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Herpetofauna from an urban Pampa fragment in southern Brazil: composition, structure and conservation

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Abstract: Faunistic inventories regarding natural history of amphibians and reptiles are considered scarce and very little is known about their assemblages in urban areas; the Pampas morphoclimatic domain, also known as Uruguayan Savannah or Southern Grasslands, is also poorly known regarding their faunal composition. Herein, we present a checklist of 16 amphibian and 20 reptile species recorded over a course of four years in the Instituto Federal de Educação, Ciências e Tecnologia, Câmpus Pelotas-Visconde da Graça, in Pelotas, Rio Grande do Sul, Brazil. We also present data on natural history and discuss conservation efforts to be undertaken in the area, in one of the least preserved and known Brazilian morphoclimatic domains, providing insights into urban herpetofaunal diversity patterns and showing the importance of modified areas in its conservation.

Key words: natural history; amphibians; reptiles; Uruguayan Savannah; Rio Grande do Sul

INTRODUCTION

The state of Rio Grande do Sul (RS), Brazil, can be split into two morphoclimatic domains: Atlantic Forest in its northern portion, and Pampa, also known as Uruguayan Savannah or Southern Grasslands, occurring principally south of the 30th parallel. Although occurring in other countries, in Brazil Pampa is restricted to RS (Ab'Sáber 1977; Olson et al. 2001; IBGE 2004). Only 41% of its original habitat remains, in various stages of conservation, contrasting with no protected areas under categories I–IV under its *sensu strictu* (IBGE 2004) concept. Therefore it is one of the least protected morphoclimatic domains in Brazil (Maury 2002; IBGE 2004; Hasenack and Cordeiro 2006). Although it supports important species diversity, the faunal composition and structure of Rio Grande do Sul Pampa are poorly known (Quintela and Loebmann 2009).

Although indispensable to the knowledge and conservation of amphibians and reptiles, faunistic inventories are few in Brazil (Haddad 1998; Santos et al. 2005). Most of these studies are conducted in relatively well-preserved areas, with few data being gathered in areas with significant anthropic action (Santos et al. 2005; Hamdan et al. 2013). These areas, even small fragments, are crucial to local fauna conservation, and in most cases, represent the only areas with favorable habitats to native species in urban areas, known as "green islands" (Barbo et al. 2011; Hamdan et al. 2013).

Amphibians and reptiles also suffer from several pressures to coexistence with humans in urbanized areas (Hamer and McDonnel 2008; Toledo 2009; Puorto 2012), leading to a decrease of specialist and an increase in opportunistic species, eg. inharmonious relationships with humans, habitat fragmentation and pollution (Magura et al. 2004; Rubbo and Kiesecker 2005; McKinney 2006; Purkayastha et al. 2011).

In order to provide an inventory of herpetofauna and contribute to understanding the impacts of urbanization, this work seeks to assess richness and species composition of amphibian and reptile assemblages in an urban area of Pampa, Pelotas, RS, Brazil.

MATERIALS AND METHODS

Study site

The study was conducted in the Instituto Federal de Educação, Ciência e Tecnologia, Câmpus Pelotas-Visconde da Graça (Figures 1 and 2; 31°43′27″ S, 052°18′27″ W, 30 m above sea level). The area is approximately 809,300 m², located in the urban region of Pelotas municipality, Rio Grande do Sul, Brazil. The site is in the Coastal Plains of the Pampa morphoclimatic domain, with grasslands, wetlands and native forests. There is a strong anthropic

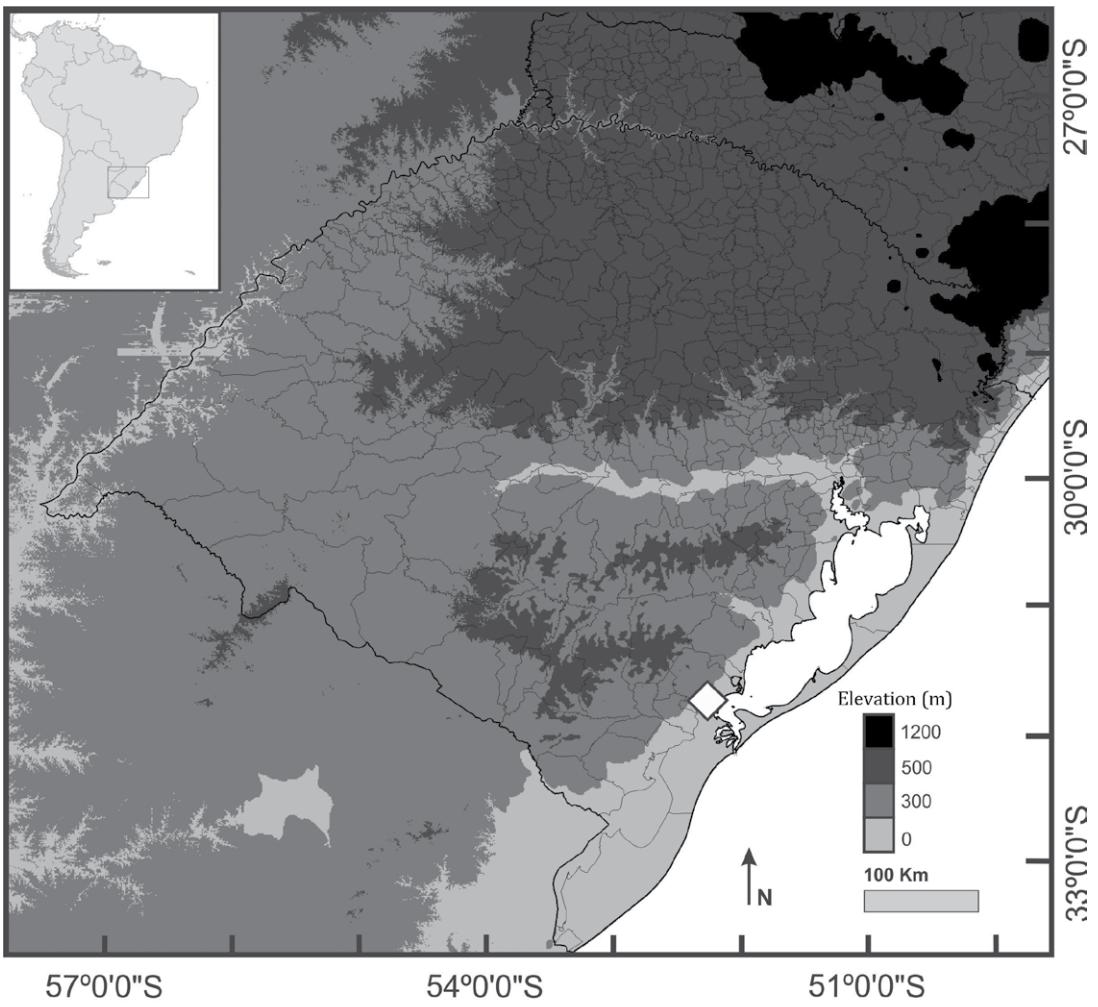

Figure 1. (White polygon): Location of Pelotas, Rio Grande do Sul, Brazil.

Figure 2. General aspect of study site (**A**) Altered open area; (**B**) Open area with little alteration; (**C**) Altered forest area; (**D**) Forest area with little to no alteration.

alteration in the Campus, due to the suppression of native vegetation for pasture and cultivation. The region is characterized by its horizontal heterogeneity, with short shrubs, forest areas with native trees of reduced stature and plain physiognomy, and sand dunes (Burger and Ramos 2007).

Data collection

Fieldwork was carried out sporadically, usually 16 times a month, with an unspecified range of hours, from July 2012 to April 2015, for a total of 34 months, and 544 search days. For recording observations, we used the following methods:

Time-constrained active search: This method was modified from Campbell and Christman (1982), Oliveira (1998) and Bernarde and Abe (2006), consisting of walking slowly (approximately 100 m per 30 minutes) during day (07:30–17:00) or night (18:30–04:30), with the objective of observing individuals. For crocodilians and chelonians, we used binoculars for passive observation. For amphibians, we employed a modified version of quantitative counting based on listening points and the "Índice Pontual de Abundância" methodology of Vielliard et al. (2010). This allowed for causual movement of the observer within the limitations of the terrain (as opposed to the strict transect methodology) and significantly reduced recounted specimens.

Road search: This method consists of repeated vehicle travel over roads in search of live or roadkilled specimens.

Occasional records: Specimens which were not found by the previous methods, recorded either by photographic evidence or collected specimens, or by other researchers or local inhabitants, or roadkilled individuals in the collection of the Campus Pelotas-Visconde da Graça (CHIF). This method was modified from Cunha and Nascimento (1978) and Vanzolini (1986). Taxonomy follows Costa and Bérnils (2014) and Segalla et al. (2014). Specific identifications and the term "cf." (abbreviation of the Latin word "*confer*") follow Abegg and Entiauspe-Neto (2012) and Quintela et al. (2006). Unless stated in Appendix I (index of the 20 voucher specimens used in this study) or in the species accounts, specimens were not collected, but are herein represented by a photographic record.

RESULTS

From 2012 to 2015, we recorded 162 amphibians in 16 species and 37 reptiles in 20 species (Tables 1 and 2). Among the amphibians, anurans of the families Bufonidae (one species), Odontophrynidae (one species), Hylidae (seven species), Leptodactylidae (five species) and Microhylidae (one species) as well as an Apoda of the family Typhlonectidae were recorded. Among the Reptiles, snakes of the families Dipsadidae (10 species) and Viperidae (two species) were recorded as well as lizards of the families Gymnophtalmidae (one species) and Teiidae (two species), chelonians of the family Emydidae (one species) and Chelidae (two species), one crocodilian of the family Alligatoridae and one amphisbaenian of the family Amphisbaenidae.

In all years there was a marked difference in activity correlated to the temperature in colder (autumn to winter) and warmer (spring to summer) months (Figure 3). The majority of the reptiles were found from November

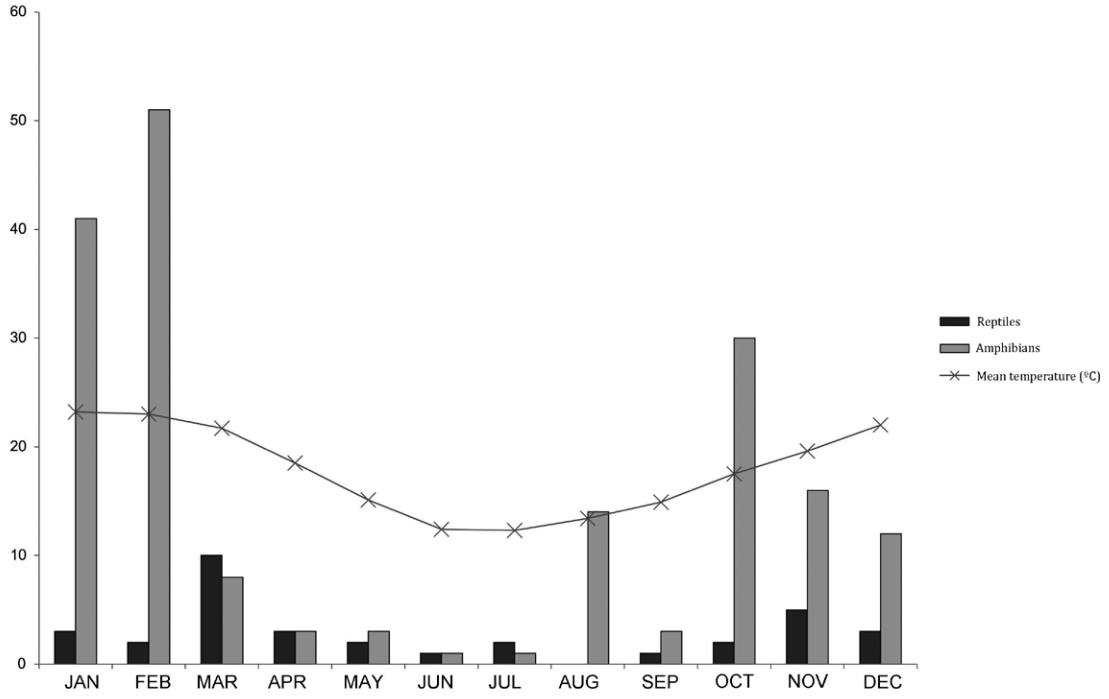

Figure 3. Occurrence of reptile and amphibians in the study site from 2012 to 2015 (see Materials and Methods), correlated with mean temperature in the city of Pelotas, Rio Grande do Sul, Brazil.

Table 1. Amphibian species recorded at Campus Pelotas-Visconde da Graça, Pelotas, Brazil. OA = Open areas; FL = Forested areas; WA = Wet areas (Includes swamps and seasonal wetlands); G = Generalist (Species assigned for all anterior options); activity pattern: D = Diurnal; N = Nocturnal; G = Generalist. Substrate: AQ = Aquatic; AR = Arboreous; FO = Fossorial or cryptozoic (Species recorded either under the substrate or soil, including hibernating or inactive individuals); TE = Terrestrial; G = Generalist; record type: AS = Active search; RS = Road search; OR = Occasional records. Unknown categories are indicated with a (?).

Taxon	Habitat	Activity pattern	Substrate	Record type
GYMNOPHIONA				
Typhlonectidae				
Chtonerpeton indistinctum (Reinhardt & Lütken, 1862)	WA	G	AQ/FO	AS, RS, OR
ANURA				
Bufonidae				
Rhinella dorbignyi (Duméril & Bibron, 1841)	G	G	AQ/ FO/TE	AS, RS, OR
Odontophrynidae				
Odontophrynus americanus (Duméril & Bibron, 1841)	?	?	?	RS
Hylidae				
Dendropsophus sanborni (Schmidt, 1944)	FL	N	AR	AS
Hypsiboas pulchella (Duméril & Bibron, 1841)	G	N	AR/TE	AS
Scinax fuscovarius (Lutz, 1925)	OA	N	AR	AS
Scinax cf. *granulatus* (Peters, 1871)	OA	N	AR	OR
Scinax nasicus (Cope, 1862)	OA	N	TE	AS
Scinax squalirostris (Lutz, 1925)	OA	G	AR/AQ	AS
Pseudis minuta Günther, 1858	OA	N	AQ/TE	AS
Leptodactylidae				
Leptodactylus latrans (Steffens, 1815)	G	G	AQ/FO/TE	AS, RS
Leptodactylus mystacinus (Burmeister, 1861)	G	G	FO/TE	AS
Leptodactylus latinasus Jiménez de la Espada, 1875	OA/ WA	N	TE	AS
Physalaemus biligonigerus (Cope, 1861)	OA / WA	N	TE	AS
Physalaemus gracilis (Boulenger, 1883)	FL	G	TE/FO	AS
Microhylidae				
Elachistocleis bicolor (Valenciennes *in* Guérin-Meneville, 1838)	FL	N	FO	AS

Table 2. Reptile species recorded at Campus Pelotas-Visconde da Graça, Pelotas, Brazil. (See Table 1 for abbreviations.)

Taxon	Habitat	Activity pattern	Substrate	Record type
CROCODYLIA				
Alligatoridae				
Caiman latirostris (Daudin, 1801)	WA	D	AQ	AS
TESTUDINES				
Chelidae				
Phrynops hilarii (Duméril & Bibron, 1835)	WA	D	AQ	AS, OR
Hydromedusa tectifera Cope, 1870	WA	D	AQ	AS
Emydidae				
Trachemys dorbgini (Duméril & Bibron, 1835)	WA	D	AQ	AS
SQUAMATA				
AMPHISBAENIA				
Amphisbaenidae				
Amphisbaena prunicolor (Cope, 1885)	OA /FL	G	FO/TE	AS, OR
SAURIA				
Gymnophthalmidae				
Cercosaura schreibersii schreibersii Wiegman, 1834	OA	D	TE	RS
Teiidae				
Teius oculatus (d'Orbigny & Bibron, 1837)	?	?	?	OR
Salvator merianae (Duméril & Bibron, 1839)	OA /FL	D	TE	AS
OPHIDIA				
Dipsadidae				
Erythrolamprus jaegeri (Gunther, 1858)	FL	D	TE	AS
Erythrolamprus poecilogyrus sublineatus (Cope, 1860)	G	G	AQ/TE	AS, OR, RS
Helicops infratanieatus Jan, 1865	WA	G	AQ	AS, RS
Thamnodynastes hypoconia (Cope, 1860)	WA	N	TE	AS, OR
Lygophis anomalus (Günther, 1858)	?	?	?	OR
Phalotris lemniscatus (Duméril, Bibron & Duméril, 1854)	G	G	FO	AS, OR, RS
Philodryas aestiva (Duméril, Bibron & Duméril, 1854)	?	?	?	OR
Philodryas olfersii (Liechtenstein, 1823)	?	?	?	OR
Philodryas patagoniensis (Girard, 1858)	G	D	G	AS, OR, RS
Xenodon dorbignyi (Bibron *in* Duméril, Bibron & Duméril, 1854)	?	?	?	OR
Viperidae				
Bothrops alternatus Duméril, Bibron & Duméril, 1854	?	?	?	OR
Crotalus durissus terrificus (Laurenti, 1768)	OA	D	TE	AS

Figure 4. Some amphibians recorded at the study site: (**A**) *Chtonerpeton indistinctum*; (**B**) *Rhinella dorbignyi*; (**C**) *Odontophrynus americanus*; (**D**) *Dendropsophus sanborni*; (**E**) *Elachistocleis bicolor*; (**F**) *Hypsiboas pulchella*; (**G**) *Scinax fuscovarius*; (**H**) *Scinax squalirostris*.

to March; in amphibians, most activity occurred from October to February. Reptiles preferred aquatic (38%) and terrestrial (44%) substrates, and amphibians preferred the terrestrial (41%) and fossorial/cryptozoic (23%) substrates. Reptiles preferred wetlands (33%) open areas and forests (27% each) or were generalists (13%). Amphibians were recorded in open areas (38%) or generalist (25%), with wetlands (19%) and forested areas (13%) less used.

Class Amphibia
Subclass Lissamphibia
Order Gymnophiona
Family Typhlonectidae

Chthonerpeton indistinctum (Reinhardt & Lütken, 1862)
Caecilian (Figure 4A)

Chthonerpeton indistinctum (four observed individuals, one collected specimen), was not found in areas with anthropic modification. Three specimens were encountered half buried under the substrate of a wetland, under rock, and one individual was encountered dead in a dirt road. This species was recorded in the months of February and August; three specimens were under a rock in August.

Order Anura
Family Bufonidae

Rhinella dorbignyi (Duméril & Bibron, 1841)
Common Bullfrog (Figure 4B)

Rhinella dorbignyi was the second most common anuran species on the Campus (96 observed individuals), being encountered in almost all areas, including the vicinity of classrooms. It occupies semi-aquatic, terrestrial and cryptozoic habits; occurs in humid areas, under logs or buried. This species was recorded during all months of the year. We recorded explosive reproduction during September and October.

Family Odontophrynidae

Odontophrynus americanus (Duméril & Bibron, 1841)
Painted Bullfrog (Figure 4C)

Odontophrynus americanus (one observed individual) was not encountered in areas with anthropic alteration. The only recorded specimen was encountered dead on an unpaved road, in an open field area, during September.

Family Hylidae

Dendropsophus sanborni (Schmidt, 1944)
Small Treefrog (Figure 4D)

Dendropsophus sanborni (three observed individuals) was encountered in areas with anthropic alteration. Of arboreal and semi-aquatic habits, it inhabits flooded areas with bromeliads. It was recorded in August and March.

Hypsiboas pulchellus (Duméril & Bibron, 1841)
Common Treefrog (Figure 4F)

Hypsiboas pulchellus (three observed individuals) was found in areas with little anthropic alteration. It prefers arboreal habits, inhabiting forested areas and open fields, and was also encountered under logs and in ground vegetation. This species was recorded in January, March and September.

Scinax fuscovarius (Lutz, 1925)
Common Treefrog (Figure 4G)

Scinax fuscovarius (two observed individuals) was encountered in areas with anthropic alteration. It occupies terrestrial and cryptozoic habits, occurring in open fields, under or above the ground vegetation. This species was recorded in January. Identification for this and *Scinax* cf. *granulatus* was made according to Kwet (2001).

Scinax cf. ***granulatus*** (Peters, 1871)
Treefrog (Figure 6)

This treefrog is tentatively assigned to *Scinax* cf. *granulatus* (Peters, 1871) based on its external morphology, although its SVL of approximately 70 mm seems unusually large for the species. Identification is being investigated. It is an uncommon species (one collected specimen), encountered in an open field with little modification, under a log. This species was recorded in October.

Scinax nasicus (Cope, 1862)
Grey Treefrog (Figure 5A)

Scinax nasicus (one observed individual) was encountered in areas with anthropic alteration. It occurs in arboreal habits, being encountered in a transition zone between a forested and open field, in October.

Scinax squalirostris (Lutz, 1925)
Treefrog (Figure 5H)

Scinax squalirostris (two observed individuals, one collected specimen) was encountered in areas with anthropic alteration. It presents arboreal habits, encountered in a transition zone between forest and open field. This species was recorded in August, and following modification of the area for agriculture, it has not been recorded since.

Pseudis minuta Günther, 1858
Green Frog (Figure 5B)

Pseudis minuta (two observed individuals), was encountered in areas without anthropic alteration. It presents semi-aquatic habits, inhabiting wetlands. This species was recorded in January.

Figure 5. Some amphibians recorded at the study site: (**A**) *Scinax nasicus*; (**B**) *Pseudis minuta*; (**C–D**) *Physalaemus biligonigerus*; (**E**) *Physalaemus gracilis*; (**F**) *Leptodactylus latrans*; (**G**) *Leptodactylus latinasus*; (**H**) *Leptodactylus mystacinus*.

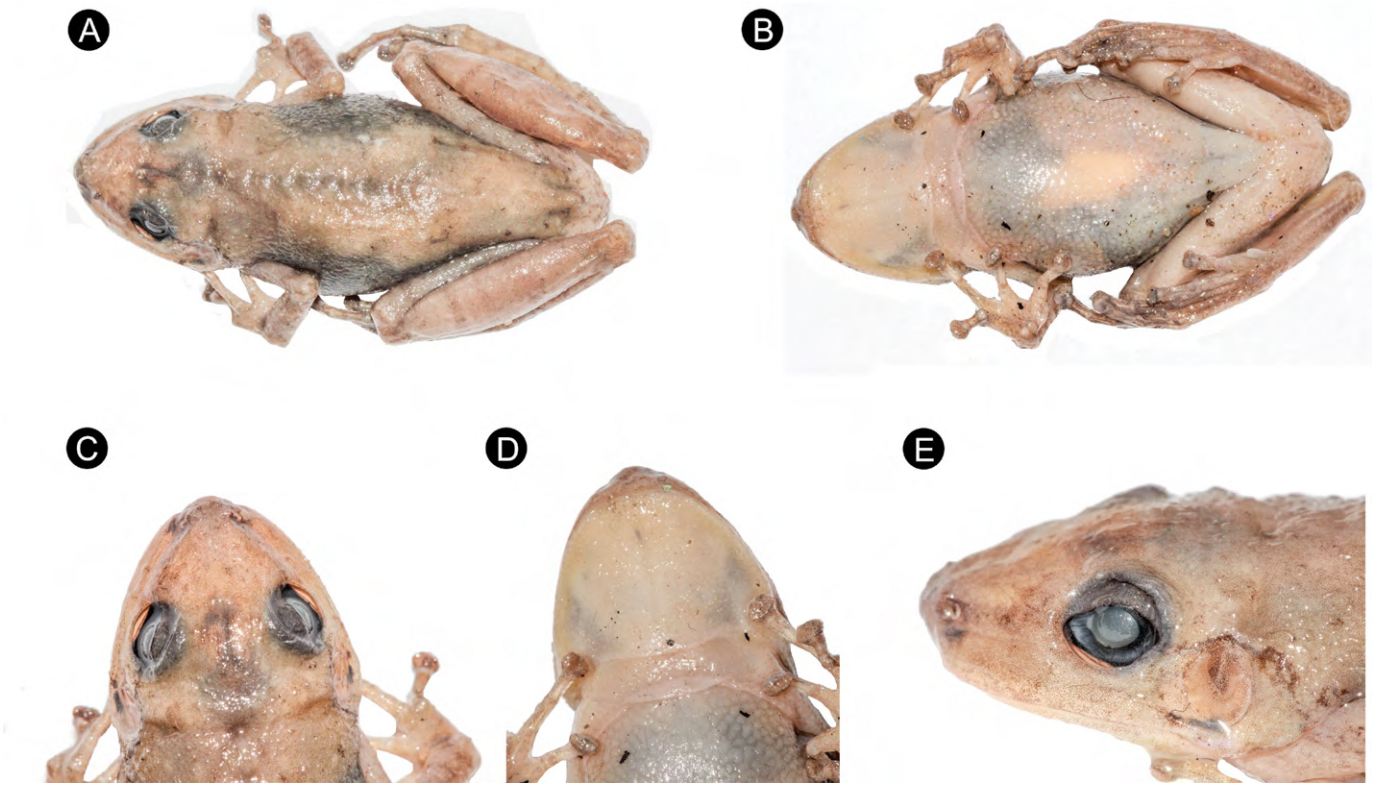

Figure 6. Specimen of *Scinax* cf. *granulatus* (CHIF – 17) from the study site. (**A**) Dorsal view; (**B**) Ventral view; (**C**) Top of head; (**D**) Ventral head view; (**E**) Lateral head view.

Family Leptodactylidae

Leptodactylus latrans (Steffens, 1815)
Creole Frog (Figure 5F)

Leptodactylus latrans is a common anuran species (97 observed individuals), encountered in areas with and without anthropic alteration. Of terrestrial and semi-aquatic habits, it inhabits open fields and forested areas, found under rocks and logs. This species was recorded in the months of January, February, March, April and November.

Leptodactylus mystacinus (Burmeister, 1861)
Striped Frog (Figure 5H)

Leptodactylus mystacinus (five observed individuals) found in areas with anthropic alteration. It presents terrestrial habits, occurring in open fields, under rocks. This species was recorded in January, March, April and May.

Leptodactylus latinasus Jiménez de la Espada, 1875
Blotched Frog (Figure 5G)

Leptodactylus latinasus (eight observed individuals) was encountered in areas with anthropic alteration. It presents terrestrial and cryptozoic habits, occurring in open fields. This species was recorded in March, April and August.

Physalaemus biligonigerus (Cope, 1861)
Frog (Figure 5C–D)

Physalaemus biligonigerus (three observed individuals) was encountered in areas with little anthropic alteration. Of semi-aquatic and terrestrial habits, this species was recorded in wetlands, during the month of January.

Physalaemus gracilis (Boulenger, 1883)
Variable Frog (Figure 5E)

Physalaemus gracilis (two observed individuals), was not encountered in areas with anthropic alteration. Of terrestrial and cryptozoic habits, it inhabits forested areas, being found under logs, during the months of May and September.

Family Microhylidae

Elachistocleis bicolor (Valenciennes *in* Guérin-Meneville, 1838)
Oval Frog (Figure 4E)

Elachistocleis bicolor (one observed individual) was not encountered in areas with anthropic alteration. It presents cryptozoic habits, with a record in a forested area, during the month of May.

Class Reptilia
Order Crocodylia
Family Alligatoridae

Caiman latirostris (Daudin, 1801)
Broad-Snouted Caiman (Figure 7A)

Caiman latirostris (one observed individual) was recorded based on a single specimen observed in the main

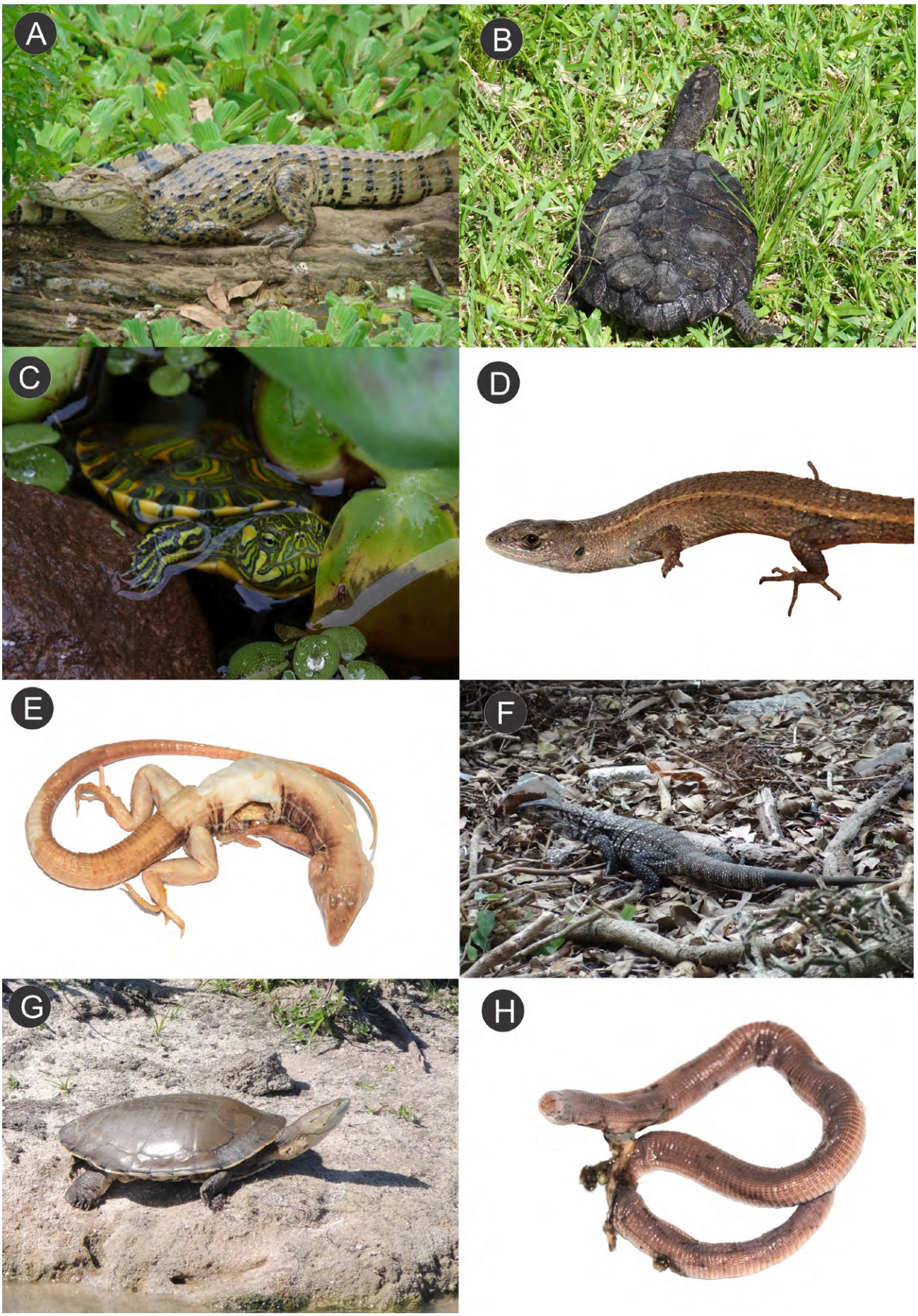

Figure 7. Some reptiles recorded at the study site: (**A**) *Caiman latirostris*; (**B**) *Hydromedusa tectifera*; (**C**) *Trachemys dorbignyi*; (**D**) *Cercosaura schreibersii*; (**E**) *Teius oculatus*; (**F**) *Salvator merianae*; (**G**) *Phrynops hilarii*; (**H**) *Amphisbaena trachura*.

water reservoir. It presents aquatic habits, with the specimen encountered swimming on the water surface, in July.

Order Testudines
Suborder Pleurodyra
Família Chelidae

Phrynops hilarii (Duméril & Bibron, 1835)
Bearded Toadhead (Figure 7F)

Phrynops hilarii (two observed individuals) was encountered in open fields or flooded areas. We encountered one specimen crossing an open field and the other under a log, in September and December, respectively.

Hydromedusa tectifera Cope, 1870
Snake-Necked Turtle (Figure 7B)

Hydromedusa tectifera (one observed individual) encountered in flooded areas of the main reservoir. This species was recorded in February.

Suborder Cryptodira
Family Emydidae

Trachemys dorbigni (Duméril & Bibron, 1835)
Common Slider (Figure 7C)

Trachemys dorbigni (13 observed individuals) was encountered in flooded areas, even in those with strong anthropic alteration. Of semi-aquatic habits, it inhabits wetlands, water reservoirs and can also be found in terrestrial habitats. It was recorded in the months of February, September and November. We also observed the hatching of 10 eggs in September.

Order Squamata
Suborder Amphisbaenia
Family Amphisbaenidae

Amphisbaena prunicolor (Cope, 1885)
Blind Snake (Figure 7H)

Amphisbaena prunicolor (two observed individuals, one collected specimen) was found in areas with strong human presence. It is of fossorial habit, found in humid and shaded habitats; encountered in the months of May and November.

Suborder Sauria
Family Gymnophthalmidae

Cercosaura schreibersii schreibersii Wiegman, 1834
Lizard (Figure 7D)

Cercosaura schreibersii (one observed individual) was recorded by a single specimen encountered moving on an unpaved road in March. It prefers terrestrial habits, in open field areas.

Family Teiidae

Teius oculatus (d'Orbigny & Bibron, 1837)
Green Lizard (Figure 7E)

No specimens of *Teius oculatus* were observed during our fieldwork. The species was recorded based on two collected specimens from the institutional collection, recorded as "Occasional records", with no specific collection date.

Salvator merianae (Duméril & Bibron, 1839)
Black Tegu (Figure 7F)

Salvator merianae (three observed individuals) was encountered in areas with anthropic alteration. Of terrestrial habits, it was found in open fields and forested areas. This species was recorded in the months of March and December.

Suborder Ophidia
Family Dipsadidae

Erythrolamprus jaegeri (Gunther, 1858)
Striped Green Snake (Figure 8B)

Erythrolamprus jaegeri (one observed individual) was encountered in an area without strong anthropic affects. It presents terrestrial habits, encountered in open fields and flooded areas, recorded in the month of October.

Erythrolamprus poecilogyrus sublineatus (Cope, 1860)
Green Snake (Figure 8A)

Erythrolamprus poecilogyrus (10 observed individuals, four collected specimens) was encountered in areas with strong anthropic alteration. Of terrestrial habits, it inhabits open fields, flooded areas and forested areas. We encountered specimens under wooden boards, rocks and moving over the ground. This species was recorded in January, February, March, April, May and November.

Helicops infrataeniatus Jan, 1865
Water Snake (Figure 8C)

*Helicops infrataeniatus (*two observed individuals, one collected specimen) was encountered in areas with anthropic alteration. Of semi-aquatic habits, in inhabits open fields, in association with water. We encountered specimens crossing an unpaved road and on the surface of a water reservoir, in the months of March and November.

Thamnodynastes hypoconia (Cope, 1860)
Racer (Figure 8F)

Thamnodynastes hypoconia (two observed specimens, one collected individual) was encountered in areas with little anthropic disturbance. Of terrestrial and semi-aquatic habits, it inhabits open fields, usually associated with flooded areas of the study site. We recorded two specimens, one observed on floating vegetation of the main reservoir, and another in open fields, during the month of May.

Lygophis anomalus (Günther, 1858)
Striped Racer (Figure 8E)

Lygophis anomalus is considered an uncommon species

Figure 8. Some reptiles recorded at the study site: (**A**) *Erythrolamprus poecilogyrus*; (**B**) *Erythrolamprus jaegeri*; (**C**) *Helicops infrataeniatus*; (**D**) *Phalotris lemniscatus*; (**E**) *Lygophis anomalus*; (**F**) *Thamnodynastes hypoconia*; (**G**) *Xenodon dorbignyi*; (**H**) *Bothrops alternatus*.

Figure 9. Some reptiles recorded at the study site: (**A**) *Philodryas aestiva*; (B) *Philodryas patagoniensis*; (**C**) *Philodryas olfersii*; (**D**) *Crotalus durissus*.

since no specimens were observed during the fieldwork, being recorded only from a specimen in the collection, considered as "Occasional records".

Phalotris lemniscatus (Duméril, Bibron & Duméril, 1854)
Pampas Blackhead (Figure 8D)

Phalotris lemniscatus (seven observed individuals, one collected specimen) was encountered in areas with strong anthropic alteration. It occupies cryptozoic, fossorial and terrestrial habits, with specimens being encountered under rocks, logs, or moving across the substrate. This species was recorded in the months of April, June, September and December.

Philodryas aestiva (Duméril, Bibron & Duméril, 1854)
Green Snake (Figure 9A)

Philodryas aestiva is an uncommon species, recorded based on a single juvenile individual in the didactic collection, considered as "Occasional records". Figure 8A depicts a live individual from Parque Nacional das Emas, Goiás, Brazil, outside of the Pampa morphoclimatic domain.

Philodryas olfersii (Liechtenstein, 1823)
Striped Green Snake (Figure 9C)

Philodryas olfersii is an uncommon species, with no specimens being found during our fieldwork, only from a single adult in the specimen collection, considered as "Occasional records". Figure 8C depicts a live individual from Santa Maria, RS, Brazil, outside of the Pampa morphoclimatic domain.

Philodryas patagoniensis (Girard, 1858)
Ratsnake (Figure 9B)

Philodryas patagoniensis (six observed individuals, one collected specimen) were encountered in areas with strong anthropic alterations. It has generalist habits and diurnal activity, and based on our observations of specimens in the altered areas of the campus, the species possibly exhibits great ecological plasticity. It was recorded in the months of February, March, May and June.

Xenodon dorbignyi (Bibron *in* Duméril, Bibron & Duméril, 1854)
False Lancehead (Figure 8G)

Xenodon dorbignyi is an uncommon species since it was not recorded during fieldwork, but recorded based on two collected specimens on the collection, considered as "Occasional records".

Family Viperidae

Bothrops alternatus Duméril, Bibron & Duméril, 1854
Urutu Lancehead (Figure 8H)

Bothrops alternatus is considered an uncommon species, recorded based on a single collected specimen, in the collection, considered as "Occasional records". Figure 7H depicts a specimen from Porto Alegre, RS, outside of the Pampa morphoclimatic domain.

Crotalus durissus terrificus (Laurenti, 1768)
Neotropical Rattlesnake (Figure 9D)

Crotalus durissus (1 observed individual) was encountered in areas with little anthropic alteration. Of terrestrial habits, it inhabits open fields. The specimen was recorded while thermoregulating, in a field at a forest edge, in March.

DISCUSSION

The observation of nine reptile and nine amphibian species in altered areas, as well as five reptile and seven amphibian species in unaltered areas, highlight the importance of these "green islands" in cities. This corroborates the previous hypothesis that specialized species may not be able to thrive in environments with strong anthropic pressure (Purkayastha et al. 2011). The records of six reptile species recorded only as occasional records may indicate a local extinction pattern since these species were found in the study site in the past, but not during recent extensive searches, possibly correlated to habitat loss.

Previous studies describe the herpetofauna of the Coastal Plains as being relatively well known, although these studies were not conducted in a systematic manner (Quintela and Loebmann 2009). The conservation of the study site is a reflection of the conservation in the Pampa morphoclimatic domain, where the remnants of natural vegetation are of reduced sizes and are often fragmented (Braun and Braun 1980; Gomes and Krause 1982; Lema 1994; Quintela et al. 2006).

As argued by Zanella and Cechin (2006) and Barbo et al. (2011), species with conspicuous coloration, diurnal activity, terrestrial habits and slower movement seem to be collected more frequently. We found a low occurrence of reptiles with arboreal habits and cryptic coloration (three species), which supports the hypothesis of these authors. Alternatively, as argued by Schaad and Poe (2010), it may be due to a ecomorphological convergence in assemblage organization, in which a scarcity of suitable arboreal habitat in the Pampa morphoclimatic domain leads to a similar ecological evolutionary regional diversity due to shared ecological pressures. However, further testing of these models between communities with similar sampling and equilibrium evaluation under an anthropic alteration framework are needed for evaluation of these matters.

Regarding the Pampa *sensu strictu* localities, a few inventories regarding herpetofauna have been published: (1) on the Brazil-Uruguay border, 81 terrestrial and marine reptile species (Lema and Fabian-Beurmann 1977), (2) Taim Ecological Station, 21 reptile species (Gomes and Krause 1982), (3) Rio Grande municipality, with 30 reptile and 16 amphibian species (Loebmann 2005; Quintela et al. 2009) and (4) an unpublished doctoral thesis from the Southeastern Mountain Ranges, with 28 snake species (Outeiral 2005), as well as other studies done in transition areas between the grasslands and forest formations of Atlantic Forest (e.g., Lema et al. 1980, 1984; Souza-Filho and Verrastro 2012). The reduced number of recorded species in our study in comparison to the other studies is probably related to the constant anthropic action in the study area, considering that the result of constant alterations could eliminate habitats suitable for fragile or specialist species (Pickett et al. 2001; Farhig 2003; McKinney 2006). Another possibility to be considered is the reduced size of the Campus (approximately 200 acres use metric measurement), its urban location, the absence of methods such as pitfall traps and possible environmental corridors that could be used by species of low population density as an ecological corridor.

Regarding the conservation of these urban fragments, public institutions should be models of good environmental management, allowing urban development without deeply affecting the biodiversity (Hamdan et al. 2013). The threats represented by the reduction of the populations contained in these "green islands" (due to the aforementioned reduction of suitable habitats) could cause a subsequent lack of genetic diversity, increase in endogamy and enhance effects related to the excess of competition, predation or low population density (Ridley 2006; Begon et al. 2007; Hamdan et al. 2013). It is also imperative to maintain the trophic structural complexity in these remaining areas, as well as the execution of management plans that increase the conservation of the local species, their habitats and ecological corridors (Hamer and McDonell 2010). Thence, institutions should develop the education, conduct the research and apply the results, taking the knowledge from inside research facilities to the adjacent communities, fulfilling its educative ethos towards society and contributing to the formation of citizens with an environmental education basis, promoting the conservation and public education regarding the fauna contained in these urban "green islands", since a subject cannot be preserved until it is effectively known.

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APPENDICES

Appendix 1. Reptile voucher specimens housed at the Didactic Collection of Instituto Federal de Educação, Ciências e Tecnologia, Câmpus Pelotas-Visconde da Graça.
Amphisbaenidae: *Amphisbaena prunicolor* (CHIF – 13); **Dipsadidae:** *Erythrolamprus poecilogyrus* (CHIF – 03, 11, 12, 15); *Thamnodynastes hypoconia* (CHIF – 14); *Helicops infrataeniatus* (CHIF – 19); *Lygophis anomalus* (CHIF – 20); *Phalotris lemniscatus* (CHIF – 07); *Philodryas aestiva* (CHIF – 10); *Philodryas olfersii* (CHIF – 08); *Philodryas patagoniensis* (CHIF – 09); *Xenodon dorbignyi* (CHIF – 01, 02); **Viperidae:** *Bothrops alternatus* (CHIF – 04); **Teiidae:** *Teius oculatus* (CHIF – 05, 06).

Appendix 2. Amphibian voucher specimens housed at the Didactic Collection of Instituto Federal de Educação, Ciências e Tecnologia, Câmpus Pelotas-Visconde da Graça.
Typhlonectidae: *Chtonerpeton indistinctum* (CHIF – 18); **Hylidae:** *Scinax* cf. *granulatus* (CHIF – 16); *Scinax squalirostris* (CHIF – 17).