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Birds at Santa Bárbara Ecological Station, one of the last Cerrado remnants in the state of São Paulo, Brazil

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Abstract: In the state of São Paulo, southeastern Brazil, the phytophysiognomy known as Cerrado takes less than 1% of its original cover. Thus, the establishment and management of protected areas are essential to save a significant sample of biodiversity of this environment in the region. The Santa Bárbara Ecological Station is one of the largest protected areas in São Paulo, and one of the few ones to cover a mosaic with most of the vegetation types of Cerrado. This article aims to increase the knowledge of avifauna in the reserve, showing new bird records and evaluating the association of species to their physiognomies. We carried out surveys from 2008 to 2013, which resulted in the record of 226 species, or 246 when in regard to Willis & Oniki's works (1981, 2003). Twenty-two are regionally threatened, and five globally threatened. Despite showing lower species richness, grasslands stood out because of the number of species of conservation concern. Preventing the densification of woody vegetation and controlling the invasion of alien plants are important management actions for the conservation of the bird assemblages at Santa Bárbara reserve, one of the last open Cerrado remnants in São Paulo.
Keywords: *conservation, protected area, management, savanna*

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Resumo: Atualmente no estado de São Paulo, o Cerrado ocupa menos de um por cento de sua cobertura original. O estabelecimento e o manejo de unidades de conservação de proteção integral são fundamentais para resguardar uma amostra significativa da biodiversidade deste domínio fitogeográfico em território paulista. A Estação Ecológica de Santa Bárbara está entre as maiores áreas protegidas em São Paulo, e é uma das poucas a contemplar um mosaico dos diferentes tipos de vegetação de Cerrado. Os objetivos do presente trabalho foram ampliar o conhecimento sobre a avifauna da estação e avaliar a associação das espécies com as diferentes fitofisionomias. A amostragem ocorreu entre 2008 e 2013. Foram registradas 226 espécies de aves, ou 246 considerando os primeiros estudos na área (Willis & Oniki 1981, 2003). Vinte e duas encontram-se regionalmente ameaçadas de extinção e cinco ameaçadas globalmente. Apesar da menor riqueza específica, as formações campestres destacaram-se pelo número de espécies ameaçadas. Evitar o adensamento da vegetação arbórea e controlar a invasão por plantas exóticas são práticas de manejo fundamentais para a conservação das assembléias de aves na estação ecológica, um dos últimos remanescentes de Cerrado aberto em São Paulo.
Palavras-chave: *conservação, área protegida, manejo, savana.*

Introduction

In the Brazilian states of São Paulo and Paraná, Cerrado phytophysiognomies appear as open vegetation enclaves immersed in a forest matrix, establishing the southern boundary of this domain (Durigan et al. 2006). In São Paulo, where the Cerrado took nearly 14% of the area, today less than 1% of its original cover remains (Kronka et al. 2005), and only 0.5% is protected area, including ecotones with the Atlantic Forest domain (Durigan et al. 2006).

Regarded as the most biodiverse tropical Savanna, Cerrado is among the 34 areas with higher conservation priorities, also known as hotspots of biodiversity of the world (Mittermeier et al. 2004). In this context, the birds constitute the animal group best known from both taxonomic and ecological viewpoints. The avifauna inventory in Cerrado remnants may contribute to select areas aimed for the creation of reserves, as well as to monitor ecological restoration actions within the already implemented ones.

There are 856 known bird species in the Cerrado domain, within which 30 (3.5%) are considered endemic (Silva & Santos

2005). In comprehensive analyses of Cerrado avifauna, Silva (1995a, b, 1996) excluded the Cerrado in São Paulo and Paraná, which he designated as enclaves within the Atlantic forest. Nonetheless, among the endemic species (Silva 1995b, Silva & Santos 2005), 16 (53%) of them still occur in patches located within São Paulo (Willis & Oniki 2003). For this reason, many authors believe an analysis of these bird species makes more sense when they are regarded as part of the Cerrado (Willis 2004, Motta-Júnior et al. 2008, Batalha et al. 2010, Fieker et al. 2013).

Willis & Oniki (1981) were pioneers in bird censuses in São Paulo protected areas, especially in Cerrado and semideciduous forests of interior plateaus. In their studies, they included three Cerrado areas, named ecological stations of Assis, Mogi Guaçu (formerly Fazenda Campininha), and Santa Bárbara (formerly Santa Bárbara do Rio Pardo), the latter highlighted for the occurrence of endemic and threatened species of Cerrado, as happens at the Itirapina Ecological Station (Motta-Júnior et al. 2008).

Santa Bárbara Ecological Station currently harbors up to 330 vertebrate species (São Paulo 2011, Araújo et al. 2010, 2013) and 530 vascular plants species (Meira-Neto et al. 2007, São Paulo 2011). It is one of the few protected areas to cover a mosaic with most vegetation types in Cerrado. A comparison with other Cerrado bird assemblages within São Paulo could clarify the understanding of the patterns of avian species richness and species-physiognomy relation in the Ecological Station. Published bird surveys encompass forest physiognomies of Cerrado (Telles & Dias 2010, Cavarzere et al. 2011); shrubby ones (Willis 2006); forest and shrubby ones (Motta-Júnior 1990, Dias 2000, Manica et al. 2011); forest, shrubby and grassland ones (Motta-Júnior et al. 2008), and Atlantic forest-savanna bondaries (Develey et al. 2005).

This article aims to increase knowledge of the birds at Santa Bárbara Ecological Station, showing new bird records; evaluating species richness and its relation to the local physiognomies, and examining the relevance of maintaining this reserve for the conservation of birds in the Cerrado of São Paulo.

Material and Methods

1. Study area

Santa Bárbara Ecological Station (headquarters at 22° 48'54"S and 49°14'12"W) takes an area of 2,712 ha in the county of Águas de Santa Bárbara. The altitude ranges between 600-680 m and climate is classified as Köppen's Cwa, with warm summer and dry winter. Based on field observations and literature (Stotz et al. 1996), we classified the vegetation into three main phytophysiognomies, namely: open grass savanna, which consists of wet grassland remnants and *campo cerrado*; shrubby savanna (cerrado *sensu stricto*); and woody savanna (forest-like vegetation), formed by dense *cerrado*, *cerradão* woodland, semideciduous seasonal forest, riparian vegetation and marsh-like vegetation. There are also *capoeiras*, plots of *Pinus* spp. and *Eucalyptus* spp., anthropic fields (pastures with invasive alien grasses), and aquatic vegetation associated with streams and water reservoirs. The Management Plan for the reserve shows a map with the distribution of local physiognomies (São Paulo 2011).

The local avifauna was previously surveyed by Willis & Oniki (1981, 2003), who visited the area between 1976 and 1989, and recorded 131 bird species in 17 transect hours.

2. Bird census

Birds were surveyed with transect counts (Bibby et al. 1993), which consist of walking slowly at a speed of about 1 km/h on trails, firebreaks and roads, registering each individual bird contacted. We visited excerpts of all environments at Santa Bárbara Ecological Station between October 2008 and August 2013, for 380 hours of sampling effort.

Observations of birds were aided with 8 x 42 binoculars. For documentation purposes, we used professional recorders Sony PCM-D50 and Marantz PMD222, with a Sennheiser ME66/K6C Shotgun microphone, and a camera Canon SX30 IS. Sound recordings have been deposited at Xeno-Canto database (http://www.xeno-canto.org). Geographic coordinates of the main sampled areas were obtained with GPS Garmin e-Trex Summit, with geodetic system in SAD 69 Datum.

The scientific nomenclature adopted comes from the Comitê Brasileiro de Registros Ornitológicos (CBRO 2014). When defining threatened species, we followed the official list of São Paulo (Silveira et al. 2009), the Brazilian list (Silveira & Straube 2008), and the global list (IUCN red list) (BirdLife International 2014). For defining species endemic to the Cerrado, we relied on Silva & Santos (2005), Motta-Júnior et al. (2008), and Vasconcelos (2008).

Species composition was compared to other areas of Cerrado within São Paulo, namely: Botanical Garden/UNESP Reserve in Bauru (Cavarzere et al. 2011), Canchim Farm in São Carlos (Manica et al. 2010), UNESP Reserve in Corumbataí (Willis 2006), Itirapina Ecological Station (Willis 2004, Motta-Júnior et al. 2008, Fieker et al. 2013), Itirapina Experimental Station (Telles & Dias 2010), Jataí Ecological Station (Dias 2000), Cerrado Pé-de-Gigante/Vassununga State Park (Willis & Oniki 2003, Develey et al. 2005), and UFSCar, campus São Carlos (Motta-Júnior 1990) (Figure 1). Similarities (Jaccard's index) between areas were evaluated through the UPGMA clustering analysis with Euclidean distance matrix, using the R stats package (R Development Core Team 2008).

Results and Discussion

We found 226 avian species, of which 128 were tape-recorded and 79 photographed, counting upon 69% of the avifauna. Along with Willis and Oniki's transect counts, Santa Bárbara Ecological Station reaches 246 species (Table 1). The two studies had 111 species in common, reaching 45% of similarity at different times. Twenty species were found only in the 1980s, and 115 species found in this study had not been previously reported for the area, an increase of the local species list by 87%. The bird list of the ecological station can possibly be expanded with more surveys. However, the nuclear avifauna for each phytophysiognomy, i.e. the set of resident and regular migratory species (Remsen 1994), was determined. Therefore, we believe data showed here constitute a strong basis for local assemblages.

We observed 90 species in open grass savannas, 81 in shrubby savannas, and 124 in woody savannas (Figure 2). The number of exclusive species was significantly higher in the forest environments than in the savanna ones. Sick (1966) and Silva & Santos (2005) described the avifauna in Cerrado as a predominantly forest group living in a biome mainly covered by savannas, since 72% of species use forest physiognomies. Besides, several species from open formations require the

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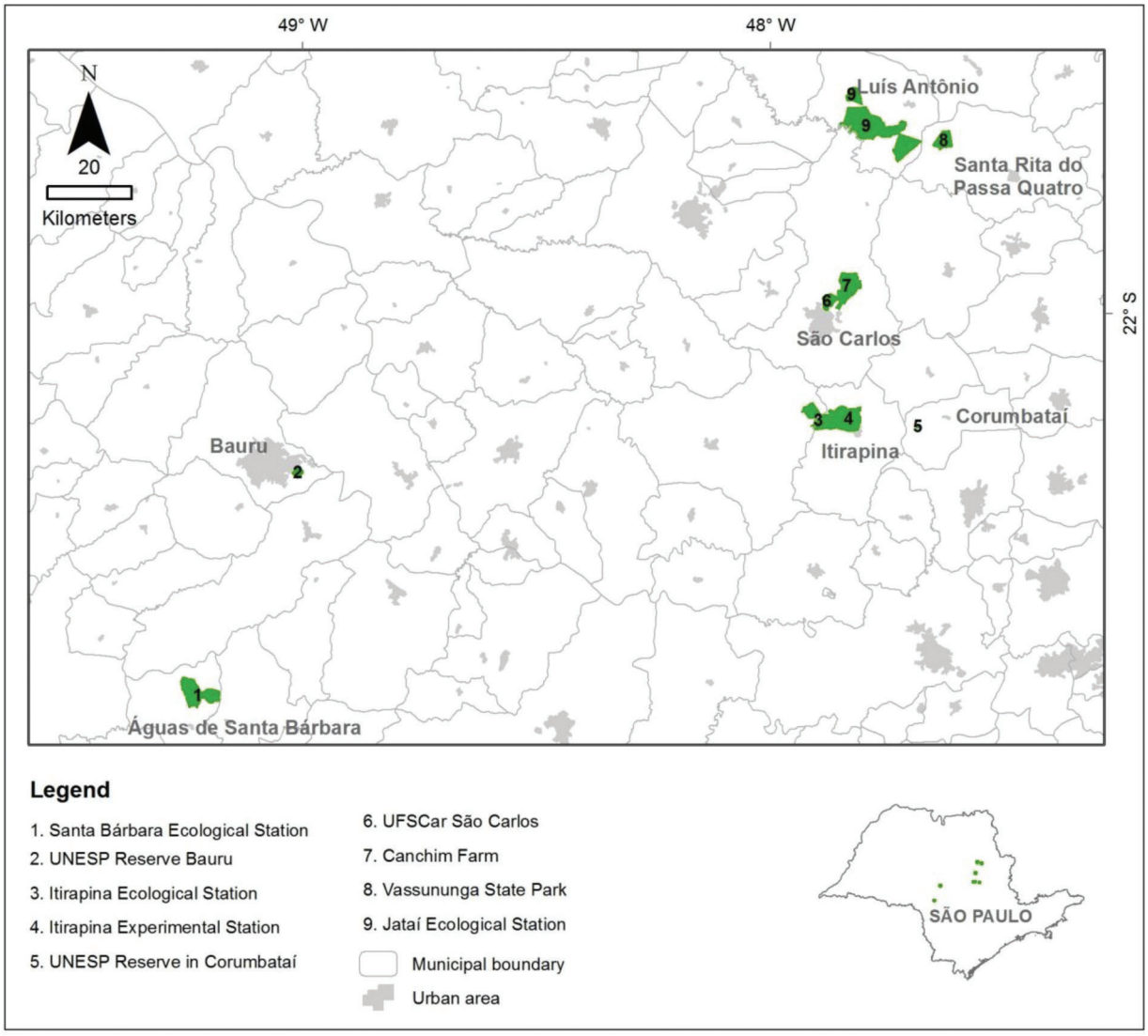

Figure 1. Cerrado locations within São Paulo state with published bird surveys.

vegetation mosaic to keep their population, because they obtain resources in savanna spots and forest edges (Piratelli & Blake 2006). On the other hand, the records of threatened species were more frequent in environments with open vegetation, such as *campo cerrado* and wet grassland. Ignoring anthropogenic habitats and individual birds flying over, grasslands had the highest proportion of species of conservation concern (14%).

In general, Santa Bárbara assemblages correspond to 29% of the known Cerrado avifauna (Silva & Santos 2005), with six species restricted to this domain: *Melanopareia torquata* (Wied, 1831), *Antilophia galeata* (Lichtenstein, 1823), *Cyanocorax cristatellus* (Temminck, 1823), *Saltatricula atricollis* (Vieillot, 1817), *Cypsnagra hirundinacea* (Lesson, 1831), and *Neothraupis fasciata* (Lichtenstein, 1823). Seven local species are nearly threatened and twenty-two are threatened in São Paulo, within which four are in the Brazilian list and five in the global list. Among the species threatened in São Paulo, eight (38%) are in the critically endangered category, i.e. with extremely high risk of regional extinction; three were found only by Willis & Oniki (1981, 2003): *Cistothorus platensis* (Latham, 1790), *Anthus nattereri* Sclater, 1878, and *Coryphaspiza melanotis* (Temminck, 1822).

When compared to other Cerrado sampled areas in São Paulo, Santa Bárbara is among those richer in bird

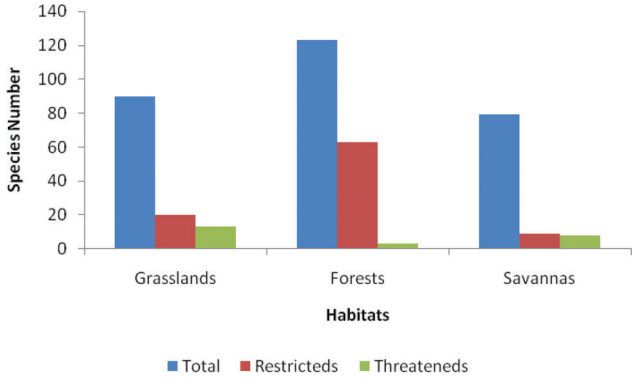

Figure 2. Bird species richness in three sets of habitats observed at Santa Bárbara Ecological Station, São Paulo, Brazil.

Table 1. Birds recorded at Santa Bárbara Ecological Station, São Paulo, Brazil. Types of documentation: T = tape-record; P = photograph. *Status*: NT = near threatened; CR = critically endangered; EN = endangered; VU = vulnerable. SP = local list of threatened species; BR = Brazilian list; red list = global list. N = number of contacts. Ecosystems: RS = reservoirs and swamps; AF = anthropic field (pasture); CC = *campo cerrado*; DC = dense *cerrado*; CW = *cerradão* woodland; WG = wet grassland; SS = cerrado *sensu stricto*; RV = riparian vegetation; SF = semideciduous seasonal forest; and MV = marsh-like vegetation. [lak]: species reported in this study; [wo]: species exclusively reported by Willis & Oniki (1981, 2003).

Species	Popular Name	SP	BR	red list	N	Ecosystems
Rheiformes						
Rheidae						
Rhea americana (Linnaeus, 1758) P	Greater Rhea	CR		NT	1	WG
Tinamiformes						
Tinamidae						
Crypturellus parvirostris (Wagler, 1827) T	Small-billed Tinamou				12	CC, SS
Crypturellus tataupa (Temminck, 1815)[wo]	Tataupa Tinamou					
Rhynchotus rufescens (Temminck, 1815) T	Red-winged Tinamou	VU			20	CC, WG, SS
Nothura maculosa (Temminck, 1815)	Spotted Nothura				2	AF, CC
Anseriformes						
Anatidae						
Cairina moschata (Linnaeus, 1758)[lak]	Muscovy Duck				5	RS
Amazonetta brasiliensis (Gmelin, 1789) P	Brazilian Teal				5	RS
Galliformes						
Cracidae						
Penelope superciliaris Temminck, 1815[lak] T	Rusty-margined Guan	NT			8	DC, CW, SS, RV, SF
Podicipediformes						
Podicipedidae						
Podilymbus podiceps (Linnaeus, 1758)[lak]	Pied-billed Grebe				1	RS
Suliformes						
Phalacrocoracidae						
Phalacrocorax brasilianus (Gmelin, 1789)[lak]	Neotropic Cormorant				1	RS
Anhingidae						
Anhinga anhinga (Linnaeus, 1766)	Anhinga				1	RS
Pelecaniformes						
Ardeidae						
Butorides striata (Linnaeus, 1758)[wo]	Striated Heron					
Bubulcus ibis (Linnaeus, 1758)[lak]	Cattle Egret				15	AF
Ardea alba Linnaeus, 1758[lak]	Great Egret				1	RS
Syrigma sibilatrix (Temminck, 1824) T	Whistling Heron				3	CC, WG
Threskiornithidae						
Mesembrinibis cayennensis (Gmelin, 1789)[lak] T	Green Ibis				4	RV, SF
Theristicus caudatus (Boddaert, 1783)[lak] T	Buff-necked Ibis				4	AF
Platalea ajaja Linnaeus, 1758[lak]	Roseate Spoonbill				1	RS
Cathartiformes						
Cathartidae						
Cathartes aura (Linnaeus, 1758) P	Turkey Vulture				4	DC
Coragyps atratus (Bechstein, 1793) P	Black Vulture				15	ALL
Sarcoramphus papa (Linnaeus, 1758)	King Vulture	VU			1	SF
Accipitriformes						
Accipitridae						
Gampsonyx swainsonii Vigors, 1825[lak] P	Pearl Kite				1	SS
Elanus leucurus (Vieillot, 1818)	White-tailed Kite				1	flying over CC
Accipiter bicolor (Vieillot, 1817)[wo]	Bicolored Hawk					
Ictinia plumbea (Gmelin, 1788)[lak]	Plumbeous Kite				3	DC
Rostrhamus sociabilis (Vieillot, 1817)[wo]	Snail Kite					
Heterospizias meridionalis (Latham, 1790) P	Savanna Hawk				3	SS
Rupornis magnirostris (Gmelin, 1788) T, P	Roadside Hawk				6	CC, DC, SS, RV, SF
Geranoaetus albicaudatus (Vieillot, 1816)	White-tailed Hawk				4	WG, SS, *Eucalyptus*
Buteo brachyurus Vieillot, 1816 T[lak]	Short-tailed Hawk				2	SF, flying over CC
Gruiformes						

Continued on next page

Table 1. Continued.

Species	Popular Name	SP	BR	red list	N	Ecosystems
Rallidae						
Micropygia schomburgkii (Schomburgk, 1848)[lak]	Ocellated Crake	CR			3	CC
Aramides cajaneus (Statius Muller, 1776)[lak] T	Gray-necked Wood-Rail				2	RS
Laterallus xenopterus Conover, 1934 T	Rufous-faced Crake	CR		VU	2	WG, RV
Porzana albicollis (Vieillot, 1819)[lak] T	Ash-throated Crake				18	CC, WG, SS
Pardirallus nigricans (Vieillot, 1819)[lak] T	Blackish Rail				2	RS
Gallinula galeata (Lichtenstein,1818)[lak]	Common Gallinule				2	RS
Charadriiformes						
Charadriidae						
Vanellus chilensis (Molina, 1782) P	Southern Lapwing				13	AF, CC
Scolopacidae						
Gallinago undulata (Boddaert, 1783)[lak] T	Giant Snipe				2	WG
Tringa flavipes (Gmelin, 1789)[wo]	Lesser Yellowlegs					
Jacanidae						
Jacana jacana (Linnaeus, 1766)[lak]	Wattled Jacana				4	WG
Columbiformes						
Columbidae						
Columbina talpacoti (Temminck, 1811) T, P	Ruddy Ground-dove				11	AF, CC
Columbina squammata (Lesson, 1831)[lak] T, P	Scaled Dove				9	AF, CC
Claravis pretiosa (Ferrari-Perez, 1886)[lak]	Blue Ground-dove				1	SS
Patagioenas picazuro (Temminck, 1813)[lak] T	Picazuro Pigeon				31	AF, CC, DC, CW, SS, RV, SF
Patagioenas cayennensis (Bonnaterre, 1792) T	Pale-vented Pigeon				7	CW, RV, SF
Zenaida auriculata (Des Murs, 1847) T, P	Eared Dove				19	CC, SS
Leptotila verreauxi Bonaparte, 1855 T, P	White-tipped Dove				10	CW, SS, RV, SF
Cuculiformes						
Cuculidae						
Piaya cayana (Linnaeus, 1766) T	Squirrel Cuckoo				5	SS, RV, SF
Coccyzus melacoryphus Vieillot, 1817	Dark-billed Cuckoo				2	CC
Crotophaga ani Linnaeus, 1758 T	Smooth-billed Ani				11	AF, CC, SS
Guira guira (Gmelin, 1788) T, P	Guira Cuckoo				23	AF, CC
Tapera naevia (Linnaeus, 1766) T, P	Striped Cuckoo				9	RS, CC, SS, RV
Dromococcyx pavoninus Pelzeln, 1870[lak]	Pavonine Cuckoo				2	SS
Strigiformes						
Tytonidae						
Tyto furcata (Scopoli, 1769)	Barn Owl				1	flying over SS
Strigidae						
Megascops choliba (Vieillot, 1817)[lak] T	Tropical Screech-Owl				2	RV
Athene cunicularia (Molina, 1782) P	Burrowing Owl				6	AF, CC, WG
Asio stygius (Wagler, 1832)[lak] T	Stygian Owl				1	RV
Asio flammeus (Pontoppidan, 1763)[lak]	Short-eared Owl	EN			1	WG
Nyctibiiformes						
Nyctibiidae						
Nyctibius griseus (Gmelin, 1789)[lak]	Common Potoo				2	RV, MV
Caprimulgiformes						
Caprimulgidae						
Antrostomus rufus (Boddaert, 1783)[lak] T	Rufous Nightjar				6	RV, SF, on firebreaks
Lurocalis semitorquatus (Gmelin, 1789)[lak]	Short-tailed Nighthawk				1	RV
Hydropsalis albicollis (Gmelin, 1789)[lak]	Pauraque				9	DC, RV, on firebreaks
Hydropsalis parvula (Gould, 1837)[lak]	Little Nightjar				4	RV, on firebreaks
Hydropsalis torquata (Gmelin, 1789)[lak]	Scissor-tailed Nightjar				2	DC, SS, on firebreaks
Apodiformes						

Continued on next page

Table 1. Continued.

Species	Popular Name	SP	BR	red list	N	Ecosystems
Apodidae						
Cypseloides fumigatus (Streubel, 1848)T	Sooty Swift				200	flying over AF
Cypseloides senex (Temminck, 1826)[wo]	Great Dusky Swift	NT				
Streptoprocne zonaris (Shaw, 1796)[lak]	White-collared Swift				1	flying over SS
Trochilidae						
Phaethornis pretrei (Lesson & Delattre, 1839)[lak]	Planalto Hermit				4	CW, RV, SF
Eupetomena macroura (Gmelin, 1788)[lak]	Swallow-tailed Hummingbird				5	CC, SS
Colibri serrirostris (Vieillot, 1816) P	White-vented Violetear				9	CC, WG, SS
Anthracothorax nigricollis (Vieillot, 1817)[lak]	Black-throated Mango				1	SF
Chlorostilbon lucidus (Shaw, 1812)[lak]	Glittering-bellied Emerald				3	SS
Thalurania glaucopis (Gmelin, 1788)[lak]	Violet-capped Woodnymph				1	CW, SF
Hylocharis chrysura (Shaw, 1812)[lak] P	Gilded Hummingbird				15	CC, DC, SS
Polytmus guainumbi (Pallas, 1764)[wo]	White-tailed Goldenthroat	VU				
Amazilia versicolor (Vieillot, 1818)	Versicolored Emerald				1	SF
Amazilia lactea (Lesson, 1832)[lak] P	Sapphire-spangled Emerald				4	RV, SF
Coraciiformes						
Alcedinidae						
Megaceryle torquata (Linnaeus, 1766)[lak]	Ringed Kingfisher				1	RS
Galbuliformes						
Galbulidae						
Galbula ruficauda Cuvier, 1816[lak] T, P	Rufous-tailed Jacamar				2	RV, SF
Bucconidae						
Nystalus chacuru (Vieillot, 1816) T, P	White-eared Puffbird				5	CC, SS
Piciformes						
Ramphastidae						
Ramphastos toco Statius Muller, 1776[lak] T, P	Toco Toucan				15	AF, DC, SS, RV
Picidae						
Picumnus temminckii Lafresnaye, 1845[wo]	Ochre-collared Piculet					
Picumnus albosquamatus d'Orbigny, 1840	White-wedged Piculet				3	SS, RV, SF
Melanerpes candidus (Otto, 1796)[lak] P	White Woodpecker				11	AF, CC, SS
Veniliornis passerinus (Linnaeus, 1766)[lak] T	Little Woodpecker				6	CC, SF
Colaptes melanochloros (Gmelin, 1788) T	Green-barred Woodpecker				2	RV
Colaptes campestris (Vieillot, 1818) T, P	Campo Flicker				17	AF, CC, SS
Celeus flavescens (Gmelin, 1788)[wo]	Blond-crested Woodpecker					
Dryocopus lineatus (Linnaeus, 1766)[lak] P	Lineated Woodpecker				5	CC, RV, SF
Cariamiformes						
Cariamidae						
Cariama cristata (Linnaeus, 1766)[lak] T, P	Red-legged Seriema				8	AF, CC, SS
Falconiformes						
Falconidae						
Caracara plancus (Miller, 1777) T, P	Southern Caracara				7	AF, CC
Milvago chimachima (Vieillot, 1816) T, P	Yellow-headed Caracara				7	AF, CC, SS, RV
Herpetotheres cachinnans (Linnaeus, 1758)[lak] T, P	Laughing Falcon				4	CC, DC, SS
Micrastur semitorquatus (Vieillot, 1817)[lak] T	Collared Forest-falcon				2	RV, *Pinus* plantation
Falco sparverius Linnaeus, 1758 P	American Kestrel				2	AF, SS
Falco femoralis Temminck, 1822 P	Aplomado Falcon				4	WG, CC, SS
Psittaciformes						

Continued on next page

Table 1. Continued.

Species	Popular Name	SP	BR	red list	N	Ecosystems
Psittacidae						
Psittacara leucophthalmus (Statius Muller, 1776) T	White-eyed Parakeet				23	DC, CW, RV, SF
Brotogeris chiriri (Vieillot, 1818)[lak] T	Yellow-chevroned Parakeet				17	CC, DC, CW, RV, SF
Amazona aestiva (Linnaeus, 1758)[lak]	Blue-fronted Parrot	NT			2	flying over SS
Passeriformes						
Thamnophilidae						
Formicivora rufa (Wied, 1831)[lak] T, P	Rusty-backed Antwren				9	CC
Dysithamnus mentalis (Temminck, 1823)[lak] T	Plain Antvireo				6	SF
Thamnophilus doliatus (Linnaeus, 1764)[lak] T, P	Barred Antshrike				6	CC, RV, SF
Thamnophilus ruficapillus Vieillot, 1816 T	Rufous-capped Antshrike				20	CC, WG
Thamnophilus pelzelni Hellmayr, 1924 T	Planalto Slaty-Antshrike				13	DC, CW, SS, RV
Thamnophilus caerulescens Vieillot, 1816	Variable Antshrike				4	DC, CW, RV, SF
Taraba major (Vieillot, 1816)[lak] T	Great Antshrike				4	RV, SF
Melanopareiidae						
Melanopareia torquata (Wied, 1831)[lak] T, P	Collared Crescentchest	EN			8	CC, WG
Conopophagidae						
Conopophaga lineata (Wied, 1831) T	Rufous Gnateater				3	SF, MV
Dendrocolaptidae						
Campylorhamphus falcularius (Vieillot, 1822)[lak]	Black-billed Scythebill				1	SF
Lepidocolaptes angustirostris (Vieillot, 1818) T, P	Narrow-billed Woodcreeper				11	AF, CC, SS
Furnariidae						
Furnarius rufus (Gmelin, 1788) T	Rufous Hornero				2	AF
Automolus leucophthalmus (Wied, 1821)[lak] T	White-eyed Foliage-gleaner				3	SF, MV
Phacellodomus ferrugineigula (Pelzeln, 1858)[lak] T	Orange-breasted Thornbird				2	SF, MV
Certhiaxis cinnamomeus (Gmelin, 1788)[lak] T	Yellow-chinned Spinetail				2	RS
Synallaxis ruficapilla Vieillot, 1819 T	Rufous-capped Spinetail				2	WG, SF
Synallaxis frontalis Pelzeln, 1859	Sooty-fronted Spinetail				2	CC, SS, RV
Synallaxis albescens Temminck, 1823 T, P	Pale-breasted Spinetail	NT			16	CC, WG, SS
Synallaxis spixi Sclater, 1856 T, P	Spix's Spinetail				6	CC, RV
Pipridae						
Chiroxiphia caudata (Shaw & Nodder, 1793) T	Swallow-tailed Manakin				4	SF
Antilophia galeata (Lichtenstein, 1823)[lak] T	Helmeted Manakin	NT			14	RV, SF
Tityridae						
Pachyramphus polychopterus (Vieillot, 1818)	White-winged Becard				1	CW
Pachyramphus validus (Lichtenstein, 1823)[lak]	Crested Becard				3	RV
Platyrinchidae						
Platyrinchus mystaceus Vieillot, 1818[lak] T	White-throated Spadebill				8	SF
Rhynchocyclidae						
Leptopogon amaurocephalus Tschudi, 1846[lak]	Sepia-capped Flycatcher				2	SF
Corythopis delalandi (Lesson, 1830)[lak]	Southern Antpipit				1	SF
Tolmomyias sulphurescens (Spix, 1825)[lak] T	Yellow-olive Flycatcher				1	SF
Todirostrum poliocephalum (Wied, 1831)[lak] T	Yellow-lored Tody-Flycatcher				1	SF
Todirostrum cinereum (Linnaeus, 1766)	Common Tody-Flycatcher				2	CW, RV

Continued on next page

Table 1. Continued.

Species	Popular Name	SP	BR	red list	N	Ecosystems
Poecilotriccus plumbeiceps (Lafresnaye, 1846)[lak] T	Ochre-faced Tody-Flycatcher				2	SF
Myiornis auricularis (Vieillot, 1818)[wo]	Eared Pygmy-Tyrant					
Hemitriccus diops (Temminck, 1822)[wo]	Drab-breasted Pygmy-Tyrant					
Hemitriccus nidipendulus (Wied, 1831)[lak]	Hangnest Tody-Tyrant				2	SF
Hemitriccus margaritaceiventer (d'Orbigny & Lafresnaye, 1837)[lak] T Tyrannidae	Pearly-vented Tody-Tyrant				11	CC, SS
Euscarthmus meloryphus Wied, 1831	Tawny-crowned Pygmy-Tyrant				2	CC, SS
Camptostoma obsoletum (Temminck, 1824) T	Southern Beardless-Tyrannulet				5	CC, DC, SS, RV, SF
Elaenia flavogaster (Thunberg, 1822) T, P	Yellow-bellied Elaenia				18	CC, DC, SS, RV
Elaenia parvirostris Pelzeln, 1868	Small-billed Elaenia				1	SF
Elaenia mesoleuca (Deppe, 1830)[lak] T	Olivaceous Elaenia				1	SF
Elaenia cristata Pelzeln, 1868[lak] T	Plain-crested Elaenia	VU			8	SS
Elaenia chiriquensis Lawrence, 1865 T, P	Lesser Elaenia				39	CC, WG, SS, RV
Elaenia obscura (d'Orbigny & Lafresnaye, 1837) T, P	Highland Elaenia				16	DC, CW, RV, SF, MV
Suiriri suiriri (Vieillot, 1818) T	Suiriri Flycatcher	EN			2	CC, SS
Phaeomyias murina (Spix, 1825) T	Mouse-colored Tyrannulet				11	CC, DC, CW, RV, SF
Culicivora caudacuta (Vieillot, 1818)[lak] T, P	Sharp-tailed Tyrant	CR	VU	VU	7	CC, WG
Serpophaga subcristata (Vieillot, 1817) T, P	White-crested Tyrannulet				3	CC, SS, RV
Myiarchus swainsoni Cabanis & Heine, 1859[lak] T	Swainson's Flycatcher				6	RV, SF
Myiarchus ferox (Gmelin, 1789) T, P	Short-crested Flycatcher				8	CC, DC, CW, SS, RV
Myiarchus tyrannulus (Statius Muller, 1776) T, P	Brown-crested Flycatcher				2	CC, CW, SS, RV
Sirystes sibilator (Vieillot, 1818)[wo]	Sirystes					
Casiornis rufus (Vieillot, 1816)[lak]	Rufous Casiornis	NT			5	CD, CW, SS
Pitangus sulphuratus (Linnaeus, 1766) T	Great Kiskadee				10	AF, CW, SS, RV
Machetornis rixosa (Vieillot, 1819) T	Cattle Tyrant				2	AF
Myiodynastes maculatus (Statius Muller, 1776)[lak] T	Streaked Flycatcher				16	DC, CW, RV, SF
Megarynchus pitangua (Linnaeus, 1766)[lak] T	Boat-billed Flycatcher				9	CW, RV, SF
Myiozetetes similis (Spix, 1825) T	Social Flycatcher				2	CW, RV
Tyrannus melancholicus Vieillot, 1819 T, P	Tropical Kingbird				16	AF, DC, SS, RV
Tyrannus savana Vieillot, 1808 T, P	Fork-tailed Flycatcher				42	AF, CC, WG, SS
Empidonomus varius (Vieillot, 1818)[lak]	Variegated Flycatcher				2	CW, RV
Colonia colonus (Vieillot, 1818)[lak] T	Long-tailed Tyrant				2	SF
Myiophobus fasciatus (Statius Muller, 1776) T	Bran-colored Flycatcher				6	CC, SS, RV
Pyrocephalus rubinus (Boddaert, 1783) P	Vermilion Flycatcher				1	CC
Fluvicola nengeta (Linnaeus, 1766)[lak] P	Masked Water-Tyrant				2	AF
Arundinicola leucocephala (Linnaeus, 1764)[lak] P	White-headed Marsh Tyrant				1	RS
Gubernetes yetapa (Vieillot, 1818) T	Streamer-tailed Tyrant				2	CC, WG
Alectrurus tricolor (Vieillot, 1816) T	Cock-tailed Tyrant	CR	VU	VU	4	CC
Cnemotriccus fuscatus (Wied, 1831)[lak] T	Fuscous Flycatcher				9	DC, CW, SS, RV, SF
Lathrotriccus euleri (Cabanis, 1868)	Euler's Flycatcher				4	SF
Satrapa icterophrys (Vieillot, 1818)	Yellow-browed Tyrant				1	AF
Xolmis cinereus (Vieillot, 1816) T	Gray Monjita				5	CC, WG
Xolmis velatus (Lichtenstein, 1823) P	White-rumped Monjita				3	AF, CC
Vireonidae						

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Table 1. Continued.

Species	Popular Name	SP	BR	red list	N	Ecosystems
Cyclarhis gujanensis (Gmelin, 1789) T	Rufous-browed Peppershrike				8	DC, CW, RV, SF
Vireo chivi (Linnaeus, 1766) T	Chivi Vireo				14	DC, CW, RV, SF
Hylophilus amaurocephalus (Nordmann, 1835) T	Gray-eyed Greenlet				2	CW, SS
Corvidae						
Cyanocorax cristatellus (Temminck, 1823) T, P	Curl-crested Jay				23	AF, CC, DC, SS
Cyanocorax chrysops (Vieillot, 1818)[lak] T, P	Plush-crested Jay				35	AF, DC, CW, SS, RV, SF
Hirundinidae						
Pygochelidon cyanoleuca (Vieillot, 1817)[lak]	Blue-and-white Swallow				9	AF
Alopochelidon fucata (Temminck, 1822)[wo]	Tawny-headed Swallow					
Stelgidopteryx ruficollis (Vieillot, 1817)	Southern Rough-winged Swallow				6	AF, RV
Progne tapera (Vieillot, 1817)[lak]	Brown-chested Martin				2	AF
Progne subis (Linnaeus, 1758)[wo]	Purple Martin	NT				
Progne chalybea (Gmelin, 1789)[lak] T	Gray-breasted Martin				4	AF
Tachycineta albiventer (Boddaert, 1783)[lak]	White-winged Swallow				4	RS
Tachycineta leucorrhoa (Vieillot, 1817)	White-rumped Swallow				10	RS, AF, CC
Troglodytidae						
Troglodytes musculus Naumann, 1823 T, P	Southern House Wren				6	AF, CC, SS
Cistothorus platensis (Latham, 1790)[wo]	Sedge Wren	CR				
Turdidae						
Catharus fuscescens (Stephens, 1817)[wo]	Veery					
Turdus leucomelas Vieillot, 1818 T	Rufous-bellied Thrush				27	AF, CC, DC, CW, SS, RV, SF
Turdus rufiventris Vieillot, 1818[lak] P	Pale-breasted Thrush				1	AF
Turdus amaurochalinus Cabanis, 1850 T	Creamy-bellied Thrush				13	AF, CW, SS, RV, SF
Turdus subalaris (Seebohm, 1887)[lak] T	Eastern Slaty Thrush				2	RV
Turdus albicollis Vieillot, 1818[lak] P	White-necked Thrush				2	SS
Mimidae						
Mimus saturninus (Lichtenstein, 1823) T, P	Chalk-browed Mockingbird				22	AF, CC, WG, SS
Motacillidae						
Anthus lutescens Pucheran, 1855[lak]	Yellowish Pipit				1	AF
Anthus nattereri Sclater, 1878[wo]	Ochre-breasted Pipit	CR	VU	VU		
Passerellidae						
Zonotrichia capensis (Statius Muller, 1776) T, P	Rufous-collared Sparrow				26	AF, CC, SS
Ammodramus humeralis (Bosc, 1792)[lak] T, P	Grassland Sparrow				48	CC, WG, SS
Arremon flavirostris Swainson, 1838[lak] P	Saffron-billed Sparrow				1	SF
Parulidae						
Setophaga pitiayumi (Vieillot, 1817) T	Tropical Parula				8	DC, CW, RV, SF
Geothlypis aequinoctialis (Gmelin, 1789)[lak] T, P	Masked Yellowthroat				9	RS, CC, WG, SS, RV
Basileuterus culicivorus (Deppe, 1830) T	Golden-crowned Warbler				10	DC, CW, RV, SF
Myiothlypis flaveola (Baird, 1865) T	Flavescent Warbler				14	DC, CW, RV, SF
Icteridae						
Psarocolius decumanus (Pallas, 1769)[lak] P	Crested Oropendola				10	AF, RV
Gnorimopsar chopi (Vieillot, 1819)	Chopi Blackbird				1	CC
Chrysomus ruficapillus (Vieillot, 1819)[lak] P	Chestnut-capped Blackbird				2	RS
Pseudoleistes guirahuro (Vieillot, 1819)	Yellow-rumped Marshbird				9	AF, WG
Molothrus rufoaxillaris Cassin, 1866[wo]	Screaming Cowbird					

Continued on next page

Table 1. Continued.

Species	Popular Name	SP	BR	red list	N	Ecosystems
Molothrus bonariensis (Gmelin, 1789)	Shiny Cowbird				18	AF, SS
Sturnella superciliaris (Bonaparte, 1850) T, P	White-browed Blackbird				21	AF
Thraupidae						
Coereba flaveola (Linnaeus, 1758)[lak]	Bananaquit				2	RV
Saltatricula atricollis (Vieillot, 1817) T, P	Black-throated Saltator	VU			23	AF, CC, WG, SS
Saltator similis d'Orbigny & Lafresnaye, 1837 T	Green-winged Saltator				6	RV, SF
Saltator fuliginosus (Daudin, 1800)[lak] T, P	Black-throated Grosbeak				1	SF
Nemosia pileata (Boddaert, 1783)[lak] P	Hooded Tanager				1	SS
Thlypopsis sordida (d'Orbigny & Lafresnaye, 1837)	Orange-headed Tanager				3	RV, SF
Cypsnagra hirundinacea (Lesson, 1831)[lak] P	White-rumped Tanager	EN			14	CC, SS
Tachyphonus coronatus (Vieillot, 1822)	Ruby-crowned Tanager				2	SF
Ramphocelus carbo (Pallas, 1764)[lak] T	Silver-beaked Tanager				2	SF
Lanio cucullatus (Statius Muller, 1776) P	Red-crested Finch				62	CC, SS
Lanio melanops (Vieillot, 1818)[lak]	Black-goggled Tanager				1	SF
Tangara sayaca (Linnaeus, 1766) T	Sayaca Tanager				10	AF, CC, DC, CW, SS, RV, SF
Tangara cayana (Linnaeus, 1766) T, P	Burnished-buff Tanager				16	AF, DC, CW, SS, RV, SF
Neothraupis fasciata (Lichtenstein, 1823) T, P	White-banded Tanager	EN			10	CC, SS
Schistochlamys melanopis (Latham, 1790)[lak] T, P	Black-faced Tanager	VU			3	SS, RV
Schistochlamys ruficapillus (Vieillot, 1817) T, P	Cinnamon Tanager				17	CC, DC, SS, RV
Pipraeidea melanonota (Vieillot, 1819)[lak] P	Fawn-breasted Tanager				1	SF
Tersina viridis (Illiger, 1811)[lak] T	Swallow Tanager				6	CW, RV
Dacnis cayana (Linnaeus, 1766)[lak] P	Blue Dacnis				2	CW, SS
Hemithraupis guira (Linnaeus, 1766)[lak]	Guira Tanager				2	CC
Conirostrum speciosum (Temminck, 1824)[lak]	Chestnut-vented Conebill				2	SS
Sicalis citrina Pelzeln, 1870[lak] T, P	Stripe-tailed Yellow-Finch				2	AF
Sicalis flaveola (Linnaeus, 1766)	Saffron Finch				2	CC
Sicalis luteola (Sparrman, 1789)[lak] T, P	Grassland Yellow-Finch				22	CC
Emberizoides herbicola (Vieillot, 1817) T, P	Wedge-tailed Grass-Finch				46	CC, WG, SS
Volatinia jacarina (Linnaeus, 1766) T, P	Blue-black Grassquit				52	AF, CC, SS
Sporophila plumbea (Wied, 1830) T, P	Plumbeous Seedeater	EN			23	CC, WG, SS
Sporophila caerulescens (Vieillot, 1823) T, P	Double-collared Seedeater				3	CC
Sporophila pileata (Sclater 1864)[lak] T	Capped Seedeater	VU			8	CC, WG
Sporophila angolensis (Linnaeus, 1766)[lak] T	Chestnut-bellied Seed-finch	VU			2	RS
Tiaris fuliginosus (Wied, 1830)[wo]	Sooty Grassquit					
Coryphaspiza melanotis (Temminck, 1822)[wo]	Black-masked Finch	CR	VU	VU		
Cardinalidae						
Piranga flava (Vieillot, 1822)[lak]	Hepatic Tanager				3	CC, RV
Habia rubica (Vieillot, 1817)[lak]	Red-crowned Ant-Tanager				4	SF
Fringillidae						
Sporagra magellanica (Vieillot, 1805) T, P	Hooded Siskin				34	AF, CC, WG, SS
Euphonia chlorotica (Linnaeus, 1766) T	Purple-throated Euphonia				4	DC, CW, RV, SF
Euphonia violacea (Linnaeus, 1758)[lak] T	Violaceous Euphonia				1	SF
Passeridae						
Passer domesticus (Linnaeus, 1758)	House Sparrow				14	AF

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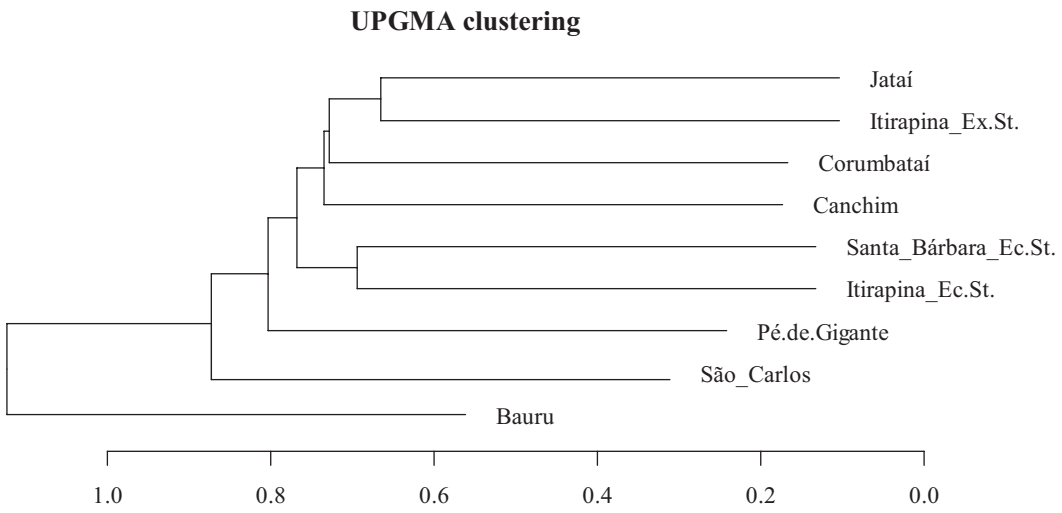

Figure 3. UPGMA clustering of Cerrado areas with bird assemblages sampled within São Paulo, with leaves hang according to the Euclidean distances from each other.

Table 2. Cerrado areas with exhaustive bird surveys within São Paulo state.

Area	Richness	Endemic species	Threatened species
Bauru Reserve	144	01	01
Canchim Farm	160	06	06
Corumbataí Reserve	180	02	02
Itirapina Ec. St.	231	11	32
Itirapina Ex. St.	210	05	06
Jataí Ec. St.	302	03	16
Cerrado Pé-de-Gigante	209	03	07
Santa Bárbara Ec. St.	**243**	**06**	**22**
UFSCar São Carlos	115	05	06

species, as well as in the number of endemic and threatened species (Table 1). Many other Cerrado bird assemblages in São Paulo are composed by forest species, and few are in conservation concern (Motta-Júnior 1990, Develey et al. 2005, Telles & Dias 2010, Cavarzere et al. 2011). In the Cerrado, forest habitats such as *cerradão* woodlands attract more forest avian species (Silva 1995b, Silva & Santos 2005), which could explain parts of the differences between studies.

On the other hand, Santa Bárbara and Itirapina Ecological Stations were more similar regarding the different types of avifauna, differing from geographically closer areas (Figure 3). It has been suggested that closer specific composition in both areas is due to similarities in the mosaic of grassland and savanna physiognomies and their surroundings (Willis 2004, Motta-Júnior et al. 2008). Differences in species composition between them probably reflect the proportions of occupation by physiognomies on each. Santa Bárbara has a greater extension of arboreal formations, which takes nearly 20% of its surface while in Itirapina, grasslands cover 40% of the area (São Paulo 2006, 2011). Apart from that some absences in the Santa Bárbara assemblage are due to the distribution of certain species in the state, for instance, *Clibanornis rectirostris* (Wied, 1831) and *Myiothlypis leucophrys* (Pelzeln, 1868) from Itirapina riparian vegetation, which are lacking on the left bank of Tietê river (Willis & Oniki 2003).

Grassland avifaunas in both Santa Bárbara and Itirapina are highlighted for the number of threatened species (Motta-Júnior et al. 2008). Within these reserves, grasslands have lost their areas due to colonization by pine *Pinus elliottii* Engelm as well as by vegetation densification, with more intensity at Santa Bárbara where previously it was practiced extensive livestock. To make cattle farming possible, people used to set fire in the local vegetation, favoring the grasslands and preventing an increasing in tree density. With the suppression of these activities, open-habitats tend to be restricted to areas where the soil suffers water saturation, at least seasonally (São Paulo 2011). Moreover, avoiding fire, which leads vegetation densification, may eliminate bird habitats in the medium and long terms, since several species are adapted to the fire dynamic in the Cerrado (Parker III & Willis 1997). In turn, the loss of grassland birds will have an impact on local ecological processes in both reserves, since this assemblage is functionally complementary to the forest and savanna environments (Batalha et al. 2010).

Scientific evidence about management implications on fauna, such as avoiding fires aiming to improve the effectiveness of protected areas, is still limited (Geldmann et al. 2013). The Santa Bárbara Ecological Station Management Plan was recently completed (São Paulo 2011). Its main goal is to recover local physiognomies to the proportions observed in 2011. To reach this goal, some priority researches were listed, such as the role of controlled fires and herbivory in order to maintain the mosaic of vegetation, and the controlling and eradication of invasive exotic plant species (São Paulo 2011). These researches

must evaluate the natural occurrence of fire, its frequency, and which areas need to be managed annually to maintain the percentage representation of physiognomies. Results obtained in other Cerrado regions may not necessarily be generalized, with case studies and gathering of researchers from different knowledge areas important to carry out a comprehensive evaluation (França et al. 2007).

Thus, avifauna monitoring may contribute to evaluate the effectiveness of management actions at Santa Bárbara Ecological Station, especially when regarding noteworthy records.

1. Noteworthy records

Greater Rhea *Rhea americana* (critically endangered, SP). Species globally nearly threatened and heavily hunted in the region in recent decades, as well as suffering from poisoning by use of herbicides and frequent burning of vegetation. In São Paulo, the species has been seen only on the border with Mato Grosso do Sul state, and at Itirapina Ecological Station (Motta-Júnior et al. 2008). At Jataí Ecological Station, it was already common in the 1960s, but it is now disappeared (Dias 2000). In our study, we recorded Greater Rhea solely by tracks in October 21, 2009 (22°49'30"S, 49°14'51"W) and a photograph taken by camera trap, installed by mastozoologists on 09/01/2008. Nowadays, the local species occurrence has been reported only to a disturbed Cerrado area at Thermas de Santa Bárbara, a settlement surrounding the reserve, what warrant additional surveys covering both their inner and outer areas.

Rufous-faced Crake *Laterallus xenopterus* (critically endangered, SP; vulnerable, Red list). Some duets of this secretive crake were heard in contact areas between wet grasslands and riparian vegetation. A recording was obtained on October 23, 2009 at coordinates 22°48'54"S and 49°10'41"W. This is a poorly known species deemed to be threatened both in the state and in international lists. Its occurrence in São Paulo until then was based on a single specimen, found dead on a railway line in the town of Itirapina (Willis 2004, Vasconcelos et al. 2006). Despite lacking records, it can be more widespread than we think. Its trilling call's similarity with congeners and sympatric (*e.g.* Rufous-sided Crake *L. melanophaius*) along with limited access to their occurrence areas by researchers possibly make it difficult to detect. The species is considered threatened mainly due to habitat destruction, addressed by drainage of wetlands and adjacent afforestation with *Eucaliptus* and *Pinus* plantations (del Hoyo et al. 1996).

Ocellated Crake *Micropygia schomburgkii* (critically endangered, SP). Heard in patches of *campo cerrado*, sometimes over wet grasslands. This rail responds well to playback techniques, even at a distance. We noticed that this species approaches when closer to the sound source, walking carefully and silently. Nonetheless, this behavior probably does not prevent its detection, as the species has been recorded increasingly in other parts of Brazil by ornithologists who have knowledge of its vocalization (Vasconcelos et al. 2006, Lopes et al. 2009). In São Paulo, the species is threatened by conversion of grasslands to monoculture plantations, being detected only once in a narrow range of Cerrado at Lençóis Paulista (Marcondes & del Rio 2012).

Short-eared Owl *Asio flammeus* (endangered, SP). Species detected only once on March 27, 2012 perched in a pine tree inside a patch of wet grassland (22°48'42"S, 49°10'60"W), and singing series of 13-16 notes. This species inhabits marsh-like vegetation on the riverbanks and in flooded areas, and is adversely threatened by human presence (Silveira et al. 2009).

Collared Crescentchest *Melanopareia torquata* (endangered, SP). The only species of this genus in Brazil, occurring in *campos cerrados* and cerrado *sensu stricto* at altitudes up to 1000m. At Santa Bárbara Ecological Station, the species is observed foraging for insects on the ground by gleaning techniques. Originally classified as part of the family Furnariidae, *M. torquata* has been included among Formicariidae, and after among Rhinocryptidae, due to its morphological similarity with tapaculos. Only after recent molecular studies a new family was created for *Melanopareia*, known as Melanopareiidae, within which exclusively groups species of the genus (Ericson et al. 2010). In addition to its typical, monotonous call, the species is notable for a warming call similar to the vocalization of *M. schomburgkii*. In São Paulo, this species was once abundant in the 90s (Motta-Júnior 1990), and today it has declined due to loss of natural open savannas and widespread invasive grasses. In this context, it is imperative to understand the role of *Urochloa* spp. on Collared Crescentchest ecology. Although it has been implied that the species does not tolerate habitat changes promoted by exotic plants (Kanegae et al. 2012b), we have observed it foraging in grounds intensely invaded by this African grass.

Sharp-tailed Tyrant *Culicivora caudacuta* (critically endangered, SP; vulnerable, BR, Red list). Species present in the few dry natural grasslands and more open moist fields with tall grasses that remain in the ecological station. Known for nesting in bushes of ironweed *Vernonia* (Asteraceae; del Hoyo et al. 2004), *C. caudacuta* can rely on seven herbaceous species of this genus in *campos cerrados* of Santa Bárbara (São Paulo 2011). Due to current loss of habitat outside nature reserves in southeastern Brazil, it has a strong tendency to remain confined in the few protected dry grasslands such as Santa Bárbara Ec. St., free of charge by agricultural conversion.

Cock-tailed Tyrant *Alectrurus tricolor* (critically endangered, SP; vulnerable, BR, Red list). This species currently shows irregular distribution, largely due to the rarity of undisturbed open-habitats, especially tall grasses. In the Cerrado, these environments have been quickly converted in agricultural areas. In São Paulo, this species has not been detected in other places, except at Itirapina Ecological Station (Motta-Júnior et al. 2008). When breeding, males display nuptial conspicuous behaviors such as flights up to 4 m in height followed by freefalls to the ground, and vertical movements of the long tail. This behavior was observed near to a female on October 21, 2008 (22°47'08"S, 49°14'24"W) at a site recovering from burning.

Sedge Wren *Cistothorus platensis* (critically endangered, SP). Open-habitat species with a large vocal repertoire, usually forages low down in vegetation looking for insects. Inhabitant of *campo*s, seasonally wet grasslands and freshwater marshes, it has declined due to habitat loss from changes in land use, and converting natural grasslands to forestry and pastures. In Santa Bárbara, this bird was once relative abundant in the 70s and 80s with a record of 27 individuals in 17 transect hours (Willis & Oniki 1981). It has not been recorded there recently and even using sound emissions by playback techniques, intensive searches in habitats with potential occurrences were not successful in finding the species, suggesting a possible local extinction (A.S. Lucindo & M.M. Dias, unpublished data). It is necessary a detailed search for isolated population of the

species at surroundings, in order to develop management actions.

Ochre-breasted Pipit *Anthus nattereri* (critically endangered, SP; vulnerable, BR, Red list). Grassland species are known for preferring burnt areas (not over-frequent burnings) and lightly grazed grasslands (Parker III & Willis 1997). Although recorded in Itirapina in the past, the species has not been sighted since 2000, even during breeding season (Willis 2004, Motta-Júnior et al. 2008), suggesting a possible local extinction. In Santa Bárbara, the species has not been found since Willis & Oniki's studies, even using playback sounds from elsewhere (A.S. Lucindo & M.M. Dias, unpublished data). It makes even more serious the situation of the species on site. As it is a restricted species regarding the environment occupied, it may have disappeared due to conversion of grasslands into *Pinus* plantations and vegetation densification (Silveira et al. 2009). Further studies are needed to clarify its actual condition locally.

White-rumped Tanager *Cypsnagra hirundinacea* (endangered, SP). Although considered rare in São Paulo, the species is frequently observed in *campos cerrados* in the ecological station, forming monospecific flocks from two to three individuals. It is commonly seen foraging for insects in the tree and bush stratum above 1.5m. It is highly territorial, since actively responds to audio playback, vocalizing and flying over the sound source in searching for the supposed intruder. In São Paulo, it is threatened due to disturbance and destruction of their habitats (Silveira et al. 2009).

White-banded Tanager *Neothraupis fasciata* (endangered, SP). Species usually observed in groups of two or more individuals in the *campo cerrado* and cerrado *sensu stricto*, sometimes feeding on the ground. We found this species joining mixed flocks with *S. atricollis*. Their diet includes insects, seeds and fruits. In the ecological station, the bird actively feeds on *Aegiphila lhotskiana* (Lamiaceae) when bearing fruiting. The main threat to its existence is the conversion of natural areas into pasture and farmland (Silveira et al. 2009).

Plumbeous Seedeater *Sporophila plumbea* (endangered, SP). Coveted for cagebird trade, this short-distance migrant species also suffers from habitat loss, which must be addressed through the conservation of natural grasslands. In Jataí, it was frequently seen in the 60s, but has not been observed recently (Dias 2000). In Cerrado Pé-de-Gigante, it was usually observed in the 90s (Develey et al. 2005). For now, Santa Bárbara along with Itirapina emerge as priority conservation areas for *Sporophila* seedeaters in general, since they still rely on Cerrado formations and specific grassland environments. However, both invasive grasses and vegetation densification due to fire protection have leaded to a gradual modification of its preferential habitat.

Pearly-bellied Seedeater *Sporophila pileata* (vulnerable, SP). Originally considered as a subspecies of *S. bouvreuil* (Copper Seedeater), this taxon was recently recognized as a full species (Machado & Silveira 2010). Some couples have been spotted in *campo cerrado* when foranging in mixed flocks with *S. plumbea*, which can indicate the use of the region as a stopover on their migratory routes.

Black-masked Finch *Coryphaspiza melanotis* (critically endangered, SP; vulnerable, BR, Red list). Restricted bird to grassland environments, it usually lives on the ground, rising in grasses with emerging stalk during its breeding season. The Black-masked Finch has high research and conservation priority, because it is a rare and declining species (Stotz et al. 1996, Silveira & Straube 2008). Recently, some efforts to find it using playbacks were not successful at Santa Bárbara grasslands, suggesting a possible local extinction (A.S. Lucindo & M.M. Dias, unpublished data). However, it is worth considering that the species was detected by Motta-Júnior et al. (2008), and a few years thereafter it was thought to be extinct in Itirapina (Willis 2004). Therefore, new searches covering the surroundings are needed to find some isolated population, and develop management actions.

2. Concluding remarks

To recognize the species at Santa Bárbara Ecological Station is the first step towards preparing an effective strategy to conserve the local avifauna. Key approaches to improve knowledge of this bird assemblage include analyses of habitat use via BARCI designs (Before-After Reference Control-Impact), and population size estimates for species of conservation concern (e.g. Kanegae 2011, Kanegae et al. 2012a, 2012b). Conservation of the grassland and savanna biota at Santa Bárbara Ecological Station in the medium and long terms is a challenge that must be faced with management grounded on scientific research. Knowledge of birds at this reserve will allow us to use local avifauna as an indicator of the effectiveness of actions deployed.

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