0	0	0
HYLODIDAE													
<i>Crossodactylus schmidti</i> Gallardo, 1961	0	0	0	0	0	124	0	0	0	0	0	0	0
LEPTODACTYLIDAE													
<i>Leptodactylus latrans</i> (Steffen, 1815)	0	0	0	0	0	0	0	19	0	0	0	0	0
<i>Physalaemus cuvieri</i> Fitzinger, 1826	6	0	0	1	0	0	0	6	0	53	0	0	0
<i>Physalaemus</i> cf. <i>carrizorum</i>	0	0	0	0	0	0	0	0	0	11	0	0	0
MICROHYLIDAE													

Elachistocleis bicolor (Guérin-Méneville, 1838) 0 0 0 0 0 0 2 0 0 0 0 0 0

ODONTOPHRYNIDAE

Proceratophrys avelinoi
 Mercadal de Barrio and Barrio, 1993 0 0 0 0 0 0 0 0 0 0 0 0 7

PHYLLOMEDUSIDAE

Phyllomedusa tetraploidea
 Pombal and Haddad, 1992 0 0 0 88 0 0 7 0 0 0 6 0 0

RANIDAE

Lithobates catesbeianus (Shaw 1802) 0 0 0 0 0 0 25 10 0 0 0 0 0

Total abundance	11	76	23	100	400	126	98	89	19	105	63	104	21
Total richness	2	2	3	3	1	3	8	5	4	6	6	2	2
Rarefied richness	2	1.9	2.7	1.9	1.0	1.0	5.2	3.5	2.3	5.2	2.9	1.5	2.0

Total

Continuation

TABLE S2. Tadpole abundance and observed and rarefied richness for the 25 waterbodies (breeding sites) of Atlantic Forest habitats in southern Brazil, recorded from October 2018 to March 2019. P = Pond; S = Stream. Species listed are Common Name: Striped Toad (*Rhinella henseli*); Cururu Toad (*Rhinella icterica*); Green Treefrog (*Aplastodiscus perviridis*); Forest Treefrog (*Boana curupi*); *Boana* cf. *curupi*; Gladiator Treefrog (*Boana faber*); Striped Treefrog (*Boana leptolineata*); Burmeister's Treefrog (*Boana prasina*); Montevideo Treefrog (*Boana pulchella*); Nova Friburgo Treefrog (*Dendropsophus microps*); Swamp Treefrog (*Dendropsophus minutus*); Snouted Treefrog (*Scinax fuscovarius*); Granulated Snouted Treefrog (*Scinax granulatus*); Perereca Snouted Treefrog (*Scinax perereca*); Schmidt's Spinythumb Frog (*Crossodactylus schmidti*); Criolla Frog (*Leptodactylus latrans*); Barker Frog (*Physalaemus cuvieri*); *Physalaemus* cf. *carrizorum*; Two-colored Oval Frog (*Elachistocleis bicolor*); Avelino's Smooth Horned Frog (*Proceratophrys avelinoi*); Monkey Treefrog (*Phyllomedusa tetraploidea*); American Bullfrog (*Lithobates catesbeianus*).

Family/Species	18	19	21	22	23	24	25	26	27	28	29	30
	S	P	S	P	S	S	P	P	S	P	S	S
BUFONIDAE												
<i>Rhinella henseli</i> (Lutz, 1934)	0	0	0	0	0	0	0	0	0	0	0	0
<i>Rhinella icterica</i> (Spix, 1824)	19	0	0	0	0	0	0	0	0	0	0	0
HYLIDAE												
<i>Aplastodiscus perviridis</i> Lutz 1950	0	0	0	0	0	0	0	0	0	0	0	0
<i>Boana</i> cf. <i>curupi</i>	0	0	55	0	30	37	0	0	0	0	0	0
<i>Boana curupi</i> (Garcia, Faivovich and Haddad 2007)	0	0	43	0	6	41	0	0	0	0	0	0
<i>Boana faber</i> (Wied-Neuwied, 1821)	91	48	0	10	0	0	7	40	6	0	0	0

<i>Boana leptolineata</i> (Braun and Braun, 1977)	0	0	0	0	0	0	0	0	0	0	0	0
<i>Boana prasina</i> (Burmeister, 1856)	0	0	0	0	0	0	0	0	0	0	0	0
<i>Boana pulchella</i> (Duméril and Bibron, 1841)	0	0	0	0	0	0	0	0	0	0	0	0
<i>Dendropsophus microps</i> (Peters, 1872)	0	7	0	40	0	0	6	14	0	0	0	0
<i>Dendropsophus minutus</i> (Peters, 1872)	0	53	0	0	0	0	0	2	0	0	0	0
<i>Scinax fuscovarius</i> (Lutz, 1925)	0	9	0	5	0	0	0	0	0	0	0	0
<i>Scinax granulatus</i> (Peters, 1871)	0	0	0	0	0	0	0	0	0	0	0	0
<i>Scinax perereca</i> Pombal, Haddad and Kasahara, 1995	0	0	0	9	0	0	0	0	0	90	67	0
HYLODIDAE												
<i>Crossodactylus schmidtii</i> Gallardo, 1961	0	0	16	0	0	0	0	0	118	0	0	136
LEPTODACTYLIDAE												
<i>Leptodactylus latrans</i> (Steffen, 1815)	53	0	0	0	0	0	0	0	0	0	0	0
<i>Physalaemus cuvieri</i> Fitzinger, 1826	0	28	0	0	0	0	0	0	0	0	0	0
<i>Physalaemus cf. carrizorum</i>	0	0	0	8	0	0	0	0	0	0	0	0
MICROHYLIDAE												

Elachistocleis bicolor (Guérin-Méneville, 1838) 0 0 0 0 0 0 0 0 0 0 0 0 0

ODONTOPHRYNIDAE

Proceratophrys avelinoi
 Mercadal de Barrio and Barrio, 1993 0 0 0 0 0 0 0 0 0 0 0 0

PHYLLOMEDUSIDAE

Phyllomedusa tetraploidea
 Pombal and Haddad, 1992 0 0 0 19 0 0 0 56 0 0 0 0

RANIDAE

Lithobates catesbeianus (Shaw 1802) 0 2 0 8 0 0 0 0 0 0 0 0

Total abundance	163	147	114	99	36	78	13	112	124	90	67	136
Total richness	2	6	3	7	2	2	2	4	2	1	1	1
Rarefied richness	2.0	4.2	2.9	5.9	1.8	2.0	2.0	3.0	1.4	1.0	1.0	1.0

Total 2414

TABLE S3. Average area (km²) of different categories of land use surrounding the sampled waterbodies estimated on the basis of a 500-m-radius buffer, in Atlantic Forest habitats in southern Brazil, from October 2018 to March 2019.

Waterbody	Land use area (km ²)				
	Agriculture	Aquatic environment	Forest	Livestock farming	Urban area
1	0.00	0.00	0.73	0.03	0.03
2	0.00	0.00	0.01	0.00	0.03
3	0.00	0.00	0.22	0.00	0.02
4	0.00	0.00	0.35	0.00	0.00
6	0.00	0.00	0.23	0.42	0.14
7	0.00	0.00	0.79	0.00	0.00
8	0.07	0.00	0.00	0.71	0.00
10	0.00	0.00	0.22	0.54	0.02
11	0.00	0.00	0.55	0.22	0.01
13	0.00	0.00	0.37	0.31	0.11
15	0.14	0.00	0.64	0.00	0.00
16	0.00	0.00	0.68	0.10	0.00
17	0.11	0.00	0.23	0.44	0.00
18	0.37	0.00	0.42	0.00	0.00
19	0.00	0.17	0.05	0.57	0.00
21	0.00	0.00	0.79	0.00	0.00
22	0.49	0.00	0.29	0.00	0.00
23	0.32	0.00	0.47	0.00	0.00
24	0.00	0.00	0.78	0.00	0.00

25	0.03	0.01	0.37	0.38	0.00
26	0.00	0.00	0.79	0.00	0.00
27	0.03	0.00	0.35	0.41	0.00
28	0.48	0.00	0.00	0.31	0.00
29	0.36	0.00	0.00	0.42	0.00
30	0.37	0.00	0.00	0.42	0.00

TABLE S4. Buffer area overlap among pairs of waterbodies based on 500-m-radius circular buffers, in Atlantic Forest habitats in southern Brazil, from October 2018 to March 2019. Buffer area = 785,398 m².

Waterbodies	Overlap (m²)	Overlap (%)
06 & 08	288,847	36.8
10 & 11	105,155	13.4
11 & 13	253,512	32.3
14 & 18	156,851	20.0
15 & 18	157,054	20.0
20 & 24	11,867	1.5
25 & 26	298,698	38.0
25 & 27	270,690	34.5
25 & 30	52,173	6.6
26 & 27	30,001	3.8
27 & 30	30,594	3.9
29 & 30	76,436	9.7
