

Birds of Parque Estadual do Tainhas, an important protected area of the highland grasslands of Rio Grande do Sul, Brazil

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Abstract. Parque Estadual do Tainhas – PET (Tainhas State Park) is a protected area with significant extensions of natural grasslands located in highland grasslands of northeastern Rio Grande do Sul state, Brazil, and recognized as an Important Bird Area. Our aim was to record the bird species richness of PET with a greater sampling effort than previous studies at the site, including unpublished data such as occurrence status of most species and evidence of breeding of some of them in the park. We surveyed birds between 2012 and 2018 performing aleatory trails covering mainly the central portion of PET (1,500 ha). We also added records from published studies. We listed 208 species, of which 203 were recorded during our fieldwork (including 18 species of conservation concern). The estimated richness was 222.22 (SD = 10.91) species, according to Jackknife 1 method. This result represents a 58% increase in the species richness of the park and shows that long-term monitoring of the bird community allows to access more accurate richness and to identify the regular species (core avifauna) of the park. The presence of 55 breeders and threatened species shows the importance of this protected area for breeding and conservation of grassland birds, such as *Urubitinga coronata*, *Cinclodes pabsti*, *Xolmis dominicanus*, *Anthus nattereri*, *Xanthopsar flavus*, and *Sporophila melanogaster*.

Key-Words. Breeding; Campos de Cima da Serra; Conservation unit; Grassland birds; Species richness.

INTRODUCTION

Grasslands are the most representative vegetation type in extreme southern Brazil (Andrade *et al.*, 2019). Despite this, it is one of the most neglected ecosystems considering that few grassland areas are protected in conservation units of integral protection in Brazil (less than 0.5%) (Overbeck *et al.*, 2007; Pillar & Vélez, 2010). Approximately 25% of the grasslands in southern Brazil have been lost in the last three decades (Overbeck *et al.*, 2007), mainly by changes in land use that affect grasslands over the world, such as expansion of crops, forestation with exotic species, and pastures with exotic grasses for livestock (Gibson, 2009; Bond & Parr, 2010). Brazilian conservation policies are strongly focused on forest biomes (*e.g.*, Amazon and Atlantic Forest), while little importance is given to non-forest ecosystems (Overbeck *et al.*, 2015). Therefore, knowledge on the diversity of these open habitats is a basic information necessary to expand the protected areas and contribute to a suitable management of current grassland conservation units.

In the Atlantic Forest biome the grassland landscape forms a mosaic with forests, known as *Campos do Planalto Meridional* or *Campos de Altitude* (highland grasslands) (MMA, 2000; IBGE, 2004). Specifically in northeastern Rio Grande do Sul and southeastern Santa Catarina states, this region receives the physiographic name of *Campos de Cima da Serra* due to the natural occurrence of grasslands in hills around 800 m above sea level (Bond-Buckup & Dreier, 2008). *Campos de Cima da Serra* show a complex natural physiognomy, with large extensions of grasslands interspersed with araucaria forests (*Araucaria angustifolia*), water courses, marshes and peat bogs (Hasenack & Lucatelli, 2008; Boldrini, 2009). As in most of the grasslands in South America, the habitats of this region have been threatened by anthropogenic actions, such as afforestation with *Pinus* spp. and other tree species, crops, unmanaged fires, drainage of wetlands, and installation of hydroelectric dams (Fontana *et al.*, 2003; Buckup & Bond-Buckup, 2008). Although they are part of the Atlantic Forest biome, highland grasslands of southern Brazil show many affinities with large open biomes of

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South America in terms of avifauna similarities (Stotz *et al.*, 1996; Sick, 1997), especially with the Pampa biome in Brazil (Fontana *et al.*, 2008a). However, perhaps because it is inserted in the Atlantic Forest biome, *Campos de Cima da Serra* have been neglected in widely disseminated studies on open ecosystems (Fontana *et al.*, 2008a).

Studies developed in *Campos de Cima da Serra* region have counted 1,161 plant species, of which 107 are endemic (Boldrini, 2009), and a high richness of birds (337 species), with several rare, endemic, and threatened species (Fontana *et al.*, 2008a). Approximately 42% of these birds are associated with grassland habitats or marshes, while the others are associated with forest habitats (e.g., riparian forests and wood patches) (Fontana *et al.*, 2008a, b). The Long-tailed Cinclodes (*Cinclodes pabsti*) is an endemic species of the southern Brazilian highland grasslands, occurring only in *Campos de Cima da Serra* region (Freitas *et al.*, 2008). The region is extremely important for the Black-bellied Seedeater (*Sporophila melanogaster*) breeding, since this endemic species of Brazil breeds only in highland grasslands of Rio Grande do Sul and Santa Catarina (Bencke *et al.*, 2003; Rovedder & Fontana, 2012). One study carried out in two protected areas (Parque Nacional de Aparados da Serra and Parque Nacional da Serra Geral) with large extensions of grasslands in the region (sampled together) indicates the presence of 301 bird species (IBAMA, 2004).

Parque Estadual do Tainhas (Tainhas State Park – hereafter PET) is a protected area (a conservation unit) with 6,654 ha located in *Campos de Cima da Serra* region, covering portions of Jaquirana, São Francisco de Paula, and Cambará do Sul municipalities (Bencke & Duarte, 2008). It is one of the few conservation units of integral protection in Rio Grande do Sul that includes significant extensions of natural grasslands (Bencke & Duarte, 2008), and is also recognized as an Important Bird Area (IBA) due to its role in the conservation of threatened birds (Bencke *et al.*, 2006). The complete implementation of PET and the expansion of its limits are recommended actions in a national plan for the conservation of birds in the grasslands of southern Brazil (Serafini, 2013). The terrestrial fauna of PET has a great representativeness of animals of open areas and associated habitats, such as marshes and peat bogs (Bencke & Duarte, 2008). Several threatened species are found in the PET, mainly birds (Fontana *et al.*, 2003; Bencke *et al.*, 2006; Bencke & Duarte, 2008; Serafini, 2013) and mammals (Bencke & Duarte, 2008). The management plan of the park reported 132 bird species with confirmed occurrence in the area, plus 15 species of potential occurrence that occur in its immediate surroundings or in nearby areas with similar characteristics (Bencke & Duarte, 2008). However, the sample effort used in this survey (from September 17th to September 19th and from October 17th to October 19th, 2007; G.A. Bencke, *pers. comm.*) was small, suggesting that the bird richness of the park can be larger.

Our aim was to survey the bird species richness of Parque Estadual do Tainhas, an important protected area of the highland grasslands in southern Brazil, with a greater sampling effort than previous studies performed

at the site. We also present unpublished data on the occurrence status of most species and breeding evidences of some species in the park, besides providing additional information on species of conservation concern.

MATERIAL AND METHODS

Study area

The study was performed in Parque Estadual do Tainhas, located in northeastern Rio Grande do Sul state, Brazil (Fig. 1). Sampling was carried out mainly in the central portion of PET, in an area of approximately 1,500 ha (nearly ¼ of the total area of the park), located between “Passo da Ilha” (29°07’22”S, 50°21’30”W) and “Passo do S” (29°05’05”S, 50°22’03”W). Other areas were sampled non-systematically, such as a large forest patch in the northern part of PET sampled only once (in 2018) to access the possible presence of species not recorded before. Most of the area of the park is not implemented yet, and owners remain raising cattle and growing crops, besides managing grasslands with fire according to the established culture in the region. There are two main grassland vegetation management types in the sampled area of the park: (1) area burned only once in the last ten years (about 300 ha burned in 2016) and (2) areas burned annually or every two years for cattle grazing.

Vegetation types and environments found at PET are grasslands, marshes, peat bogs, rocky outcrops, and araucaria forests (Bencke & Duarte, 2008) (Fig. 2). Grassland areas occupy most of the park, while native forest areas encompass only patches of araucaria and riparian forests of the Tainhas river and its tributaries. The climate of the region corresponds to the mesothermic humid (Vieira, 1984) or humid temperate (Maluf, 1999), and the annual mean temperature is 15.7°C, with mean of 11.1°C for minimum temperatures and mean of 21.6°C for maximum temperatures (Rambo, 2000). The precipitation is well distributed over the year (1,500-1,700 mm annual mean), reaching values up to 2,500 mm in certain sub regions (Almeida, 2009).

Data collection and analysis

We collected data between 2012 and 2018, while carrying on other studies. Data are related to five breeding seasons (October to March). In four of them (2012-2013, 2013-2014, 2016-2017, and 2017-2018) one researcher (EC) stayed in the field full time (*i.e.*, five months per season). In 2015-2016 sampling was carried out on a non-full-time basis, totaling 30 days of fieldwork over the breeding season. There was no sampling in winter.

Birds were sampled qualitatively through daily random displacements in several habitats. Birds heard and/or visualized during these displacements were identified and recorded with the help of binoculars, digital camera and/or audio recorder. Documented records (photographs and voices) were deposited on WikiAves website (www.wikiaves.org).

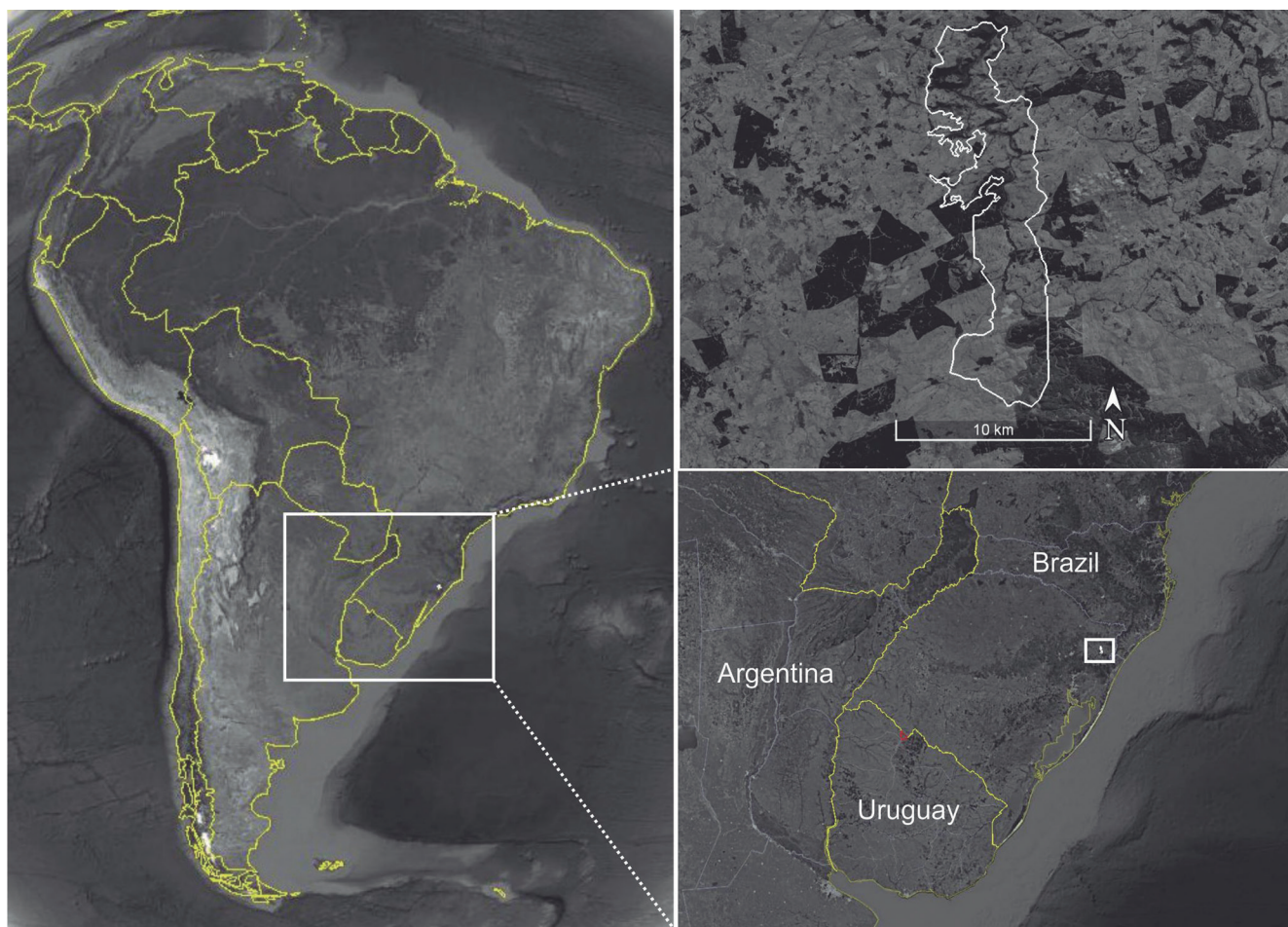


Figure 1. Location of Parque Estadual do Tainhas (white polygon on upper right detail) in southern Brazil. Source: Google Earth.

wikiaves.com). In addition, we included species records made in the park that are published in its management plan (Bencke & Duarte, 2008) but that were not recorded in our field surveys. We also searched for species records deposited in online databases (Macaulay Library – www.macaulaylibrary.org; Xeno-canto – www.xeno-canto.org; and WikiAves) and specimens deposited in Brazilian museums (Museu de Ciências e Tecnologia, of Pontifícia Universidade Católica do Rio Grande do Sul, and Museu de Ciências Naturais, of Fundação Zoobotânica do Rio Grande do Sul) and North American collections (ORNIS digital database – www.ornisnet.org), whose locality record could be safely attributed to the PET or its vicinities.

In order to estimate the bird richness of PET we used the first-order Jackknife species richness estimator, since our data were based on incidence of the species (Gotelli & Colwell, 2010). We also built a rarefaction curve with the observed richness, considering each breeding season as a sampling unit (sample-based rarefaction curve; Gotelli & Colwell, 2010). This analysis was performed in EstimateS 9.1.0 (Colwell, 2013).

The confirmation of breeding activity of the species was made through observation of active nests under construction, with eggs or nestlings, or through observation of young individuals with limited flying ability (“prejuvenal”) or smaller than adults (Binford, 1973; Maurício *et al.*, 2013). For species whose juveniles have greater dispersion capacity (*e.g.*, birds of prey) and did not have their

nests found (only juveniles with parents), we considered that the breeding area can be the PET or its vicinities, since the immature with fully-grown flight feathers are capable of traveling long distances from the nest site (Binford, 1973). The status of occurrence of species in the PET was determined using the incidence values. Thus, we consider “regular” those species recorded in all the five breeding seasons sampled, usually more than five times per season; “occasional” those species recorded in two to four breeding seasons, usually with few records per season (from one to five times); and “rare” the species found few times (one to five) only in a single season. Regular species include migratory species, what does not mean these species may be found over the year in the park. The term “core avifauna” (*sensu* Remsen, 1994) can be applied to regular species (*i.e.*, those species that regularly breed, winter, or migrate through the site). Species recorded only in the large forest fragment in the northern of PET, sampled only once, did not have their occurrence status verified.

The status of threat in state, country, and global levels follow Rio Grande do Sul (2014), MMA (2014), and IUCN (2018), respectively. Endemic species of the Atlantic Forest biome follow Bencke *et al.* (2006). Species restricted to grassland habitats or which make extensive use of grassland follow Azpiroz *et al.* (2012). Migratory species were classified according to Bencke (2001). Scientific names and the taxonomic order of the species follow Piacentini *et al.* (2015).

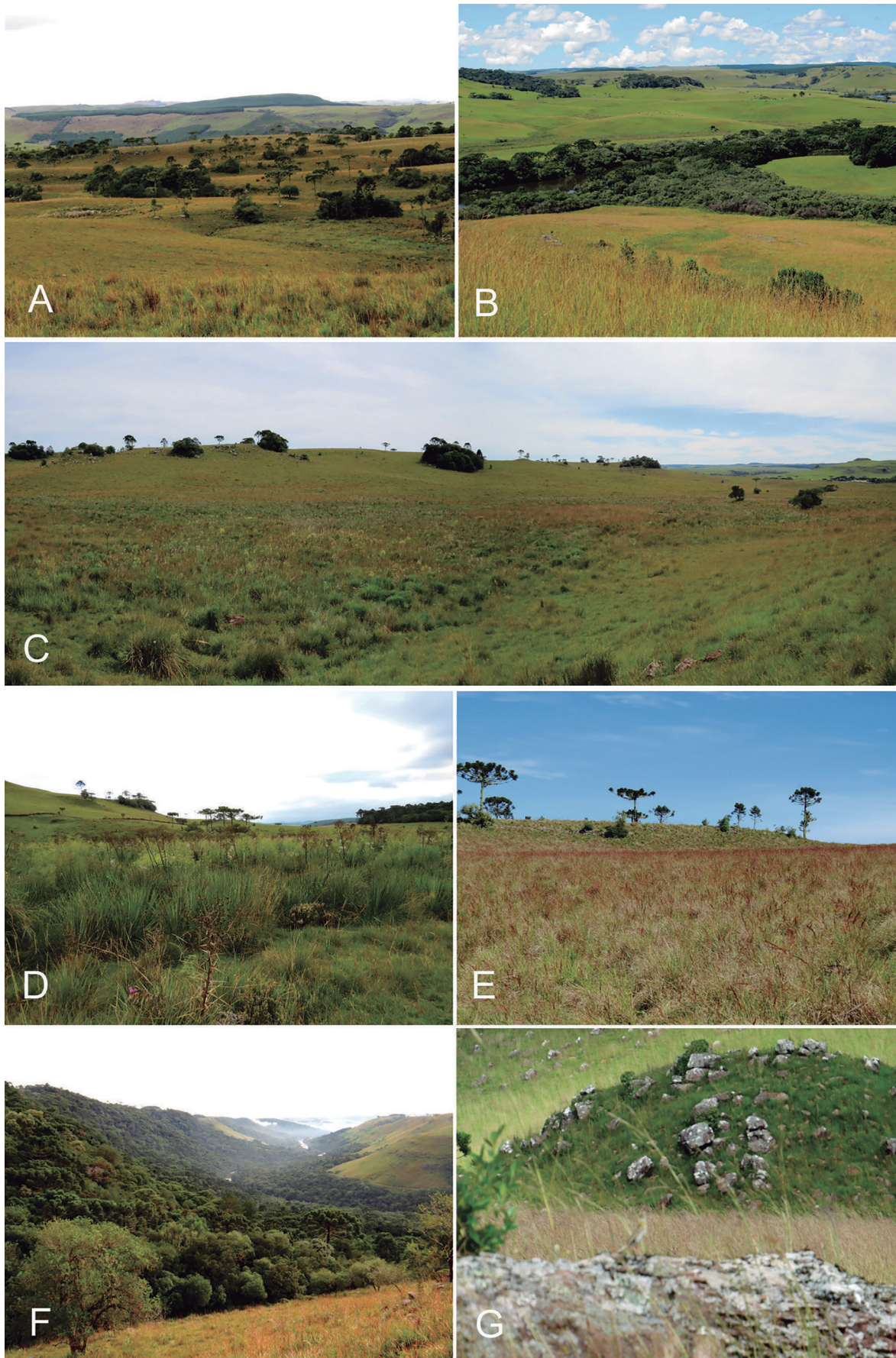


Figure 2. Habitats and vegetation types found in Parque Estadual do Tainhas: (A) landscape of PET showing grasslands interspersed with forest patches composed mainly of araucaria (*Araucaria angustifolia*), (B) riparian forest along the Tainhas river and its tributary, (C) grassland with marsh in lower areas, (D) marsh dominated by “gravatã” (*Eryngium pandanifolium*), (E) dry grassland composed mainly of *Sorghastrum* sp., (F) large forest area in the northern portion of PET, (G) rocky outcrop. Photos: Eduardo Chiarani.

RESULTS

Species list

We recorded 203 bird species in Parque Estadual do Tainhas during fieldwork, of which 150 were documented (Table 1). Five species reported in the PET's management plan were not recorded during our study: *Podilymbus podiceps*, *Sarcoramphus papa*, *Porphyriops melanops*, *Stephanoxis loddigesii*, and *Jacana jacana*. We recorded *P. melanops* only outside PET's limits (about 2 km far from the East limit). Species records in online databases or specimens deposited in museums reported to the PET or nearby places (e.g., Várzea do Cedro, Lajeado Grande localities) do not represent additions to the list. Thus, the total number of bird species with confirmed occurrence inside PET's limits is currently 208 species. Species richness was estimated at 222.22 (SD = 10.91) species. Although the species accumulation curve does not show a clear trend towards stabilization, the observed richness corresponds to 91.4% of the estimated richness and is within its 95% confidence interval (Fig. 3).

Ten species are threatened, and eight are near-threatened in regional, national and/or global levels (described below). Migratory species correspond to 15% ($n = 31$), while species restricted to grassland habitats totaled 24% ($n = 49$) of the birds of PET. Twenty-five species are endemic of the Atlantic Forest biome. Of the 198 species whose occurrence status was possible to determine, 146 (74%) may be considered of regular presence (the "core avifauna"). Other 33 species (17%) are occasional and 19 (9%) were classified as locally rare.

Species of conservation concern

Ten species recorded are threatened in regional (RS), national (BR), and/or global (GL) levels, while other eight species are considered near threatened. Most of them are regular species in the PET, except *Sporophila beltoni* and *S. hypoxantha*, which are occasional in the area, and *Sarcoramphus papa*, which has not been evaluated (see below).

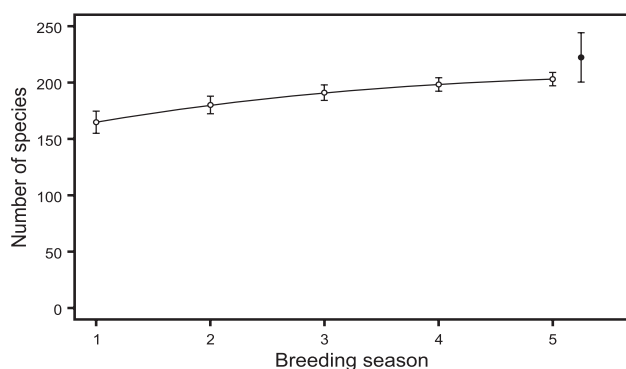


Figure 3. Rarefaction curve of bird species recorded over five breeding seasons (white dots) and estimated richness (black dot) in the Parque Estadual do Tainhas, Rio Grande do Sul, Brazil. Whiskers represent the 95% confidence interval.

Urubitinga coronata (Critically Endangered – RS; Endangered – BR, GL): at least a pair and two juveniles were recorded in the sampled area (see details in breeding data). The species was observed carrying a Southern Long-Nosed Armadillo (*Dasypus hybridus*) in flight (on October 22nd, 2016) and an unidentified snake (on December 2nd, 2012). This armadillo species was easily sighted in the area during our displacements, where it seems to be abundant.

Gallinago undulata (Vulnerable – RS): recorded with some regularity in larger marshes (at least in four marshes in the park), mainly through its voice at dusk. Probably its density is low (perhaps a single pair in each one of these marshes) making it a frequent albeit scarce species.

Amazona pretrei (Vulnerable – RS, BR, GL): couples or small groups of up to 12 individuals were observed with frequency flying over grassland areas to move among forest patches.

Cinclodes pabsti (Vulnerable – RS): found mainly close to rocky outcrops, roadsides and human constructions within the park. Family groups of up to five individuals were observed near "Passo do S", at the headquarters of the park.

Xolmis dominicanus (Vulnerable – RS, GL): common in the park, but apparently occurring in low density. Recorded almost always in pairs and only in some marshes of the park, often together with *Xanthopsar flavus*, another threatened species (see below).

Anthus nattereri (Vulnerable – RS, BR, GL): frequently recorded in the park, where it seems to be more abundant in areas burned periodically. In the area without regular fire few territories were observed, usually on hill tops where the grass is lower.

Xanthopsar flavus (Vulnerable – RS, BR, GL): common in the park, found usually in groups in the marshes or foraging in the grasslands around them, usually together with *X. dominicanus*. The largest recorded flock contained 52 individuals and was observed in a marsh surrounded by burned grassland near "Passo do S" (on September 28th, 2015).

Sporophila hypoxantha (Vulnerable – RS, BR): in three years (2012, 2015 and 2016) only one adult male was occasionally observed per season. In 2015 we banded one male which returned to the same territory in 2016. In the next season (2017-2018) the male did not return, which indicates that the occurrence of the species in the park may be occasional.

Sporophila melanogaster (Endangered – RS; Vulnerable – BR): this species is abundant in the marshes of PET and may be found with facility from November to March, when it breeds (see details in breeding data).

Sporophila beltoni (Endangered – RS; Vulnerable – BR): a single adult male was observed only for a few minutes in December 2015 and was not seen again in the same

Table 1. List of bird species recorded in Parque Estadual do Tainhas (PET), northeastern Rio Grande do Sul state, Brazil. Species marked with asterisk indicate records made only in the management plan of the park. Occurrence status: R = Regular, O = Occasional, and Ra = Rare. Conservation status in regional (RS), national (BR), and global (GL) levels: CR = Critically endangered, EN = Endangered, VU = Vulnerable, and NT = Near-threatened. Breeding evidence: N = Nest (active), P = Prejuvenal with limited flying ability or smaller than adults, and J = Juveniles with fully-grown flight feathers, seen together with adult individual. Voucher number from records deposited on WikiAves website can be accessed online using [http://www.wikiaves.com/voucher number](http://www.wikiaves.com/voucher_number).

Taxa	Status		Breeding evidence	Voucher number
	Occurrence in PET	Conservation		
Tinamidae				
<i>Crypturellus obsoletus</i> (Temminck, 1815)	R			
<i>Rhynchotus rufescens</i> (Temminck, 1815)	R		N, P	1198695
<i>Nothura maculosa</i> (Temminck, 1815)	R		N	3197749
Anhimidae				
<i>Chauna torquata</i> (Oken, 1816)	Ra			3186136
Anatidae				
<i>Amazonetta brasiliensis</i> (Gmelin, 1789)	R			3186169
<i>Anas flavirostris</i> Vieillot, 1816	R		P	747850
<i>Anas georgica</i> Gmelin, 1789	O			3186165
Cracidae				
<i>Penelope obscura</i> Temminck, 1815	R			3189200
Podicipedidae				
<i>Podilymbus podiceps</i> (Linnaeus, 1758)*				
Ciconiidae				
<i>Ciconia maguari</i> (Gmelin, 1789)	R			3185179
<i>Mycteria americana</i> Linnaeus, 1758	O			3185177
Phalacrocoracidae				
<i>Phalacrocorax brasilianus</i> (Gmelin, 1789)	R			
Ardeidae				
<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	R			
<i>Butorides striata</i> (Linnaeus, 1758)	R			1211733
<i>Bubulcus ibis</i> (Linnaeus, 1758)	R			
<i>Ardea cocoi</i> Linnaeus, 1766	O			
<i>Ardea alba</i> Linnaeus, 1758	R			
<i>Syrigma sibilatrix</i> (Temminck, 1824)	R			3187204
<i>Egretta thula</i> (Molina, 1782)	R			
Threskiornithidae				
<i>Plegadis chihi</i> (Vieillot, 1817)	Ra			3187205
<i>Phimosus infuscatus</i> (Lichtenstein, 1823)	Ra			3187226
<i>Mesembrinibis cayennensis</i> (Gmelin, 1789)	R	NT (RS)		876244
<i>Theristicus caudatus</i> (Boddaert, 1783)	R			1204046
Cathartidae				
<i>Cathartes aura</i> (Linnaeus, 1758)	R			3186161
<i>Coragyps atratus</i> (Bechstein, 1793)	R			3187228
<i>Sarcoramphus papa</i> (Linnaeus, 1758)*		NT (RS)		
Accipitridae				
<i>Elanus leucurus</i> (Vieillot, 1818)	R			3186134
<i>Circus buffoni</i> (Gmelin, 1788)	O			3186137
<i>Accipiter striatus</i> Vieillot, 1808	R			
<i>Accipiter bicolor</i> (Vieillot, 1817)	Ra			3042081
<i>Rostrhamus sociabilis</i> (Vieillot, 1817)	Ra			3186159
<i>Geranospiza caerulescens</i> (Vieillot, 1817)	Ra			3038041
<i>Heterospiza meridionalis</i> (Latham, 1790)	R		J	714485
<i>Urubitinga urubitinga</i> (Gmelin, 1788)	Ra			
<i>Urubitinga coronata</i> (Vieillot, 1817)	R	CR (RS); EN (BR, GL)	J	876258
<i>Rupornis magnirostris</i> (Gmelin, 1788)	R			
<i>Geranoaetus albicaudatus</i> (Vieillot, 1816)	R		J	1204037
<i>Geranoaetus melanoleucus</i> (Vieillot, 1819)	R	NT (RS)	J	876265
Aramidae				
<i>Aramus guarana</i> (Linnaeus, 1766)	O			3191672
Rallidae				
<i>Aramides saracura</i> (Spix, 1825)	R		P	3187236
<i>Laterallus leucopyrrhus</i> (Vieillot, 1819)	R			2484589
<i>Pardirallus nigricans</i> (Vieillot, 1819)	O			
<i>Pardirallus sanguinolentus</i> (Swainson, 1837)	R		P	3187237
<i>Gallinula galeata</i> (Lichtenstein, 1818)	R			
<i>Porphyriops melanops</i> (Vieillot, 1819)*				
Charadriidae				
<i>Vanellus chilensis</i> (Molina, 1782)	R		N, P	3187256

Taxa	Status		Breeding evidence	Voucher number
	Occurrence in PET	Conservation		
Recurvirostridae				
<i>Himantopus melanurus</i> Vieillot, 1817	O			2902509
Scolopacidae				
<i>Gallinago paraguaiiae</i> (Vieillot, 1816)	R		N	3197772
<i>Gallinago undulata</i> (Boddaert, 1783)	R	VU (RS)		3198855
<i>Actitis macularius</i> (Linnaeus, 1766)	O			3038022
Jacaniidae				
<i>Jacana jacana</i> (Linnaeus, 1766)*				
Columbidae				
<i>Columbina talpacoti</i> (Temminck, 1810)	Ra			3186128
<i>Patagioenas picazuro</i> (Temminck, 1813)	R			3187201
<i>Patagioenas cayennensis</i> (Bonnaterre, 1792)	R			3187201
<i>Zenaida auriculata</i> (Des Murs, 1847)	R			3186127
<i>Leptotila verreauxi</i> Bonaparte, 1855	R		N	3186124
<i>Leptotila rufaxilla</i> (Richard & Bernard, 1792)	O			3198854
Cuculidae				
<i>Coccyzus melacoryphus</i> Vieillot, 1817	Ra			782876
<i>Guira guira</i> (Gmelin, 1788)	O			3189171
<i>Piaya cayana</i> (Linnaeus, 1766)	Ra			
Tytonidae				
<i>Tyto furcata</i> (Temminck, 1827)	O			3189175
Strigidae				
<i>Megascops choliba</i> (Vieillot, 1817)	R			
<i>Megascops sanctaecatarinae</i> (Salvin, 1897)	R			3185145
<i>Bubo virginianus</i> (Gmelin, 1788)	O			
<i>Asio clamator</i> (Vieillot, 1808)	O			3189173
Caprimulgidae				
<i>Lurocalis semitorquatus</i> (Gmelin, 1789)	R			
<i>Hydropsalis longirostris</i> (Bonaparte, 1825)	R		P	895226
<i>Hydropsalis torquata</i> (Gmelin, 1789)	O			3191668
<i>Podager nacunda</i> (Vieillot, 1817)	Ra			
Apodidae				
<i>Cypseloides senex</i> (Temminck, 1826)	R			988813
<i>Streptoprocne zonaris</i> (Shaw, 1796)	R			938730
<i>Streptoprocne biscutata</i> (Sclater, 1866)	R			2799903
<i>Chaetura meridionalis</i> Hellmayr, 1907	R			
Trochilidae				
<i>Florisuga fusca</i> (Vieillot, 1817)	O			3189169
<i>Stephanoxis loddigesii</i> (Gould, 1831)*				
<i>Chlorostilbon lucidus</i> (Shaw, 1812)	R			3189170
<i>Leucochloris albicollis</i> (Vieillot, 1818)	R			2805770
Trogonidae				
<i>Trogon surrucura</i> Vieillot, 1817				3038025
Alcedinidae				
<i>Megaceryle torquata</i> (Linnaeus, 1766)	R			570574
<i>Chloroceryle amazona</i> (Latham, 1790)	R			766489
<i>Chloroceryle americana</i> (Gmelin, 1788)	R			766488
Bucconidae				
<i>Nystalus chacuru</i> (Vieillot, 1816)	Ra			
Picidae				
<i>Picumnus nebulosus</i> Sundevall, 1866	R	NT (GL)		
<i>Melanerpes candidus</i> (Otto, 1796)	O			3198905
<i>Veniliornis spilogaster</i> (Wagler, 1827)	R			
<i>Piculus aurulentus</i> (Temminck, 1821)	R	NT (GL)		3191670
<i>Colaptes melanochloros</i> (Gmelin, 1788)	R			
<i>Colaptes campestris</i> (Vieillot, 1818)	R			3185147
Cariamidae				
<i>Cariama cristata</i> (Linnaeus, 1766)	R			3187247
Falconidae				
<i>Caracara plancus</i> (Miller, 1777)	R		N, J	3187207
<i>Milvago chimachima</i> (Vieillot, 1816)	R		J	3185147
<i>Milvago chimango</i> (Vieillot, 1816)	R			3191691
<i>Micrastur ruficollis</i> (Vieillot, 1817)	O			
<i>Micrastur semitorquatus</i> (Vieillot, 1817)	Ra			3038035
<i>Falco sparverius</i> Linnaeus, 1758	R		N, J	3191669
<i>Falco femoralis</i> Temminck, 1822	R		J	3038034

Taxa	Status		Breeding evidence	Voucher number
	Occurrence in PET	Conservation		
Psittacidae				
<i>Pyrrhura frontalis</i> (Vieillot, 1817)	R			3189197
<i>Myiopsitta monachus</i> (Boddaert, 1783)	Ra			3189213
<i>Pionopsitta pileata</i> (Scopoli, 1769)	R			
<i>Pionus maximiliani</i> (Kuhl, 1820)	R			3189194
<i>Amazona pretrei</i> (Temminck, 1830)	R	VU (RS, BR, GL)		825689
Thamnophilidae				
<i>Thamnophilus ruficapillus</i> Vieillot, 1816	R			3198902
<i>Thamnophilus caerulescens</i> Vieillot, 1816	R			
Conopophagidae				
<i>Conopophaga lineata</i> (Wied, 1831)	R			3198856
Rhinocryptidae				
<i>Scytalopus pachecoi</i> Maurício, 2005	R			3184463
Dendrocolaptidae				
<i>Sittasomus griseicapillus</i> (Vieillot, 1818)	R			3195605
<i>Lepidocolaptes falcinellus</i> (Cabanis & Heine, 1859)	R			825683
<i>Dendrocolaptes platyrostris</i> Spix, 1825	R			
<i>Xiphocolaptes albicollis</i> (Vieillot, 1818)	O			3198857
Furnariidae				
<i>Cinclodes pabsti</i> Sick, 1969	R	VU (RS); NT (GL)	N, P, J	2017374
<i>Furnarius rufus</i> (Gmelin, 1788)	R		N	3195604
<i>Lochmias nematura</i> (Lichtenstein, 1823)	R		N	3194340
<i>Heliobletus contaminatus</i> Berlepsch, 1885	R			2350308
<i>Syndactyla rufosuperciliata</i> (Lafresnaye, 1832)	R			
<i>Leptasthenura striolata</i> (Pelzeln, 1856)	R			746242
<i>Leptasthenura setaria</i> (Temminck, 1824)	R	NT (GL)		734958
<i>Phacellodomus striaticollis</i> (d'Orbigny & Lafresnaye, 1838)	R		N	769759
<i>Anumbius anumbi</i> (Vieillot, 1817)	R		N	3201406
<i>Synallaxis cinerascens</i> Temminck, 1823				3195610
<i>Synallaxis spixi</i> Sclater, 1856	R			
<i>Limnocites rectirostris</i> (Gould, 1839)	R	NT (RS, GL)	N, P, J	570579
<i>Cranioleuca obsoleta</i> (Reichenbach, 1853)	R			
Tityridae				
<i>Pachyramphus viridis</i> (Vieillot, 1816)	O			3194359
<i>Pachyramphus polychopterus</i> (Vieillot, 1818)	O			
<i>Pachyramphus validus</i> (Lichtenstein, 1823)				3038028
Rhynchocyclidae				
<i>Phylloscartes ventralis</i> (Temminck, 1824)	R			
<i>Tolmomyias sulphurescens</i> (Spix, 1825)				
Tyrannidae				
<i>Hirundinea ferruginea</i> (Gmelin, 1788)	O			1267851
<i>Camptostoma obsoletum</i> (Temminck, 1824)	R			
<i>Elaenia parvirostris</i> Pelzeln, 1868	R		N	3201405
<i>Elaenia mesoleuca</i> (Deppe, 1830)	R			
<i>Elaenia obscura</i> (d'Orbigny & Lafresnaye, 1837)	R			
<i>Phyllomyias virescens</i> (Temminck, 1824)	R			2366535
<i>Phyllomyias fasciatus</i> (Thunberg, 1822)	O			
<i>Serpophaga nigricans</i> (Vieillot, 1817)	R			766497
<i>Serpophaga subcristata</i> (Vieillot, 1817)	R		N	
<i>Myiarchus swainsoni</i> Cabanis & Heine, 1859	R			2017371
<i>Pitangus sulphuratus</i> (Linnaeus, 1766)	R		N	
<i>Machetornis rixosa</i> (Vieillot, 1819)	R			
<i>Myiodynastes maculatus</i> (Statius Muller, 1776)	R			3191701
<i>Megarynchus pitangua</i> (Linnaeus, 1766)	Ra			
<i>Tyrannus melancholicus</i> Vieillot, 1819	R		N, P, J	3194354
<i>Tyrannus savana</i> Vieillot, 1808	R		P, J	3194345
<i>Empidonomus varius</i> (Vieillot, 1818)	O			2017367
<i>Myiophobus fasciatus</i> (Statius Muller, 1776)	R			782653
<i>Pyrocephalus rubinus</i> (Boddaert, 1783)	Ra			
<i>Lathrotriccus euleri</i> (Cabanis, 1868)	R			2350307
<i>Knipolegus cyanostris</i> (Vieillot, 1818)	R			825684
<i>Knipolegus lophotes</i> Boie, 1828	R			3194341
<i>Satrapa icterophrys</i> (Vieillot, 1818)	R		P	3201404
<i>Xolmis cinereus</i> (Vieillot, 1816)	R		P, J	797547
<i>Xolmis irupero</i> (Vieillot, 1823)	O			1204036
<i>Xolmis dominicanus</i> (Vieillot, 1823)	R	VU (RS, GL)	P	2017373

Taxa	Status		Breeding evidence	Voucher number
	Occurrence in PET	Conservation		
Vireonidae				
<i>Cyclarhis gujanensis</i> (Gmelin, 1789)	R			
<i>Vireo chivi</i> (Vieillot, 1817)	R			2796089
Corvidae				
<i>Cyanocorax caeruleus</i> (Vieillot, 1818)	R	NT (GL)		3189199
Hirundinidae				
<i>Pygochelidon cyanoleuca</i> (Vieillot, 1817)	R			3191679
<i>Stelgidopteryx ruficollis</i> (Vieillot, 1817)	R			3038022
<i>Progne tapera</i> (Vieillot, 1817)	R			3184464
<i>Progne chalybea</i> (Gmelin, 1789)	Ra			3191680
<i>Tachycineta leucorrhoa</i> (Vieillot, 1817)	R		N, J	3191675
<i>Riparia riparia</i> (Linnaeus, 1758)	O			3184464
<i>Petrochelidon pyrrhonota</i> (Vieillot, 1817)	O			3184486
Troglodytidae				
<i>Troglodytes musculus</i> Naumann, 1823	R		N, J	
Turdidae				
<i>Turdus leucomelas</i> Vieillot, 1818	O			
<i>Turdus rufiventris</i> Vieillot, 1818	R		N, P, J	3195616
<i>Turdus amaurochalinus</i> Cabanis, 1850	R		P, J	
<i>Turdus subalaris</i> (Seebohm, 1887)	R			3195614
<i>Turdus albicollis</i> Vieillot, 1818	R			
Mimidae				
<i>Mimus saturninus</i> (Lichtenstein, 1823)	R		N, P, J	746221
Motacillidae				
<i>Anthus nattereri</i> Sclater, 1878	R	VU (RS, BR, GL)	N	746219
<i>Anthus hellmayri</i> Hartert, 1909	R		N	766490
Passerelidae				
<i>Zonotrichia capensis</i> (Statius Muller, 1776)	R		N, P, J	3197767
<i>Ammodramus humeralis</i> (Bosc, 1792)	R		N	3197747
Parulidae				
<i>Setophaga pitiayumi</i> (Vieillot, 1817)	R			1211734
<i>Geothlypis aequinoctialis</i> (Gmelin, 1789)	R		N, P	746241
<i>Basileuterus culicivorus</i> (Deppe, 1830)				3195607
<i>Myiothlypis leucoblephara</i> (Vieillot, 1817)	R			
Icteridae				
<i>Cacicus chrysopterus</i> (Vigors, 1825)	R		N	
<i>Icterus pyrrhopterus</i> (Vieillot, 1819)	Ra			
<i>Gnorimopsar chopi</i> (Vieillot, 1819)	R			3194342
<i>Chrysomus ruficapillus</i> (Vieillot, 1819)	Ra			
<i>Xanthopsar flavus</i> (Gmelin, 1788)	R	VU (RS, BR, GL)	N, P, J	1198689
<i>Pseudoleistes guirahuro</i> (Vieillot, 1819)	R		N, P, J	3201402
<i>Agelaioides badius</i> (Vieillot, 1819)	R			3197748
<i>Molothrus rufoaxillaris</i> Cassin, 1866	O			
<i>Molothrus bonariensis</i> (Gmelin, 1789)	R			3194344
<i>Sturnella supercilialis</i> (Bonaparte, 1850)	O			3184505
Thraupidae				
<i>Pipraeidea melanonota</i> (Vieillot, 1819)	R			769758
<i>Pipraeidea bonariensis</i> (Gmelin, 1789)	R			3194357
<i>Stephanophorus diadematus</i> (Temminck, 1823)	R		N, J	714484
<i>Tangara sayaca</i> (Linnaeus, 1766)	R			3194355
<i>Tangara preciosa</i> (Cabanis, 1850)	R			876238
<i>Sicalis flaveola</i> (Linnaeus, 1766)	R		N, J	3195619
<i>Sicalis luteola</i> (Sparrman, 1789)	R		N, J	1198694
<i>Haplospiza unicolor</i> Cabanis, 1851	O			876237
<i>Sporophila beltoni</i> Repenning & Fontana, 2013	O	EN (RS); VU (BR)	N	3197762
<i>Sporophila caeruleascens</i> (Vieillot, 1823)	R		N, J	3195621
<i>Sporophila hypoxantha</i> Cabanis, 1851	O	VU (RS, BR)		825687
<i>Sporophila melanogaster</i> (Pelzeln, 1870)	R	EN (RS); VU (BR); NT (GL)	N, P, J	2484591
<i>Embernagra platensis</i> (Gmelin, 1789)	R		N, P, J	2017375
<i>Emberizoides ypiranganus</i> Ihering & Ihering, 1907	R		N, P, J	1862870
<i>Saltator similis</i> d'Orbigny & Lafresnaye, 1837	R			
<i>Saltator maxillosus</i> Cabanis, 1851	O			3195603
<i>Poospiza nigrorufa</i> (d'Orbigny & Lafresnaye, 1837)	R		P	3194358
<i>Microspingus cabanisi</i> Bonaparte, 1850	R			
<i>Donacospiza albifrons</i> (Vieillot, 1817)	R		N, J	714432
Fringillidae				
<i>Spinus magellanicus</i> (Vieillot, 1805)	R		J	3195617

season. In the season 2016-2017 three young males were recorded in different marshes of PET and one adult female had a successful nest (see details about the nest in breeding data).

Mesembrinibis cayennensis (Near Threatened – RS): found along the riparian forest of the Tainhas river, usually in small groups (four to six individuals). Often detected by its voice when flying over the river near dawn and dusk.

Sarcoramphus papa (Near Threatened – RS): not recorded in our survey. The occurrence of this species for the PET is mentioned only in the management plan of the park.

Geranoaetus melanoleucus (Near Threatened – RS): sighted with less frequency than the Crowned Eagle (*Urubitinga coronata*). The records are probably of a few individuals, which suggests low density in the park.

Picumnus nebulosus (Near Threatened – GL): this small woodpecker is found in riparian forests and small forest patches around marshes. It can eventually be seen inside marshes crossing from one forest patch to another.

Piculus aurulentus (Near Threatened – GL): found with frequency in the park, usually in riparian forests.

Leptasthenura setaria (Near Threatened – GL): associated with araucaria forests (*Araucaria angustifolia*), easily found in the park, usually in pairs.

Limnoctites rectirostris (Near Threatened – RS, GL): it was recorded only in marshes with "gravatá" (*Eryngium* spp., mainly *E. pandanifolium*). Although common, it occurs in low densities in the PET.

Cyanocorax caeruleus (Near Threatened – GL): this species is easily heard or sighted in the PET, moving along forest areas.

Breeding data

We determined at least 55 species breeding in the PET or in its vicinities. Only one of these species do not have regular occurrence in the park (*S. beltoni* is occasional) (Table 1). Data on the reproduction of some species are given below.

Rhynchotus rufescens: one nest containing nine eggs was found on January 2nd, 2013. The nest was in a dry grassland area under a little clump of grass.

Nothura maculosa: one nest with seven eggs was found on December 3rd, 2013 in a dry grassland area.

Urubitinga coronata: a pair was often sighted accompanied by a juvenile in 2012-2013. On December 2nd, 2012 a juvenile was seen together with an adult, which was carrying a snake in flight. A photo taken on January 13th, 2013

shows this juvenile molting the first primaries (P1 to P4), indicating it was a little more than one year old individual. In the following season, only a juvenile was observed in the park. In 2016-2017 another juvenile (differentiated by its plumage) was recorded together with an adult. In 2017-2018 probably the same juvenile and adult individuals were observed several times. All records occurred in an area of approximately 400 ha inside the PET's boundaries.

Geranoaetus melanoleucus: juvenile individuals were observed in two occasions together with adults in late 2012. Because the time-span between both records is relatively short, they may be the same individuals.

Gallinago paraguaiiae: one nest was found in a marsh on October 23rd, 2017 containing three eggs. The nest was built in a small elevation inside the marsh among grasses.

Hydropsalis longirostris: two fledglings were found in a rocky outcrop in a hill slope on December 26th, 2015. An adult was nearby and tried to distract the observer with short and erratic flights.

Cinclodes pabsti: nest activity of this species was observed in all seasons at the headquarters of PET. The species built the nest in the gap between the roof tiles, which formed a cavity. In 2017 a pair successfully raised two broods in the same season, one in September and another in December.

Lochmias nematura: one nest was found in a slope on the banks of the Tainhas river on September 25th, 2014, in a visit made in the PET outside the sampling period. An adult was seen carrying food on constant visits to the nest. At the time of the observations the nest was about 30 cm above the water level.

Phacellodomus striaticollis: some nests built in small trees in the marsh edge were found in the park. The activity of one nest was verified by the presence of adults carrying food on January 10th, 2017.

Limnoctites rectirostris: several active nests of this species were found and monitored in the PET, all located in marshes with *Eryngium* spp.

Xolmis dominicanus: three fledglings being fed by parents were observed in a marsh on January 1st, 2013. In November 2017 adults were sighted carrying food, but the nest was not found.

Anthus hellmayri: one nest with two eggs was found on November 21st, 2016 in a dry grassland area with low grasses. The nest was positively identified by the adult which left it.

Anthus nattereri: one nest with two nestlings was found on November 9th, 2017 in a dry grassland area under a low clump of grasses. The nest was on the top of a hill, where *A. hellmayri* congener was not recorded.

Geothlypis aequinoctialis: one nest with two nestlings and one egg was found in a marsh on November 20th, 2013, built in a clump of grasses.

Xanthopsar flavus: a nesting colony with approximately 40 individuals was found in a marsh surrounded by dry grassland with low grasses on November 25th, 2013. The nests were in the center of the marsh, and two of them contained four nestlings each.

Pseudoleistes guirahuro: two juveniles being fed by adults were observed in a marsh on January 5th, 2016. In early February 2018 adults were sighted carrying food, but the nest was not found.

Donacospiza albifrons: adults carrying material to build a nest were observed on December 20th, 2012, and fledglings being fed by parents were observed on January 15th, 2016.

Sicalis luteola: one nest found on November 21st, 2013 contained five eggs and was built in a site with clumps of tall and dry grasses.

Emberizoides ypiranganus: more than 200 nests of this species were monitored during the studied seasons. The species uses both wet and dry areas to build nests, always in clumps of grasses. The use of dry grasslands to breed varies according to grassland management and time since last burn. In sites periodically burned the nests tend to be built in marshes more than in dry areas.

Embernagra platensis: approximately 50 nests were found and monitored in the PET. Nests were active from early October to early February. The species usually breeds in wet areas or close to them, often using large clumps to build its nests.

Sporophila melanogaster: more than 60 nests of this threatened species were monitored in the PET. Nests were built both in marshes and dry grasslands from late November to early March. Small shrubs and grass clumps are used to build its nests.

Sporophila beltoni: one nest with two eggs was found on February 17th, 2017, in a marsh 2 km far from the Tainhas river, in the west border of PET. The marsh is dominated by *Eryngium pandanifolium* and *Ludwigia sericea* in plain terrain. During the entire nesting period only the female was seen attending the nest, and on March 8th, 2017 two fledglings left the nest.

DISCUSSION

Species list

Our results show the occurrence of 76 species not previously mentioned for the Parque Estadual do Tainhas, representing an increase of 58% in the bird richness

known to this protected area. The larger richness found in this study is mainly associated with the greater sample effort, since in the single previous survey performed at the park (management plan, Bencke & Duarte, 2008) there were only few days of fieldwork. The data compilation shows that the PET has, at least, 208 bird species, including 146 that can regularly be found in the park. The core avifauna (*i.e.*, regular species) is of greater interest to the community ecology or conservation of an area (Remsen, 1994).

This total represents approximately 30% of the bird richness known to Rio Grande do Sul state (Franz *et al.*, 2018) and 61% of the birds recorded in *Campos de Cima da Serra* region (Fontana *et al.*, 2008a). In relation to other protected areas in the region, the PET presents 69% of the bird richness recorded in Parque Nacional de Aparados da Serra and Parque Nacional da Serra Geral (IBAMA, 2004). However, the greater richness in these two protected areas can be attributed to the presence of an altitudinal gradient with several phytophysiognomies and species exclusive of some habitats, besides the larger area of these parks.

Three species previously reported for PET that were not recorded in our study are water-related species (*P. podiceps*, *P. melanops*, and *J. jacana*), and other two are forest-related species (*S. papa* and *S. loddigesii*). The lack of these forest species during our fieldwork may be associated with the subsampling of the large araucaria forest patches found inside the park, such as those at the northern limit of PET: five forest species were exclusively recorded there (*Trogon surrucura*, *Synallaxis cinerascens*, *Pachyrhamphus validus*, *Tolmomyias sulphurescens*, and *Basileuterus culicivorus*). It is possible that further sampling concentrated on forested areas of the park increases species richness even more.

Some species here classified as regular are migratory species in Rio Grande do Sul state, which are found in the south of Brazil only during spring and summer seasons (from September to March). Most of these species are known as summer residents, which come to Rio Grande do Sul to breed during the hottest months, such as *Elaenia parvirostris*, *E. mesoleuca*, *Myiarchus swainsonii*, *Tyrannus savana*, *Tyrannus melancholicus*, and *Vireo chivi* (Bencke, 2001; Belton, 2003). Other migrants are visitors from the Northern Hemisphere, and their occurrence in the PET is occasional (*e.g.*, *Actitis macularius*, *Riparia riparia*, and *Petrochelidon pyrrhonota*). These Northern Hemisphere migrants probably use the area only for short periods during their migration. Although our study did not sample birds on cold seasons (winter and fall), this limitation does not seem to have biased the results, since Southern Hemisphere migrants, which visit Rio Grande do Sul state in the winter (*sensu* Bencke, 2001), are not reported to *Campos de Cima da Serra* region (Belton, 2003; Fontana *et al.*, 2008a, b; Repenning *et al.*, 2010).

The species classified as locally rare (observed only once) or occasional were represented by lone individuals mostly. These individuals were probably passing through the area, using it only temporarily in their displacements, as observed with *Chauna torquata* (two

individuals passed over the park on October 14th, 2017, in south-north direction), *Columbina talpacoti* (a lone male was observed near the headquarters of the park on February 1st, 2017), *Myiopsitta monachus* (five individuals were in a peach tree around the headquarters on March 5th, 2018), *Xolmis irupero* (a lone individual was observed only on January 4th, 2014 and December 20th, 2017), *Riparia riparia* (a lone individual together with a flock of *Petrochelidon pyrrhonota*, *Progne tapera* and *Tachycineta leucorrhoa* was observed on October 29th, 2016 and again on October 22nd, 2017), and *Sturnella superciliaris* (a lone male was observed only on December 13th, 2016 and November 13th, 2017). Some of them were recorded in two different years but in a similar time of the year, probably the period in which the species passes through the area of the park. According to Remsen (1994), in a survey, the number of occasional, wandering or dispersing species from other habitats or regions (*i.e.*, individuals not characteristic of that habitat) depends more on the observer effort and may not reach an asymptote within the time limits of most studies.

In this group of rare and occasional species in the PET we can highlight some that are quite conspicuous and common in other regions of Rio Grande do Sul, such as *Plegadis chihi*, *Phimosus infuscatus*, *Rostrhamus sociabilis*, *C. talpacoti*, *Piaya cayana*, *M. monachus*, *X. irupero*, *Progne chalybea*, *Chrysomus ruficapillus*, and *S. superciliaris* (Belton, 2003). Many of these species have few records in *Campos de Cima da Serra* region and some of them probably indicate cases of recent colonization and may be associated with habitat transformation (Fontana *et al.*, 2008a; Repenning *et al.*, 2010). On the other hand, several uncommon species in Rio Grande do Sul are quite common in the PET, such as *Cinclodes pabsti*, *X. dominicanus*, *X. flavus*, *A. nattereri*, and *S. melanogaster*. They are threatened species regularly found in the park and some have a considerable population locally.

We emphasize the great number of birds of prey (vultures, hawks, falcons and owls) found during our fieldwork ($n = 26$ species, 13% of the bird richness recorded in the period). This shows the good conservation status of the area, since these species are indicators of environmental quality and are associated with habitats with greater biodiversity (Sergio *et al.*, 2005, 2006). Among these species we can highlight the regular presence of the Crowned Eagle (*U. coronata*) inside the PET. *Campos de Cima da Serra* are the only region in Rio Grande do Sul state where this large eagle has been seen regularly over the past few decades (Bencke & Duarte, 2008). Others are less frequent and even rare in the area, such as *Circus buffoni*, *Geranoospiza caerulescens*, *R. sociabilis*, *Urubitinga urubitinga*, *Accipiter bicolor*, and *Micrastur semitorquatus*.

Distributional novelties

Records of *C. torquata*, *Melanerpes candidus*, *G. caerulescens*, *Megarynchus pitangua*, and *R. riparia* represent novelties to the avifauna of *Campos de Cima da Serra*, since these species were not reported in local (*e.g.*,

Fontana *et al.*, 2008a, b; Repenning *et al.*, 2010) and regional works (*e.g.*, Belton, 2003). Other records can be considered as the limits of distribution of the species or small range extensions. The record of the Tropeiro Seedeater (*S. beltoni*) corresponds to the southernmost point of its distribution, 20 km far from the previous southernmost record (Repenning & Fontana, 2013). The record of the Planalto Tapaculo (*Scytalopus pachecoi*) probably corresponds to the southernmost limit of distribution of the population that occurs in the highlands of the Meridional Plateau. This species occurs in three disjoint areas in Rio Grande do Sul (Maurício, 2005). Inside the PET, the species probably occurs only in the north of "Passo do S" waterfall, where it was recorded in the riparian forest of a tributary on the left margin of the Tainhas river.

Breeding

The total of 55 species breeding in the PET or in its vicinities (being 54 regulars in the park), including threatened and/or migratory grassland species, emphasizes the importance of this protected area. Although it was not possible to find evidence of breeding for 92 regular species, we believe that the sedentary species use the area to breed. For sedentary species, the occurrence within the region (in the breeding season or not), and the presence of proper breeding habitats are regarded in the scale (at the low categories) for breeding evidence proposed by Binford (1973). The absence of breeding data on these species may reflect the difficulty to find evidences of reproduction (nests or fledglings) and highlights the necessity for further specific studies in the area.

The area houses a considerable breeding population of Black-bellied Seedeater (*S. melanogaster*) from November to March. *Campos de Cima da Serra* region is extremely important to this species, which has its breeding area limited to highland grasslands of Rio Grande do Sul and Santa Catarina (Bencke *et al.*, 2003; Rovedder & Fontana, 2012). Moreover, the PET and its surroundings serve as an important breeding area for one of the largest birds of prey in Brazil, the Crowned Eagle (*U. coronata*). Although we did not find nests of this species, the recurring records of juveniles inside the park's boundaries show that the area can be important, at least, providing food for growth of immature birds. It is believed that juveniles remain with adults for long periods or even years (Ferguson-Lees & Christie, 2001). Armadillos (mostly *Dasybus* spp.) and snakes are apparently a significant item in the diet of *U. coronata* (see Ferguson-Lees & Christie, 2001; Bierregaard *et al.*, 2019). Our observations of individuals feeding on these items and the apparent high abundance of armadillos in the area, associated with the several records of the Crowned Eagle (adults and juveniles) in a relatively small area of PET, suggest that the species often uses the park to forage.

Some grassland species in the PET use specific habitats for breeding, such as Straight-billed Reedhaunter (*L. rectirostris*), which breeds only in marshes with "gravatás" (*Eryngium* spp.), using mainly *E. pandanifolium* to

build its nests (Larre, 2017). Other grassland species may use both wet (marshes and wet grasslands) and dry areas as nest sites, such as *E. ypiranganus* and *S. melanogaster* (Rovedder & Fontana, 2012; Chiarani & Fontana, 2015). The nest site of the Tropeiro Seedeater can be considered atypical for the species, since it uses high shrubs in rugged and steep relief to breed (Repenning & Fontana, *in press*), and we found a nest in a marsh dominated by *E. pandanifolium* and *Ludwigia sericea* in plain terrain.

Breeding evidences of two species reported in our study (*Lochmias nematura* and *A. nattereri*) are not presented in the broad review on the breeding status of birds in Rio Grande do Sul, made by Maurício *et al.* (2013). However, our records could be accepted as effective breeding evidences according to the criteria established in Maurício *et al.* (2013) and could include these species in the list of bird species that breed in Rio Grande do Sul state. Besides, Belton (2003) had considered the evidences of breeding for these two species reasonable, because he accepted other breeding evidences (e.g., enlarged gonads, nests under construction, and some display behaviors), which were considered as indirect evidences and were not accepted in Maurício *et al.* (2013).

CONCLUSIONS

Our results extend the knowledge on the birds that occur in Parque Estadual do Tainhas. Of the 18 species of conservation concern recorded in the PET (ten threatened and eight near-threatened), 15 of them use the area of the park regularly and, at least, nine use the park or its vicinities to breed, such as *U. coronata*, *C. pabsti*, *L. rectirostris*, *X. dominicanus*, *A. nattereri*, *X. flavus*, and *S. melanogaster*. The number and composition of species recorded in the PET reinforce the importance of this protected area for bird conservation, mainly those grassland-dependent species, supporting the indication of the region as an Important Bird Area.

Since vast areas along the Tainhas river have already been completely forested by commercial plantations of *Pinus* spp. (Bencke *et al.*, 2006), appropriate protection and management measures, such as the acquisition of all areas of the park, are fundamental for the long-term bird conservation in the PET as well as in *Campos de Cima da Serra*.

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