Bird Community in Rupestrian Fields from an Ecotone: Notes on *Habitat* Losses and Conservation of the Threatened Species

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ABSTRACT – The Brazilian territory has the second largest diversity of bird species on the planet. However human actions have significantly influenced mountain environments which house the main Brazilian endangered birds. Therefore, the objective of this study was (i) to assess the bird community in rupestrian fields from a montane ecosystem of the Atlantic Forest-Cerrado ecotone; (ii) to measure the losses of field areas from temporal satellite image analyses; and (iii) to analyse the threatened bird species, mainly their season variation. The study was carried out in an area located in a montane ecosystem situated in an ecotonal region between two global biodiversity hotspots, the Atlantic Forest and the Cerrado. A total of 45 species and 357 individuals were recorded in sampled rupestrian fields, and the families more representative were Thraupidae and Tyrannidae. Further, we identified a decrease in rupestrian field areas by land-cover changes (i.e. *Eucalyptus* plantations) from 2000 to 2019 years, that corresponded to 576.27ha.The results showed records of three threatened species; *Anthus nattereri, Coryphaspiza melanotis,* and *Culicivora caudacuta*, which did not vary between climatic seasons. We emphasized that the birds found in this study, specially the threatened birds, require conservation priority due to the habitat losses.

Keywords: Cloud forests; monodominant forest; seasons.

Comunidade de Aves em Campos Rupestres de um Ecótono de Mata Atlântica-Cerrado: Notas sobre Perda de *Habitat* e Conservação de Espécies Ameaçadas

RESUMO – O território brasileiro possui a segunda maior diversidade de espécies de aves do planeta. No entanto, as ações humanas têm influenciado significativamente os ambientes montanhosos que abrigam as principais aves brasileiras ameaçadas de extinção. Portanto, o objetivo deste estudo foi (i) avaliar a comunidade de aves em campos rupestres de um ecossistema montano do ecótono Mata Atlântica-Cerrado; (ii) medir as perdas de áreas de campo a partir de análises temporais de imagens de satélite; e (iii) analisar as espécies de aves ameaçadas, principalmente a variação sazonal. O estudo foi realizado em uma área localizada em um ecossistema montano situado em uma região ecotonal entre dois *hotspots* globais de biodiversidade, a Mata Atlântica e o Cerrado. Um total de 45 espécies e 357 indivíduos foram registrados nos campos rupestres, e as famílias mais representativas foram Thraupidae e Tyrannidae. Além disso, identificamos uma diminuição nas áreas de campo rupestre por mudanças na cobertura do solo (plantações de eucalipto) de 2000 a 2019 anos, que correspondeu a 576,27ha. Os resultados mostraram registros de três espécies ameaçadas; *Anthus nattereri, Coryphaspiza melanotis* e *Culicivora caudacuta*, que não variaram entre as estações climáticas. Ressaltamos que as aves encontradas neste estudo, principalmente as ameaçadas, requerem prioridade de conservação devido às perdas de *habitat*.

Palavras-chave: Florestas nebulares; floresta monodominante; estações.

Comunidad de Aves en Campos Rupestres de un Ecotono Bosque Atlántico-Cerrado: Notas Sobre la Pérdida de Hábitat y Conservación de Especies Amenazadas

RESUMEN – El territorio brasileño tiene la segunda mayor diversidad de especies de aves del planeta. Sin embargo, las acciones humanas han influido significativamente en los entornos montañosos que albergan las principales aves brasileñas amenazadas. Por lo tanto, el objetivo de este estudio fue (i) evaluar la comunidad de aves en campos rupestres de un ecosistema montano del ecotono Bosque Atlántico-Cerrado; (ii) medir las pérdidas de áreas de campo a partir de análisis de imágenes de satélite temporales; y (iii) analizar las especies de aves amenazadas, principalmente su variación estacional. El estudio se llevó a cabo en un área ubicada en un ecosistema montano situado en una región ecotonal entre dos puntos calientes de biodiversidad global, la Mata Atlántica y el Cerrado. En los campos rupestres muestreados se registraron un total de 45 especies y 357 individuos, y las familias más representativas fueron Thraupidae y Tyrannidae. Además, identificamos una disminución en las áreas de campo rupestre por cambios en la cobertura del suelo (es decir, plantaciones de eucalipto) de 2000 a 2019 años, que correspondió a 576,27ha. Los resultados mostraron registros de tres especies amenazadas; *Anthus nattereri, Coryphaspiza melanotis* y *Culicivora caudacuta*, que no variaron entre estaciones climáticas. Enfatizamos que las aves encontradas en este estudio, especialmente las aves amenazadas, requieren prioridad de conservación debido a la pérdida de hábitat.

Palabras clave: Bosques nublados; bosque monodominante; estaciones.

Introduction

The Brazilian territory currently houses the second largest diversity of bird species on the planet (Remsen Júnior *et al.*, 2015). The Brazilian Ornithological Records Committee (CRBO) has been preparing and updating the list of birds that occur in the Brazilian territory since 2005. The CRBO published the new listing of the avifauna of the country in a new revision after birdlife previous publications in the years 2011 (10th edition) and 2014 (11th edition), in which the species are distributed in 103 families, allocated in 33 orders, totaling 1919 species (Piacentini *et al.*, 2015), and about 10% of these birds are endangered (MMA, 2014; Marini & Garcia, 2005; Piacentini *et al.*, 2015).

Human actions have significantly influenced the community of birds which inhabit Brazil's natural biogeographic domains, and in turn the avifauna response to these actions varies, as some species have benefited from landscape changes and increased their populations (Alexandrino *et al.*, 2016; Anjo *et al.*, 2004; Nunes, 2013), or in contrast they become extinct in the wild. Brazil historically has the largest number of endangered bird species in the Neotropical Region (Collar *et al.*, 1997; Marini & Garcia, 2005). The Atlantic Forest has the largest number of threatened species, followed by Cerrado and Amazon (Marini & Garcia, 2005). The main threats to bird species in Brazil are forest fragmentation and illegal capture for black market sale (Destro *et al.*, 2020; Marini & Garcia, 2005; Silva & Rossa-Feres, 2017).

Many of the high-altitude environments in Brazil are neglected in biological studies (Mariano *et al.*, 2019), mainly for birds. The main obstacles are the difficult access, high slope, (Mariano *et al.*, 2019) and closed vegetation, among others. In this context of high altitude and neglect of fauna studies, there are the rupestrian fields. Its vegetation includes a greater diversity of plants than other montane fields, with a predominance of families such as Gramineae, Compositae, Velloziaceae, and Melastomataceae (Rodela, 1998). Predominantly herbaceous-shrubby, these families vary depending on the relief, climate, and soil (Vasconcelos, 2011). These and other montane ecosystems constantly suffer from human actions (Mucina, 2018; Pontara *et al.*, 2018) and many of the endangered species are associated with these environments (Machado *et al.*, 1998; Sick, 1997; Vickery *et al.*, 1999; Lopes *et al.*, 2009).

The Perdizes Plateau in southeastern Brazil is a case of a montane ecosystem which is important for conservation due to the high biological importance already evidenced in studies (e.g. Mazzoni & Perillo, 2011; Moura & Corrêa, 2012; Machado *et al.*, 2013; Machado *et al.*, 2016). In addition, it houses springs of the second largest basin in South America (Pereira *et al.*, 2006). The region is strategic for conservation purposes, as it connects two large mountain ranges from

two biodiversity hotspots (Myers *et al*., 2000), namely the Espinhaço Complex (Cerrado) and the Mantiqueira (Atlantic Forest).

Despite its importance, the region still has gaps to be filled regarding the knowledge of its birdlife. In addition, given the high degree of threat (national and global) that the species of this taxonomic group are in, studies that report the occurrence of these species and their threats are of great relevance, as they create bases for future conservationist actions.

In view of this scenario, the aims of this study were: (i) to assess the bird community of rupestrian fields from a montane ecosystem of the Atlantic Forest-Cerrado ecotone; (ii), to measure the losses of rupestrian field areas from temporal satellite image analyses; and (iii) to analyse the threatened bird species, mainly their season variation.

Material and Methods

Study area

The study area is located in an ecotonal region between the Cerrado and Atlantic Forest, both global biodiversity hotspots (Myers *et al*., 2000), in an area considered of high biodiversity (Drummond *et al*., 2009), where the creation of a conservation unit (Lima *et al*., 2011) has already been proposed. The area is named Perdizes Plateau (21°35'37''S and 44°34'14''W), located in the southern macroregion of Minas Gerais State, southeastern Brazil (Figure 1).

Perdizes Plateau has scarps and low sloping areas, and the altitude ranges from 1,310 to 1,690m. The landscape is composed by rupestrian fields which predominate in the area, monodominant forests of *Eremanthus erythropappus*, cloud forests, and upper montane semi-deciduous forest (Oliveira-Filho *et al*., 2004). The climate on the mountaintops in the region is Cwb, according to the Köppen-Geiger classification, with annual average rainfall of 1,529.7mm and average annual temperature of 19.4°C (Alvares *et al*., 2013).

Sampling bird data

This article is part of a larger project on montane ecosystems in southeastern Brazil, where we are studying the montane fields and other phytophysiognomies. To this research, the data was collected from three sampling points randomly selected in rupestrian fields. In March and August of the 2017, each sampling area was visited twice by the same observer. One visit was made for each area in summer (March – wet and hot period) and in winter (August – dry and cold period) to record resident birds and species which make seasonal movements. So, each sample area was visited one morning and one afternoon, not sequentially, by season. All observations (day and schedule) were randomly and previously decided to avoid tending the observation of some species at the expense of others.

We decided to make a sample for the observer's radius of vision for these mountain environments to locate threatened diversity of this study. The unlimited detection radius (according to Anjos *et al*., 2004; Uezu *et al*., 2005; Alexandrino *et al*., 2016) were considered, with records of both birds seen or heard within each sampled area. The observations in the sampling areas lasted five hours (from 6h to 11h and/or from 12h to 17h). The records were obtained through Nikon 08x40 binoculars, and the nomenclature followed Piacentini *et al*. (2015). The threatened species followed MMA (2014) and IUCN (2020).

Losses of rupestrian field areas

In Perdizes Plateau, we identified rupestrian field areas which were substituted by other land-uses through visual interpretation of images from the Landsat 7 satellite, ETM + sensor with spatial resolution of 30m (scene 218/75) on two dates: June 26, 2000 and September 19, 2019. We also used high spatial resolution images from the Sentinel-2 satellite (scene 23KNS, dated October 14, 2019) and Google Earth® (Zhang *et al*., 2020). To do so, we used the QGIS 1.7.4 software (Quantum GIS Development Team 2012). Aspects such as tonality (real and false color), shape, texture, size, location in the landscape were observed in order to identify these areas (Panizza & Fonseca, 2011).

Data analysis

To assess the bird diversity, we analysed the richness and number of records in two graphs constructed: one contained a cumulative species curve to all sampling area and the other with

comparative curves between seasons (Colwell & Coddington, 1994; Gotelli & Colwell, 2001). The curves were constructed with 1000 randomizations. Furthermore, to evaluate the sampling adequacy, the rarefaction curve was compared to species estimates using the Jackknife of first order estimator. The program EstimateS version 9.10 (Colwell *et al.*, 2012) was used to obtain the rarefaction curves and the richness estimator.

Whittaker plots of relative species abundance distributions were used to elucidate bird community dominance patterns (Whittaker, 1965). These curves are cumulative graphs of the log-abundance rank of each species relative to the other species.

The significances of the seasons were verified by chi-squared test, and by the G test for samples with zero or a small number of records (Zar, 1984). These records of each species were presented by histogram. These analyses were performed using the BioEstat 3.0 program (Ayres *et al.*, 2003) with a significance level of 5%.

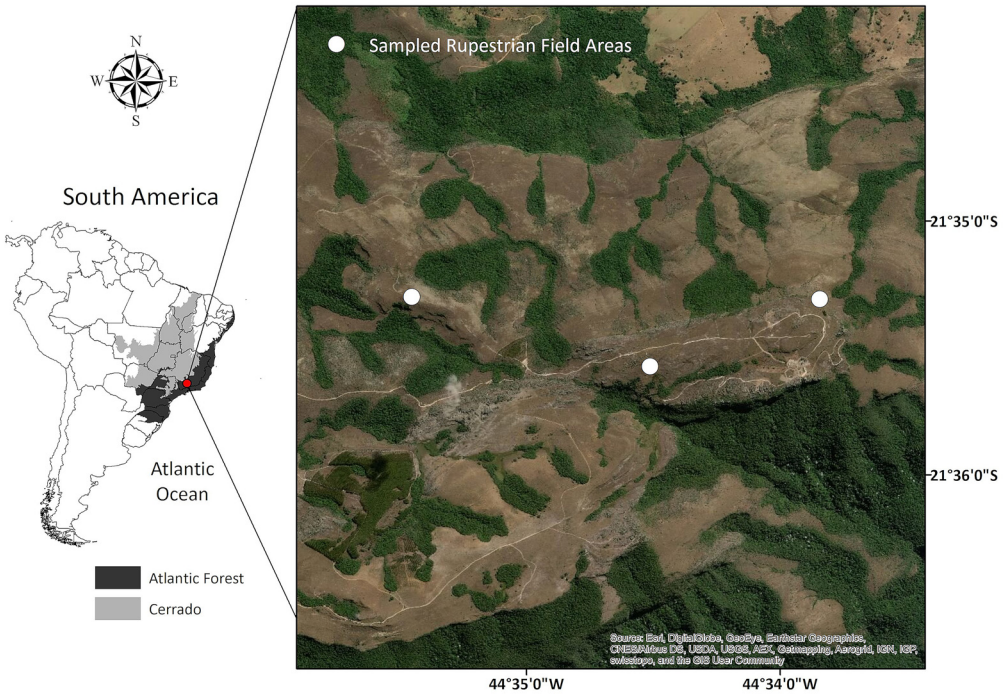

Figure 1 – Sampled areas in the Perdizes Plateau, situated in an Atlantic Forest-Cerrado ecotone, southeastern of Brazil.

Results

A total of 45 species (Supplementary Material – Table 1) in a total of 357 individuals were recorded in rupestrian fields (Figure 2A and 2B). The families more representative were Thraupidae (n=7) and Tyrannidae (n=12). The cumulative curves showed no asymptote (Figure 2A and 2B), whereas the estimated richness was outside the 95% confidence interval of the cumulative curve. The curves of the seasons are similar, because they are inside of each 95% confidence interval (Figure 2B).

The records of birds were evenly distributed among the seasons, with the dominant specie recorded alternating from the study area (Figure 3). The five most abundant species were *Knipolegus nigerrimus, Colibri serrirostris, Zonotrichia capensis, Culicivora caudacuta,* and *Sicalis citrina*. When considering all the species recorded, the five most abundant have 40% of total abundance (n=143); others 71.11% of the species have a maximum of 10 individuals recorded, one of those species with more records is the globally threatened *C. caudacuta*, which will be mentioned later.

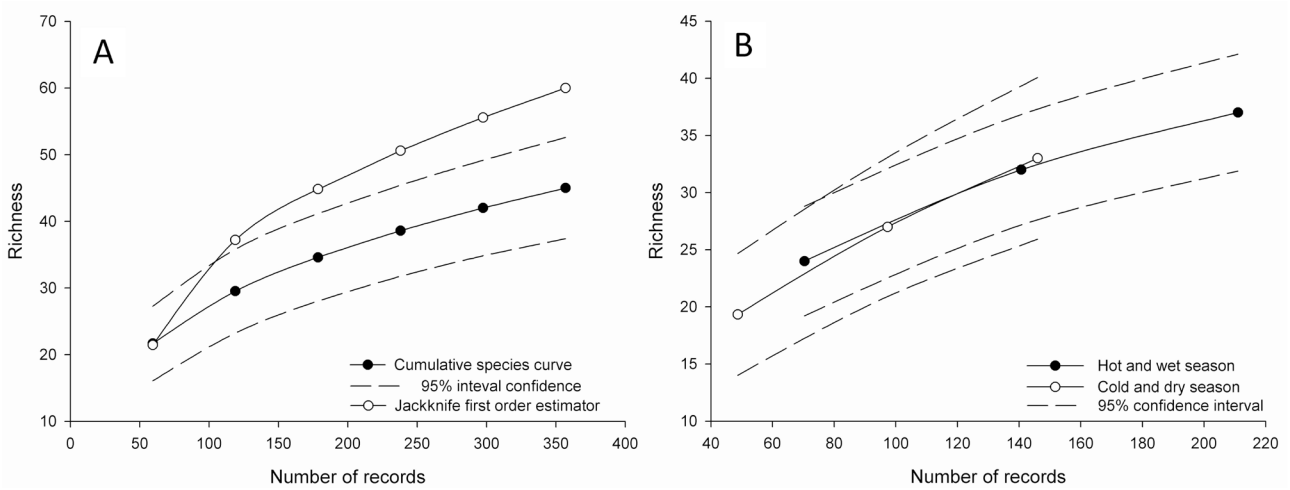

Figure 2 – Species accumulation curves for the sampling area to Perdizes Plateau, situated in an Atlantic Forest-Cerrado ecotone, southeastern of Brazil. Letter A to all area and Jackknife first order estimator, and letter B to seasons separated.

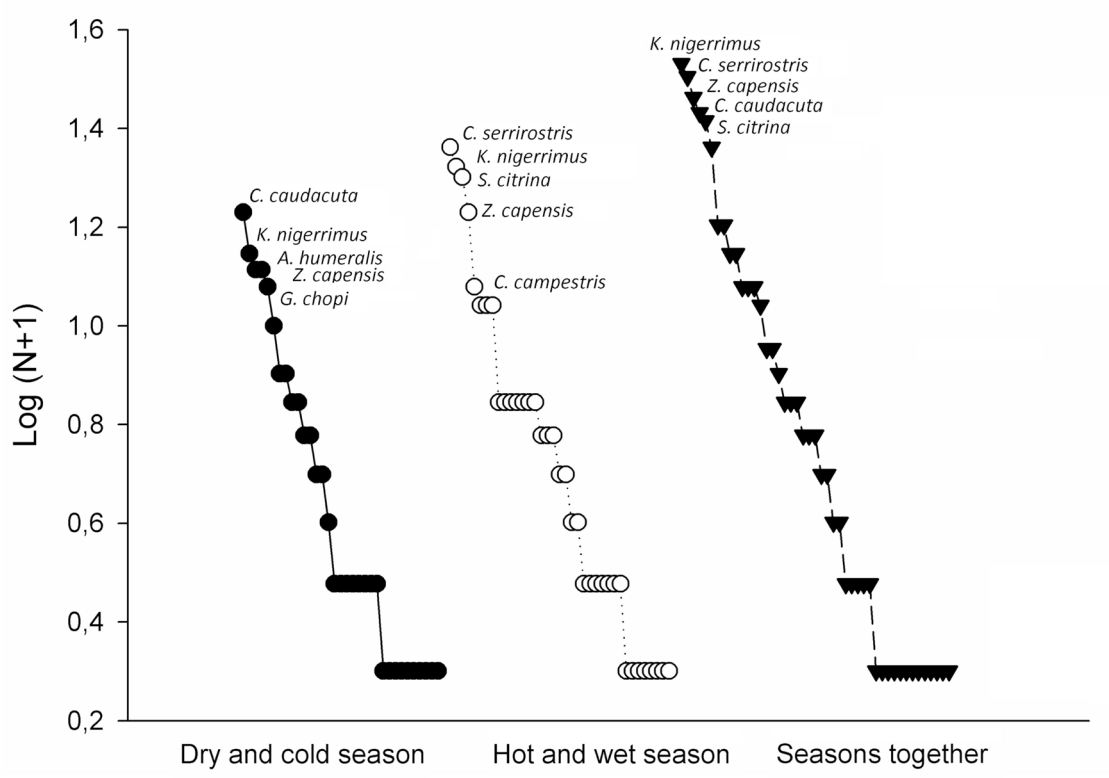

Figure 3 – Rank-abundance distribution (Whittaker plots) of bird list to rupestrian fields from Perdizes Plateau, situated in an Atlantic Forest-Cerrado ecotone, southeastern of Brazil.

We identified a decrease in rupestrian field areas by land-cover changes. We did not identify decreased rupestrian field areas in the 2000 year, indicating that the land-cover changes occurred after this date. We also identified 71 polygons comprising rupestrian field areas replaced by *Eucalyptus* stands for 2019 year, corresponding to a total of 576.27ha. The quantified area underestimates the implantation impact of *Eucalyptus* stands on natural ecosystems, since we do not quantify the area of infrastructure necessary to support silvicultural activities such as roads and buildings (Figure 4).

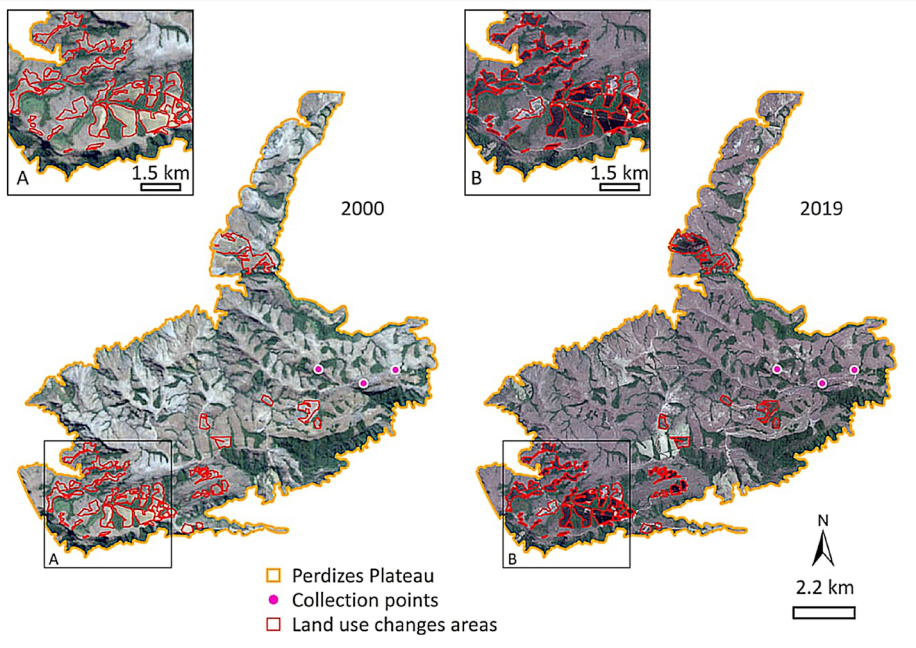

Figure 4 – Images from the Landsat satellite of the years 2000 and 2019 to Perdizes Plateau, situated in an Atlantic Forest-Cerrado ecotone, southeastern of Brazil. The polygons A and B show the main land use changes from 2000 to 2019 years, respectively.

In the rupestrian fields sampled we found a total of 34 individuals of threatened bird species (six of *Anthus nattereri*, two of *Coryphaspiza melanotis*, and 26 of *Culicivora caudacuta*; Figure 5). The Chi-squared and G tests used for species records between climatic seasons showed no statistically significant difference (P>0.05) (Table 2).

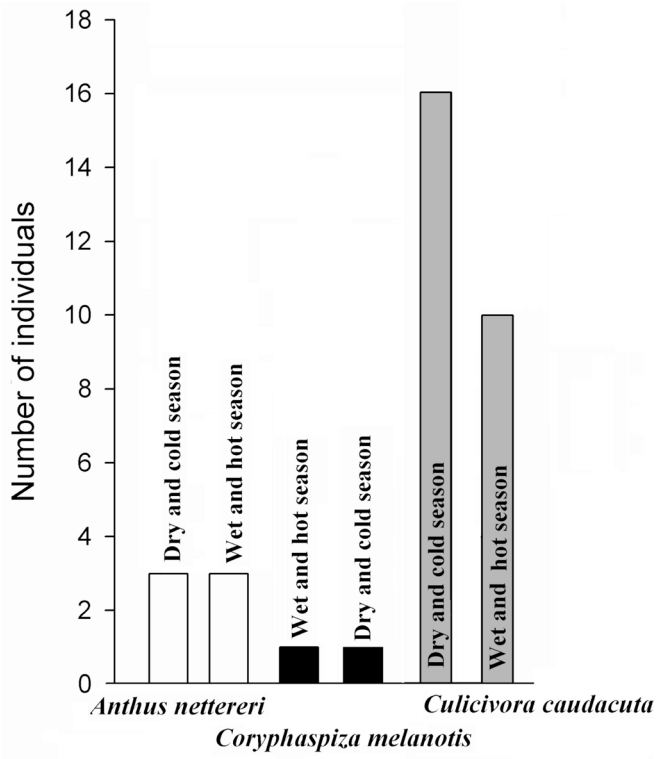

Figure 5 – Number of individuals to *Anthus nattereri* (white), *Coryphaspiza melanotis* (black) and *Culicivora caudacuta* (gray) to rupestrian fields sampled from Perdizes Plateau, situated in an Atlantic Forest-Cerrado ecotone, southeastern of Brazil.

Table 2 – Chi-square test (X^2) and G test (G) values, with significance (P) and degrees of freedom (DF) to rupestrian fields (between seasons) to Perdizes Plateau, situated in an Atlantic Forest-Cerrado ecotone, southeastern of Brazil.

Species	X^2 or G	P	DF
Coryphaspiza melanotis	G = 2.77	p = 0.25	DF = 2
Anthus nattereri	X^2 = 1.33	P = 0.51	DF = 2
Culicivora caudacuta	X^2 = 4.87	P = 0.08	DF = 2

Source: Authors

Discussion

The present research assessed the bird community of rupestrian fields from a montane ecosystem of the Atlantic Forest-Cerrado ecotone, measuring the losses of rupestrian field areas from temporal satellite image analyses, and analysing the threatened bird species, mainly their season variation. The richness observed in our research is low when compared with others researches carried out in the rupestrian field montane areas focusing on the bird community, in which between 107 and 151 species were found (respectively Moura *et al*., 2020 and Rodrigues *et al*., 2011). This low richness is the result of a composition with birds strictly dependent on field phytophysiognomy – as mentioned by Melo-Junior *et al*. (2001) and also reported by Mallet-Rodrigues *et al*. (2010). Some species restrict to fields present small differences in their specific patterns (Sabo, 1980), so there are strong competition, limiting population sizes (Sabo, 1980) and the species richness. In addition, field environments have fewer niches available because they are less heterogeneous environments (*sensu* August, 1983) when compared to forest environments, for example. And the reduction in the number of niches makes greater richness impossible. Even so, the results also evidence the high potential of the area by the presence of threatened species and closely linked only to the rupestrian fields (Sick, 1997; Piacentini *et al*., 2015). In addition, it is known that the area is notorious in the diversity of vertebrates, as the list increases with each new survey, such as Machado *et al*. (2017) and Machado *et al*. (2018) that mention the presence of 65 species of mammals in the region.

The species accumulation curves and richness estimator suggest the potential to register new species (Gotelli & Colwell, 2011). It was expected that the study area would have a high richness (as Herzog *et al*., 2005) because it is an ecotonal region and the diversity of the rupestrian fields is influenced by the adjacent physiognomies. Our results showed that the bird species evaluated are residents (IUCN, 2020; Sick, 1997; Piacentini *et al*., 2015; Somenzari *et al*., 2018), because the rank-abundance shows equity between seasons and the cumulative curves between stations are similar. Then, the fact that the species just lives in opened areas suggest that are severely impacted by habitat losses of rupestrian fields, as they do not migrate to distant areas or do they live in surrounding closed vegetation areas (personal observation – unpublished data). The results of landscape analyses showed that the mountain tops of the Perdizes Plateau have long rupestrian fields which are being replaced by *Eucalyptus* plantations, thereby altering the microhabitats with less available resources and conditions for the bird communities (Fastré *et al*., 2020). These *Eucalyptus* forests are currently large and are expanding, and suggest the reducing the populations of the threatened and another species typical of fields. In addition, there is a risk of invasion of *Eucalyptus* in natural areas, which would cause structural changes in phytophysionomies in the Perdizes Plateau, and could decline the population of some species.

The important biodiversity of this vegetation type has been severely affected by human actions which have been intensifying, causing a growing number of threatened and extinct species (Fernandes *et al*., 2014). Protected areas should be created to avoid more habitat losses of ruspestrian fields, focusing on the conservation of this vegetation type. Despite this, few protected areas have been created to protect this ecosystem (Silveira *et al*., 2016). For example, there is only one protected area in Perdizes Plateau (Rosendo N. Andrade Private Natural Heritage Reserve) which preserves large rupestrian field areas in

the northern region of the plateau. However, all other regions of Perdizes Plateau are vulnerable to the expansion of *Eucalyptus* forests and other land-use changes such as quartzite mining, which is very common in the region. Considering that knowledge about the composition of communities of vertebrate groups from different areas are key factors in conservation biology projects (Lawton, 1996), and that montane ecosystems tends to be neglected by biodiversity inventories (Mariano *et al.*, 2019), studies involving bird communities and other taxonomic groups should be systematically performed in natural field areas, including montane ecosystems such as the Perdizes Plateau, in order to subsidize the creation of protected areas (Peach *et al.*, 2019) to avoid biodiversity losses through habitat losses.

The *A. nattereri, C. melanotis* and *C. caudacuta* species are categorized as vulnerable according to the International Union for Conservation of Nature (IUCN, 2020). Regarding the official Brazilian list (MMA, 2014), *A. nattereri* is recognized as "vulnerable", and *C. melanotis* as "endangered"; however, *C. caudacuta* is not mentioned in this document. Although the three species studied herein are in the threatened categories, the current official Brazilian list (MMA, 2014) does not mention *C. caudacuta* as a threatened species. This species also is considered vulnerable by BirdLife International (2011), and is considered vulnerable in the Brazilian States of Bahia, Distrito Federal, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraná, São Paulo, and Tocantins (Machado *et al.*, 1998; Mikich & Bérnils, 2004). Therefore, we suggest a review for adding *C. caudacuta* onto the official list of threatened animals of Brazil. We highlighted that the birds mentioned in this study require conservation priority due to the rapid population decline caused by the constant degradation and destruction of their habitats throughout their range (IUCN, 2020; Stotz *et al.*, 1996), which was observed in our study area.

On the seasonal variation, our study is the first in montane and ecotonal region between the Atlantic Forest and Cerrado. Climatic patterns predominantly influence the birds (Frey *et al.*, 2016), as influences shifts in search of favorable resources and conditions (Aleixo & Vielliard, 1995). However, the species threatened registered in this study are residents without migrations (Sick, 1997; Piacentini *et al.*, 2015), and our results demonstrated the absence of influence on the number of records between the wet and hot to dry and cold seasons in the open non-forest environments of Perdizes Plateau, suggesting adaptability for maximize the survival of species over time. We recommend that new researches be carried out in Perdizes Plateau and in other rupestrian fields along the Cerrado domain that clarify in greater detail these patterns of adaptability and niche selection.

Beyond the expansion of planted forests, natural fields are also threatened by climate change. Tree advancing upwards due to climate warming to more open areas in montane ecosystems has been registered in several parts of the world (Harsch *et al.*, 2009). Furthermore, we can cite uncontrolled anthropogenic burning, mining activities (Le Stradic *et al.*, 2015) and road construction as threats (Barbosa *et al.*, 2010).

Conclusion

In the rupestrian fields evaluated in a montane ecosystem (named Perdizes Plateau) situated in an Atlantic Forest-Cerrado ecotone, we verified that the bird community include a relevant species diversity that harbors threatened species – i.e. *Anthus nattereri* and *Coryphaspiza melanotis* in MMA (2014), and *Anthus nattereri, Coryphaspiza melanotis* and *Culicivora caudacuta* in IUCN (2020), which do not vary over the seasons. This vegetation type is endangered from habitat losses, consequently we suggest the creation of protected areas to protect rupestrian fields areas from habitat losses and other human actions (e.g., mining and burnings) in Perdizes Plateau. Finally, we infer that these habitat losses could also occur in other rupestrian fields areas along the Atlantic Forest-Cerrado ecotone.

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Supplementary Material

Table 1 – Bird species list to rupestrian fields from Perdizes Plateau, located in an Atlantic Forest-Cerrado ecotone, southeastern of Brazil. VU – Vulnerable, EN – Endangered, and LC – Least concern. The column "seasons" refers to the abundance of each species.

Family	Specie	Popular name	Seasons		MMA	IUCN
			Dry and cold	Wet and hot		
Tinamidae	*Rhynchotus rufescens*	Red-winged Tinamou	2	2	LC	LC
Accipitridae	*Geranoaetus melanoleucus*	Black-chested Buzzard-Eagle	0	1	LC	LC
Columbidae	*Zenaida auriculata*	Eared Dove	1	6	LC	LC
	Patagioenas picazuro	Picazuro Pigeon	6	5	LC	LC
Trochilidae	*Chlorostilbon lucidus*	Glittering-bellied Emerald	0	5	LC	LC
	Phaethornis pretrei	Planalto Hermit	0	1	LC	LC
	Eupetomena macroura	Swallow-tailed Hummingbird	0	1	LC	LC
	Heliomaster squamosus	Stripe-breasted Starthroat	0	1	LC	LC
	Colibri serrirostris	White-vented Violetear	9	22	LC	LC
Ramphastidae	*Ramphastos toco*	Toco Toucan	2	3	LC	LC
Picidae	*Colaptes campestris*	Campo Flicker	4	11	LC	LC
Psittacidae	*Eupsittula aurea*	Peach-fronted Parakeet	2	4	LC	LC
	Psittacara leucophthalmus	White-eyed Parakeet	2	2	LC	LC
Melanopareiidae	*Melanopareia torquata*	Collared Crescentchest	7	6	LC	LC
Furnariidae	*Anumbius annumbi*	Firewood-Gatherer	1	2	LC	LC
	Synallaxis spixi	Spix's Spinetail	0	2	LC	LC
Tyrannidae	*Hirundinea ferruginea*	Cliff Flycatcher	2	6	LC	LC
	Xolmis cinereus	Gray Monjita	1	0	LC	LC
	Xolmis velatus	White-rumped Monjita	4	6	LC	LC
	Elaenia obscura	Highland Elaenia	2	0	LC	LC
	Elaenia chiriquensis	Lesser Elaenia	1	0	LC	LC
	Elaenia flavogaster	Yellow-bellied Elaenia	0	1	LC	LC
	Myiarchus ferox	Short-crested Flycatcher	1	0	LC	LC
	Phylloscartes ventralis	Mottle-cheeked Tyrannulet	0	1	LC	LC
	Knipolegus lophotes	Crested Black-Tyrant	2	6	LC	LC
	Knipolegus nigerrimus	Velvety Black-Tyrant	13	20	LC	LC
	Serpophaga subcristata	White-crested Tyrannulet	0	1	LC	LC
	Culicivora caudacuta	Sharp-tailed Tyrant	16	10	LC	VU

Troglodytidae	*Cistothorus platensis*	Sedge Wren	7	6	LC	LC
	Troglodytes musculus	Southern House Wren	1	0	LC	LC
Motacillidae	*Anthus nattereri*	Ochre-breasted Pipit	3	3	VU	VU
	Anthus hellmayri	Hellmayr's Pipit	5	10	LC	LC
Passerellidae	*Ammodramus humeralis*	Grassland Sparrow	12	10	LC	LC
	Zonotrichia capensis	Rufous-collared Sparrow	12	16	LC	LC
Parulidae	*Setophaga pitiayumi*	Tropical Parula	1	0	LC	LC
Icteridae	*Molothrus bonariensis*	Shiny Cowbird	1	0	LC	LC
	Gnorimopsar chopi	Chopi Blackbird	11	0	LC	LC
Thraupidae	*Sicalis citrina*	Stripe-tailed Yellow-Finch	6	19	LC	LC
	Emberizoides herbicola	Wedge-tailed Grass-Finch	5	6	LC	LC
	Sporophila caerulescens	Double-collared Seedeater	0	5	LC	LC
	Schistochlamys ruficapillus	Cinnamon Tanager	0	2	LC	LC
	Coryphaspiza melanotis	Black-masked Finch	1	1	EN	VU
	Tersina viridis	Swallow Tanager	2	4	LC	LC
	Dacnis cayana	Blue Dacnis	0	2	LC	LC
Fringillidae	*Spinus magellanicus*	Hooded Siskin	1	2	LC	LC

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