



Bird richness at Sítio do Sol in Cabreúva, State of São Paulo, Brazil

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ABSTRACT. The Atlantic Forest biome has suffered great devastation but still possesses a vast biological and endemic richness, making its preservation essential. The Atlantic Forest fragments located in the interior of the state of São Paulo have not been studied as much as other areas, mainly in the municipality of Cabreúva. Therefore, this study aimed to characterize the bird richness of the Sítio do Sol property, in Cabreúva, São Paulo. The study was carried out from August 2021 to September 2022, covering seasonality. The findings revealed that 193 species were registered, distributed among 52 families, and 23 orders, with a predominance of the Passeriformes order and the Tyrannidae family. The most observed trophic guild among species was insectivorous, accounting for 78 (41%) species, followed by omnivorous with 59 (31%) species, carnivorous 18 (9%), frugivorous 16 (8%), granivorous 12 (6%), nectarivorous 8 (4%), and detritivorous species 2 (1%), with lower richness. This study is one of the few bird surveys carried out in the municipality of Cabreúva and indicates that even in small forest fragments, there is a considerable species richness. Developing more fauna surveys and management plans for the species present in the area is important to preserve these birds.

Keywords: zoology; ecology; biodiversity; Serra do Japi; avifauna.

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Introduction

The Atlantic Forest originally covered over 1.3 million km², distributed along the Brazilian coast (Dario, 2021). With threatened status, the Atlantic Forest is one of the 36 global biodiversity hotspots, with only 28% (32 million hectares) of its original coverage remaining (Rezende et al., 2018; Pizo & Tonetti, 2020). As it is one of the biodiversity hotspots, it has a greater bird richness, with over 930 species registered (Dario, 2021).

According to Dario (2021), many bird species in the Atlantic Forest are endangered, with 68% rare species and 23 endemic genera. Much of this biome is fragmented, forming small islands of vegetation (Rezende et al., 2018). More than 80% of the vegetation islands are smaller than 50 hectares, resulting in the edge effect (Pizo & Tonetti, 2020). The main threats to Brazilian birds are the loss and fragmentation of habitats, anthropogenic disturbance, the introduction of exotic bird species, and bird trafficking (Marini & Garcia, 2005). In the Atlantic Forest, 45-90% of trees depend on vertebrate dispersal, with birds being the exclusive dispersers of 40% of tree species (Almeida-Neto, Campassi, Galetti, Jordano, & Oliveira-Filho, 2008; Pizo & Galetti, 2010).

Fauna surveys are important for analyzing impacts on the environment and for knowing the fauna of that region (Silveira et al., 2010). This study aimed to conduct a qualitative survey of bird species, in an Atlantic Forest fragment connected to the Serra do Japi, at Sítio do Sol, Cabreúva, Brazil.

Material and methods

The property named Sítio do Sol is 29.4 hectares (294,000 m²), located in Cabreúva, state of São Paulo, at the geographic coordinates 23° 18' 54.1" S 47° 05' 42.0" W. The Serra do Japi is distributed between the municipalities of Jundiaí, Cabreúva, Cajamar, and Pirapora do Bom Jesus, occupying an area of 354 km².

The Serra do Japi has an extensive history of human influence (Paes & Eichenberger, 2021). The landscape features a diverse vegetation pattern, including expanses of large trees reaching heights of 20-25 meters with

overlapping crowns, smaller trees, secondary forests, and extensive grasslands (Leitão-Filho, 1992). According to Leitão-Filho (1992), research suggests that the biodiversity of the region is attributable to the unique combination of climate, altitude, habitats, and location, which situates Serra do Japi between the Atlantic Forest and the semi-deciduous mesophyllous forest of the interior of the state of São Paulo. The Mares de Morros domain is present in this region, characterized by rounded hills, plateaus, and mountains, ranging from 700 to 1200 meters above sea level (Ab'Sáber, 1992).

The survey was conducted between August 2021 and September 2022, totaling 30 sampling days, divided into 180 hours of transect, covering a pre-determined transect of 3 km (Figure 1), identifying the species seen or heard (adapted from Gregory, Gibbons, & Donald, 2004). These visits were performed during the early morning and early evening. Four fixed points were selected for sampling: two in forest areas and two in open environments. Researchers remained stationary for 15 min. twice a day at each point, totaling 60 hours of observation, documented the species through active visual and auditory searches, and used playback to attract birds (Krebs, 1971; Falls, 1981). The nomenclature used in listing the birds presented in the tables followed that established by the Brazilian Committee for Ornithological Records (Pacheco et al., 2021).

Results and discussion

During 180 hours of transects and 60 hours of observation, 193 species were identified (Table 1), distributed among 52 families and 23 orders, of which the order Passeriformes had 126 species (66% of the total species registered) and the Tyrannidae family, 27 species (14% of the total species registered), the greatest number of representatives. Among the 193 species, 129 (67%) have forest habits, 57 (29%) have grasslands habits, and 7 (4%) are aquatic. The low number of aquatic species is due to the scarcity of lake habitats in the study region.

The most observed trophic guild among species in the area was insectivorous, accounting for 78 (41%) species, followed by omnivorous with 59 (31%) species, and carnivorous with 18 (9%) species. Furthermore, there were 16 (8%) frugivorous species, which comprised a relatively small percentage. Frugivorous bird species are important for seed dispersal and maintenance of the environment (Almeida-Neto et al., 2008; Pizo & Galetti, 2010; Tobias, Ottenburghs, & Pigot, 2020). Additionally, there were 12 (6%) granivorous species, 8 (4%) nectarivorous species, and 2 (1%) detritivorous species, with lower richness.

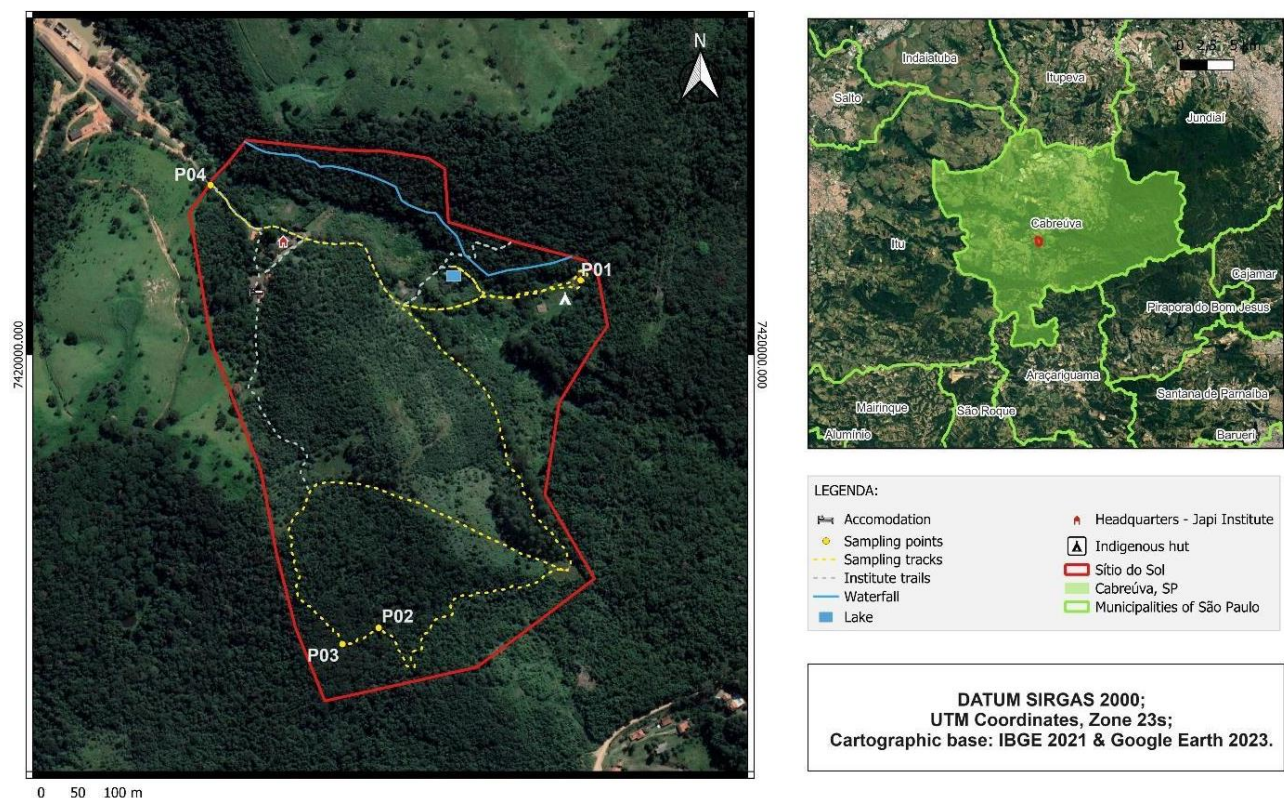


Figure 1. Location and delimitation of Sítio do Sol with the transect and fixed observation points (P01, P02, P03, P04).

Table 1. List of species with their order and family, and information on their diets, habits, and conservation status.

Taxon	Common name	Diet	Habitat	StatusIUCN	Register Edge type					
Tinamiformes Huxley, 1872										
Tinamidae Gray, 1840										
<i>Crypturellus</i> Brabourne & Chubb, 1914	Inhambu-chintã	OMN	C2	LC	A - AB					
<i>Crypturellus tataupa</i> (Temminck, 1815)										
Anseriformes Linnaeus, 1758										
Anatidae Leach, 1820										
<i>Amazonetta</i> Boetticher, 1929										
<i>Amazonetta brasiliensis</i> (Gmelin, 1789)	Marreca-ananaí	OMN	A	LC	V - AB					
Galliformes Linnaeus, 1758										
Cracidae Rafinesque, 1815										
<i>Penelope</i> Merrem, 1786	Jacuguaçu	FRU	C2	LC	A – V - AB					
<i>Penelope obscura</i> (Temminck, 1815)										
Columbiformes Latham, 1790										
Columbidae Leach, 1820										
<i>Patagioenas</i> Reichenbach, 1853										
<i>Patagioenas cayennensis</i> (Bonnaterre, 1792)	Pomba-galega	FRU	C2	LC	V - PS					
<i>Patagioenas picazuro</i> (Temminck, 1813)	Asa-branca	FRU	C2	LC	V - PS					
<i>Geotrygon</i> Gosse, 1847										
<i>Geotrygon montana</i> (Linnaeus, 1758)	Pariri	FRU	F1	LC	A - AB					
<i>Leptotila</i> Swainson, 1837										
<i>Leptotila rufaxilla</i> (Richard & Bernard, 1792)	Juriti-de-testa-branca	FRU	F2	LC	A - AB					
<i>Leptotila verreauxi Bonaparte, 1855</i>	Juriti-pupu	FRU	F2	LC	A - AB					
<i>Columbina</i> Spix, 1825										
<i>Columbina talpacoti</i> (Temminck, 1811)	Pombinha-roxa	GRA	C2	LC	V - PS					
Cuculiformes Wagler, 1830										
Cuculidae Leach, 1820										
<i>Guira</i> Lesson, 1830										
<i>Guira guira</i> (Gmelin, 1788)	Anu-branco	CAR	C2	LC	A - AB					
<i>Crotophaga</i> Linnaeus, 1758										
<i>Crotophaga ani</i> (Linnaeus, 1758)	Anu-preto	CAR	C2	LC	A – V - AB					
<i>Tapera</i> Thunberg, 1819										
<i>Tapera naevia</i> (Linnaeus, 1766)	Saci	CAR	F2	LC	A - AB					
<i>Dromococcyx</i> Wied, 1832										
<i>Dromococcyx pavoninus</i> (Pelzeln, 1870)	Peixe-frito-pavonino	INS	F1	LC	A - AB					
<i>Piaya</i> Lesson, 1830										
<i>Piaya cayana</i> (Linnaeus, 1766)	Alma-de-gato	CAR	F2	LC	A – V - AB					
Nyctibiiformes Yuri, Kimball, Harshman, Bowie, Braun, Chojnowski, Hackett, Huddleston, Moore, Reddy, Sheldon, Steadman, Witt & Braun, 2013										
Nyctibiidae Chenu & Des Murs, 1851										
<i>Nyctibius</i> Vieillot, 1816										
<i>Nyctibius griseus</i> (Gmelin, 1789)	Urutau	INS	C2	LC	A – V - PS					
Caprimulgiformes Ridgway, 1881										
Caprimulgidae Vigors, 1825										
<i>Nyctiphrynus</i> Bonaparte, 1857										
<i>Nyctiphrynus ocellatus</i> (Tschudi, 1844)	Bacurau-ocelado	INS	F2	LC	A - AB					
<i>Antrostomus</i> Bonaparte, 1838										
<i>Antrostomus rufus</i> (Boddaert, 1783)	João-corta-pau	INS	F2	LC	A – V - AB					
<i>Lurocalis</i> Cassin, 1851										
<i>Lurocalis semitorquatus</i> (Gmelin, 1789)	Tuju	INS	F2	LC	A - AB					
<i>Nyctidromus</i> Gould, 1838										
<i>Nyctidromus albicollis</i> (Gmelin, 1789)	Bacurau	INS	F2	LC	A – V - AB					
<i>Hydropsalis</i> Wagler, 1832										
<i>Hydropsalis parvula</i> (Gould, 1837)	Bacurau-chintã	INS	F2	LC	A - AB					
Apodiformes Peters, 1940										
Trochilidae Vigors, 1825										
<i>Florisuga</i> Bonaparte, 1850										
<i>Florisuga fusca</i> (Vieillot, 1817)	Beija-flor-preto	NEC	F2	LC	V - PS					
<i>Phaethornis</i> Swainson, 1827										
<i>Phaethornis pretrei</i> (Lesson & Delattre, 1839)	Rabo-branco-acanelado	NEC	F2	LC	V - PS					
<i>Phaethornis eurynome</i> (Lesson, 1832)	Rabo-branco-de-garganta-rajada	NEC	F2	LC	V - PS					
<i>Chlorostilbon</i> Gould, 1853										

<i>Chlorostilbon lucidus</i> (Shaw, 1812)	Besourinho-de-bico-vermelho	NEC	F2	LC	V - AB
<i>Thalurania</i> Gould, 1848					
<i>Thalurania glaucopsis</i> (Gmelin, 1788)	Beija-flor-de-fronte-violeta	NEC	F2	LC	V - AB
<i>Eupetomena</i> Gould, 1853					
<i>Eupetomena macroura</i> (Gmelin, 1788)	Beija-flor-tesoura	NEC	F2	LC	V - AB
<i>Leucochloris</i> Reichenbach, 1854					
<i>Leucochloris albicollis</i> (Vieillot, 1818)	Beija-flor-de-papo-branco	NEC	F2	LC	V - PS
<i>Chionomesa</i> Simon, 1921					
<i>Chionomesa fimbriata</i> (Gmelin, 1788)	Beija-flor-de-garganta-verde	NEC	C2	LC	A - AB
Gruiformes Bonaparte, 1854					
Rallidae Rafinesque, 1815					
<i>Pardirallus</i> Bonaparte, 1856					
<i>Pardirallus nigricans</i> (Vieillot, 1819)	Saracura-sanã	OMN	F2	LC	V - AB
<i>Aramides</i> Pucheran, 1845					
<i>Aramides cajaneus</i> (Statius Muller, 1776)	Saracura-três-potes	OMN	C2	LC	V - AB
<i>Aramides saracura</i> (Spix, 1825)	Saracura-do-mato	OMN	F2	LC	A - AB
Charadriiformes Huxley, 1867					
Charadriidae Leach, 1820					
<i>Vanellus</i> Brisson, 1760					
<i>Vanellus chilensis</i> (Molina, 1782)	Quero-quero	OMN	A	LC	A - AB
Suliformes Sharpe, 1891					
Phalacrocoracidae Reichenbach, 1849					
<i>Nannopterum</i> Sharpe, 1899					
<i>Nannopterum brasilianum</i> (Gmelin, 1789)	Biguá	CAR	A	LC	V - AB
Pelecaniformes Sharpe, 1891					
Ardeidae Leach, 1820					
<i>Tigrisoma</i> Swainson, 1827					
<i>Tigrisoma lineatum</i> (Boddaert, 1783)	Socó-boi	CAR	A	LC	V - AB
<i>Bubulcus</i> Bonaparte, 1855					
<i>Bubulcus ibis</i> (Linnaeus, 1758)	Garça-vaqueira	OMN	C2	LC	V - AB
<i>Nycticorax</i> Forster, 1817					
<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	Socó-dorminhoco	CAR	A	LC	A - AB
<i>Ardea</i> Linnaeus, 1758					
<i>Ardea alba</i> (Linnaeus, 1758)	Garça-branca-grande	OMN	A	LC	V - AB
Threskiornithidae Poche, 1904					
<i>Mesembrinibis</i> Peters, 1930					
<i>Mesembrinibis cayennensis</i> (Gmelin, 1789)	Coró-coró	OMN	F2	LC	V - AB
<i>Theristicus</i> Wagler, 1832					
<i>Theristicus caudatus</i> (Boddaert, 1783)	Curicara	OMN	C2	LC	V - AB
Cathartiformes Seebohm, 1890					
Cathartidae Lafresnaye, 1839					
<i>Coragyps</i> Le Maout, 1853					
<i>Coragyps atratus</i> (Bechstein, 1793)	Urubu-preto	DET	C2	LC	V - AB
<i>Cathartes</i> Illiger, 1811					
<i>Cathartes aura</i> (Linnaeus, 1758)	Urubu-de-cabeça-vermelha	DET	C2	LC	V - AB
Accipitriformes Bonaparte, 1831					
Accipitridae Vigors, 1824					
<i>Spizaetus</i> Vieillot, 1816					
<i>Spizaetus tyrannus</i> (Wied, 1820)	Gavião-pegas-macaco	CAR	F2	LC	V - AB
<i>Rupornis</i> Kaup, 1844					
<i>Rupornis magnirostris</i> (Gmelin, 1788)	Gavião-carijó	CAR	F2	LC	A - AB
Strigiformes Wagler, 1830					
Strigidae Leach, 1820					
<i>Megascops</i> Kaup, 1848					
<i>Megascops choliba</i> (Vieillot, 1817)	Corujinha-do-mato	CAR	C2	LC	A - VPS
<i>Asio</i> Brisson, 1760					
<i>Asio clamator</i> (Vieillot, 1808)	Coruja-orelhuda	CAR	F2	LC	A - PS
Trogoniformes A. O. U., 1886					
Trogonidae Lesson, 1828					
<i>Trogon</i> Brisson, 1760					
<i>Trogon surrucura</i> (Vieillot, 1817)	Surucua-variado	OMN	C2	LC	A - PS

Coraciiformes Forbes, 1844					
Alcedinidae Rafinesque, 1815					
<i>Chloroceryle</i> Kaup, 1848					
<i>Chloroceryle amazona</i> (Latham, 1790)	Martim-pescador-verde	CAR	C2	LC	V - PS
Galbuliformes Fürbringer, 1888					
Bucconidae Horsfield, 1821					
<i>Malacoptila</i> Gray, 1841					
<i>Malacoptila striata</i> (Spix, 1824)	Barbudo-rajado	INS	F1	LC	V - AB
<i>Nystalus Cabanis & Heine, 1863</i>					
<i>Nystalus chacuru</i> (Vieillot, 1816)	João-bobo	CAR	F2	LC	A - PS
Piciformes Meyer & Wolf, 1810					
Ramphastidae Vigors, 1825					
<i>Ramphastos</i> Linnaeus, 1758					
<i>Ramphastos toco</i> Statius Muller, 1776	Tucano-toco	OMN	C2	LC	A - VAB
Picidae Leach, 1820					
<i>Picumnus</i> Temminck, 1825					
<i>Picumnus cirratus</i> (Temminck, 1825)	Pica-pau-anão-barrado	INS	F2	LC	V - PS
<i>Melanerpes Swainson, 1832</i>					
<i>Melanerpes candidus</i> (Otto, 1796)	Pica-pau-branco	INS	C2	LC	A - AB
<i>Melanerpes flavifrons</i> (Vieillot, 1818)	Benedito-de-testa-amarela	OMN	F2	LC	A - AB
<i>Veniliornis Bonaparte, 1854</i>					
<i>Veniliornis spilogaster</i> (Wagler, 1827)	Picapauzinho-verde-carijó	INS	F2	LC	V - PS
<i>Dryocopus Boie, 1826</i>					
<i>Dryocopus lineatus</i> (Linnaeus, 1766)	Pica-pau-de-banda-branca	INS	C2	LC	V - PS
<i>Celeus Boie, 1831</i>					
<i>Celeus flavescens</i> (Gmelin, 1788)	Pica-pau-de-cabeça-amarela	INS	C2	LC	V - AB
<i>Colaptes Vigors, 1825</i>					
<i>Colaptes campestris</i> (Vieillot, 1818)	Pica-pau-do-campo	INS	C2	LC	A - AB
<i>Colaptes melanochloros</i> (Gmelin, 1788)	Pica-pau-de-verde-barrado	INS	F2	LC	A - AB
Cariamiformes Fürbringer, 1888					
Cariamidae Bonaparte, 1850					
<i>Cariama</i> Brisson, 1760					
<i>Cariama cristata</i> (Linnaeus, 1766)	Seriema	OMN	C1	LC	A - V - AB
Falconiformes Bonaparte, 1831					
Falconidae Leach, 1820					
<i>Micrastur</i> Gray, 1841					
<i>Micrastur ruficollis</i> (Vieillot, 1817)	Falcão-caburé	CAR	F1	LC	A - AB
<i>Micrastur semitorquatus</i> (Vieillot, 1817)	Gavião-relógio	CAR	F1	LC	A - AB
<i>Caracara Merrem, 1826</i>					
<i>Caracara plancus</i> (Miller, 1777)	Carcará	CAR	C2	LC	V - AB
<i>Milvago Spix, 1824</i>					
<i>Milvago chimachima</i> (Vieillot, 1816)	Carrapateiro	CAR	C2	LC	A - AB
Psittaciformes Wagler, 1830					
Psittacidae Rafinesque, 1815					
<i>Pionus</i> Wagler, 1832					
<i>Pionus maximiliani</i> (Kuhl, 1820)	Maitaca-verde	FRU	F2	LC	V - AB
<i>Forpus Boie, 1858</i>					
<i>Forpus xanthopterygius</i> (Spix, 1824)	Tuim	FRU	F2	LC	A - PS
<i>Psittacara Vigors, 1825</i>					
<i>Psittacara leucophthalmus</i> (Statius Muller, 1776)	Periquitão-maracanã	FRU	F2	LC	V - AB
Passeriformes Linnaeus, 1758					
Tyranni Wetmore & Miller, 1926					
Furnariides Sibley, Ahlquist & Monroe, 1988					
Thamnophilida Patterson, 1987					
Thamnophilidae Swainson, 1824					
<i>Dysithamnus Cabanis, 1847</i>					
<i>Dysithamnus mentalis</i> (Temminck, 1823)	Choquinha-lisa	INS	F1	LC	A - PS
<i>Hypodaleus Cabanis & Heine, 1859</i>					
<i>Hypodaleus guttatus</i> (Vieillot, 1816)	Chocão-carijó	INS	F1	LC	A - PS
<i>Herpsilochmus Cabanis, 1847</i>					
<i>Herpsilochmus rufimarginatus</i> (Temminck, 1822)	Chorozinho-de-asa-vermelha	OMN	F2	LC	A - VAB

<i>Herpsilochmus atricapillus</i> (Pelzeln, 1868)	Chorozinho-de-chapéu-preto	INS	F2	LC	A - PS
<i>Thamnophilus</i> Vieillot, 1816					
<i>Thamnophilus caerulescens</i> (Vieillot, 1816)	Choca-da-mata	INS	F1	LC	A - PS
<i>Thamnophilus doliatus</i> (Linnaeus, 1764)	Choca-barrada	INS	F2	LC	A - PS
<i>Taraba</i> Lesson, 1831					
<i>Taraba major</i> (Vieillot, 1816)	Choró-boi	INS	F2	LC	A - VAB
<i>Batara</i> Lesson, 1831					
<i>Batara cinerea</i> (Vieillot, 1819)	Matracão	CAR	F2	LC	A - AB
<i>Mackenziaena</i> Chubb, 1918					
<i>Mackenziaena severa</i> (Lichtenstein, 1823)	Borralhara-preta	INS	F2	LC	A - AB
<i>Pyriglena</i> Cabanis, 1847					
<i>Pyriglena leucoptera</i> (Vieillot, 1818)	Papa-taoca-do-sul	INS	F2	LC	A - VPS
<i>Drymophila</i> Swainson, 1824					
<i>Drymophila ferruginea</i> (Temminck, 1822)	Dituí	INS	F1	LC	A - PS
<i>Drymophila ochropyga</i> (Hellmayr, 1906)	Choquinha-de-dorso-vermelho	INS	F2	LC	A - VAB
<i>Drymophila rubricollis</i> (Bertoni, 1901)	Trovoada-de-bertoni	INS	F1	LC	A - AB
<i>Drymophila malura</i> (Temminck, 1825)	Choquinha-carijó	INS	F2	LC	A - PS
Conopophagidae Sclater & Salvin, 1873					
<i>Conopophaga</i> Vieillot, 1816					
<i>Conopophaga lineata</i> (Wied, 1831)	Chupa-dente	INS	F2	LC	A - AB
Furnariidae Sibley, Ahlquist & Monroe, 1988					
Grallariidae Sclater & Salvin, 1873					
<i>Grallaria</i> Vieillot, 1816					
<i>Grallaria varia</i> (Boddaert, 1783)	Tovacuçu	INS	F2	LC	A - AB
Scleruridae Swainson, 1827					
<i>Sclerurus</i> Swainson, 1827					
<i>Sclerurus scansor</i> (Ménétries, 1835)	Vira-folha	INS	F1	LC	A - AB
Dendrocolaptidae Gray, 1840					
<i>Sittasomus</i> Swainson, 1827					
<i>Sittasomus griseicapillus</i> (Vieillot, 1818)	Arapaçu-verde	INS	F2	LC	V - AB
<i>Dendrocincla</i> Gray, 1840					
<i>Dendrocincla turdina</i> (Lichtenstein, 1820)	Arapaçu-liso	INS	F2	LC	A - PS
<i>Dendrocolaptes</i> Hermann, 1804					
<i>Dendrocolaptes platyrostris</i> (Spix, 1825)	Arapaçu-grande	INS	F2	LC	A - AB
<i>Xiphorhynchus</i> Swainson, 1827					
<i>Xiphorhynchus fuscus</i> (Vieillot, 1818)	Arapaçu-rajado	INS	F1	LC	A - AB
Xenopidae Bonaparte, 1854					
<i>Xenops</i> Illiger, 1811					
<i>Xenops rutilans</i> (Temminck, 1821)	Bico-virado-carijó	OMN	F2	LC	A - VAB
<i>Xenops minutus</i> (Sparrman, 1788)	Bico-virado-miúdo	INS	F2	LC	A - PS
Furnariidae Gray, 1840					
<i>Furnarius</i> Vieillot, 1816					
<i>Furnarius figulus</i> (Lichtenstein, 1823)	Casaca-de-couro-da-lama	INS	F2	LC	A - PS
<i>Furnarius rufus</i> (Gmelin, 1788)	João-de-barro	INS	C2	LC	V - AB
<i>Lochmias</i> Swainson, 1827					
<i>Lochmias nematura</i> (Lichtenstein, 1823)	João-porca	INS	F2	LC	A - AB
<i>Automolus</i> Reichenbach, 1853					
<i>Automolus leucophthalmus</i> (Wied, 1821)	Barranqueiro-de-olho-branco	INS	F2	LC	A - AB
<i>Cranioleuca</i> Reichenbach, 1853					
<i>Cranioleuca pallida</i> (Wied, 1831)	Arredio-pálido	INS	F1	LC	A - PS
<i>Cranioleuca obsoleta</i> (Reichenbach, 1853)	Arredio-oliváceo	OMN	F2	LC	A - AB
<i>Synallaxis</i> Vieillot, 1818					
<i>Synallaxis frontalis</i> Pelzeln, 1859	Petrim	INS	F2	LC	A - VAB
<i>Synallaxis ruficapilla</i> (Vieillot, 1819)	Pichororé	INS	F2	LC	A - VPS
<i>Synallaxis spixi</i> (Sclater, 1856)	João teneném	INS	F2	LC	A - VPS
<i>Synallaxis albescens</i> Temminck, 1823	Uí-pi	INS	C2	LC	A - AB
Tyrannides Wetmore & Miller, 1926					
Tyrannida Wetmore & Miller, 1926					
Pipridae Rafinesque, 1815					
<i>Chiroxiphia</i> Cabanis, 1847					
<i>Chiroxiphia caudata</i> (Shaw & Nodder, 1793)	Tangará	OMN	F1	LC	A - VAB
Tityridae Gray, 1840					
<i>Schiffornis</i> Bonaparte, 1854					

<i>Schiffornis virescens</i> (Lafresnaye, 1838)	Flautim	INS	F1	LC	A - AB
Tityrinae Gray, 1840					
<i>Pachyramphus</i> Gray, 1839					
<i>Pachyramphus polychropterus</i> (Vieillot, 1818)	Caneleiro-preto	OMN	F2	LC	V - PS
<i>Pachyramphus viridis</i> (Vieillot, 1816)	Caneleiro-verde	INS	C2	LC	A - PS
Pipritidae Ohlson, Irestedt, Ericson & Fjeldså, 2013					
<i>Piprites Cabanis</i> , 1847					
<i>Piprites chloris</i> (Temminck, 1822)	Papinho-amarelo	INS	F2	LC	A - PS
Platyrinchidae Bonaparte, 1854					
<i>Platyrinchus</i> Desmarest, 1805					
<i>Platyrinchus mystaceus</i> (Vieillot, 1818)	Patinho	INS	F1	LC	A - PS
Rhynchocyclidae Berlepsch, 1907					
<i>Mionectes</i> Cabanis, 1844					
<i>Mionectes rufiventris</i> (Cabanis, 1846)	Abre-asa-de-cabeça-cinza	OMN	F1	LC	A - AB -
<i>Leptopogon</i> Cabanis, 1844					
<i>Leptopogon amaurocephalus</i> (Tschudi, 1846)	Cabeçudo	INS	F1	LC	A - AB
<i>Corythopis Sundevall</i> , 1836					
<i>Corythopis delalandi</i> (Lesson, 1830)	Estalador	INS	F2	LC	A - AB
<i>Tolmomyias</i> Hellmayr, 1927					
<i>Tolmomyias sulphurescens</i> (Spix, 1825)	Bico-chato-de-orelha-preta	INS	F2	LC	A - AB
<i>Todirostrum</i> Lesson, 1831					
<i>Todirostrum poliocephalum</i> (Wied, 1831)	Teque-teque	OMN	F1	LC	A - V - AB
<i>Myiornis</i> Bertoni, 1901					
<i>Myiornis auricularis</i> (Vieillot, 1818)	Miudinho	INS	F2	LC	A - PS
Tyrannidae Vigors, 1825					
<i>Hirundinea</i> d'Orbigny & Lafresnaye, 1837					
<i>Hirundinea ferruginea</i> (Gmelin, 1788)	Gibão-de-couro	INS	F2	LC	A - AB
<i>Tyranniscus</i> Cabanis & Heine, 1859					
<i>Tyranniscus burmeisteri</i> (Cabanis & Heine, 1859)	Piolhinho-chiador	INS	F1	LC	A - AB
<i>Camptostoma</i> Sclater, 1857					
<i>Camptostoma obsoletum</i> (Temminck, 1824)	Risadinha	OMN	F2	LC	A - AB
<i>Elaenia</i> Sundevall, 1836					
<i>Elaenia mesoleuca</i> (Deppe, 1830)	Tuque	OMN	F1	LC	A - AB
<i>Elaenia spectabilis</i> (Pelzeln, 1868)	Guaracava-grande	FRU	F2	LC	A - VPS
<i>Elaenia flavogaster</i> (Thunberg, 1822)	Guaracava-de-barriga-amarela	OMN	F2	LC	A - AB
<i>Myiopagis</i> Salvin & Godman, 1888					
<i>Myiopagis caniceps</i> (Swainson, 1835)	Guaracava-cinzenta	INS	F2	LC	A - PS
<i>Myiopagis viridicata</i> (Vieillot, 1817)	Guaracava-de-crista-alaranjada	INS	F2	LC	A - AB
<i>Capsiempis</i> Cabanis & Heine, 1859					
<i>Capsiempis flaveola</i> (Lichtenstein, 1823)	Marianinha-amarela	INS	F2	LC	A - AB
<i>Phyllomyias</i> Cabanis & Heine, 1859					
<i>Phyllomyias virescens</i> (Temminck, 1824)	Piolhinho-verdoso	INS	F2	LC	A - PS
<i>Ramphotrigon</i> Gray, 1855					
<i>Ramphotrigon megacephalum</i> (Swainson, 1835)	Maria-cabeçuda	INS	F1	LC	A - AB
<i>Myiarchus</i> Cabanis, 1844					
<i>Myiarchus ferox</i> (Gmelin, 1789)	Maria-cavaleira	OMN	F2	LC	A - V - AB
<i>Myiarchus tyrannulus</i> (Statius Muller, 1776)	Maria-cavaleira-de-rabo-enferrujado	OMN	C2	LC	A - VPS
<i>Myiarchus swainsoni</i> (Cabanis & Heine, 1859)	Irré	OMN	F2	LC	A - AB
<i>Sirystes</i> Cabanis & Heine, 1859					
<i>Sirystes sibilator</i> (Vieillot, 1818)	Gritador	INS	F2	LC	A - AB
<i>Pitangus</i> Swainson, 1827					
<i>Pitangus sulphuratus</i> (Linnaeus, 1766)	Bem-te-vi	OMN	F2	LC	A - V - AB
<i>Machetornis</i> Gray, 1841					
<i>Machetornis rixosa</i> (Vieillot, 1819)	Suiriri-cavalheiro	INS	C2	LC	V - AB
<i>Myiodynastes</i> Bonaparte, 1857					
<i>Myiodynastes maculatus</i> (Statius Muller, 1776)	Bem-te-vi-rajado	OMN	F2	LC	V - AB
<i>Megarynchus</i> Thunberg, 1824					
<i>Megarynchus pitangua</i> (Linnaeus, 1766)	Neinei	OMN	F2	LC	V - AB
<i>Myiozetetes</i> Sclater, 1859					
<i>Myiozetetes similis</i> (Spix, 1825)	Bentevizinho-de-penacho-vermelho	OMN	F2	LC	A - AB
<i>Tyrannus</i> Lacépède, 1799					

<i>Tyrannus melancholicus</i> (Vieillot, 1819)	Suiriri	OMN	F2	LC	A – V – AB
<i>Empidonomus</i> Cabanis & Heine, 1859					
<i>Empidonomus varius</i> (Vieillot, 1818)	Peitica	OMN	F2	LC	A – V – AB
<i>Fluvicola</i> Swainson, 1827					
<i>Fluvicola nengeta</i> (Linnaeus, 1766)	Lavadeira-mascarada	INS	A	LC	V – AB
<i>Gubernetes</i> Such, 1825					
<i>Gubernetes yetapa</i> (Vieillot, 1818)	Tesoura-do-brejo	INS	C2	LC	A – AB
<i>Myiophobus</i> Reichenbach, 1850					
<i>Myiophobus fasciatus</i> (Statius Muller, 1776)	Filipe	INS	C2	LC	A – PS
<i>Lathrotriccus</i> Lanyon & Lanyon, 1986					
<i>Lathrotriccus euleri</i> (Cabanis, 1868)	Enferrujado	INS	F1	LC	A – AB
<i>Contopus</i> Cabanis, 1855					
<i>Contopus cinereus</i> (Spix, 1825)	Papa-moscas-cinzento	INS	F2	LC	A – AB
<i>Passeri</i> Linnaeus, 1758					
<i>Corvida</i> Wagler, 1830					
<i>Vireonidae</i> Swainson, 1837					
<i>Cyclarhis</i> Swainson, 1824					
<i>Cyclarhis gujanensis</i> (Gmelin, 1789)	Pitiguari	OMN	F2	LC	A – PS
<i>Vireo</i> Vieillot, 1808					
<i>Vireo chivi</i> (Vieillot, 1817)	Juruviara	INS	F2	LC	A – AB
<i>Corvidae</i> Leach, 1820					
<i>Cyanocorax</i> Boie, 1826					
<i>Cyanocorax cristatellus</i> (Temminck, 1823)	Gralha-do-campo	OMN	C2	LC	A – V – AB
<i>Passerida</i> Linnaeus, 1758					
<i>Hirundinidae</i> Rafinesque, 1815					
<i>Pygochelidon</i> Baird, 1865					
<i>Pygochelidon cyanoleuca</i> (Vieillot, 1817)	Andorinha-pequena-de-casa	INS	C2	LC	A – V – AB
<i>Stelgidopteryx</i> Baird, 1858					
<i>Stelgidopteryx ruficollis</i> (Vieillot, 1817)	Andorinha-serradora	INS	C2	LC	V – AB
<i>Troglodytidae</i> Swainson, 1831					
<i>Troglodytes</i> Vieillot, 1809					
<i>Troglodytes musculus</i> (Naumann, 1823)	Corruíra	INS	C2	LC	A – VPS
Turdidae Rafinesque, 1815					
<i>Turdus</i> Linnaeus, 1758					
<i>Turdus amaurochalinus</i> (Cabanis, 1850)	Sabiá-poca	OMN	F2	LC	A – VPS
<i>Turdus albicollis</i> (Vieillot, 1818)	Sabiá coleira	OMN	C2	LC	A – VAB
<i>Turdus leucomelas</i> (Vieillot, 1818)	Sabiá-barranco	OMN	F2	LC	A – VAB
<i>Turdus rufiventris</i> (Vieillot, 1818)	Sabiá-laranjeira	OMN	F2	LC	A – VAB
Mimidae Bonaparte, 1853					
<i>Mimus</i> Boie, 1826					
<i>Mimus saturninus</i> (Lichtenstein, 1823)	Sabiá-do-campo	OMN	C2	LC	V – AB
<i>Estrildidae</i> Bonaparte, 1850					
<i>Estrilda</i> Swainson, 1827					
<i>Estrilda astrild</i> (Linnaeus, 1758)	Bico-de-lacre	GRA	C2	LC	A – AB
<i>Passeridae</i> Rafinesque, 1815					
<i>Passer</i> Brisson, 1760					
<i>Passer domesticus</i> (Linnaeus, 1758)	Pardal	OMN	C2	LC	A – AB
Fringillidae Leach, 1820					
<i>Spinus</i> Koch, 1816					
<i>Spinus magellanicus</i> (Vieillot, 1805)	Pintassilgo	FRU	F2	LC	A – AB
<i>Euphonia</i> Desmarest, 1806					
<i>Euphonia violacea</i> (Linnaeus, 1758)	Gaturamo-verdadeiro	FRU	F2	LC	V – PS
<i>Euphonia chlorotica</i> (Linnaeus, 1766)	Fim-fim	OMN	F2	LC	A – AB
Passerellidae Cabanis & Heine, 1850					
<i>Ammodramus</i> Swainson, 1827					
<i>Ammodramus humeralis</i> (Bosc, 1792)	Tico-tico-do-campo	GRA	C2	LC	A – AB
<i>Zonotrichia</i> Swainson, 1832					
<i>Zonotrichia capensis</i> (Statius Muller, 1776)	Tico-tico	GRA	C2	LC	V – AB
Icteridae Vigors, 1825					
<i>Molothrus</i> Swainson, 1832					
<i>Molothrus bonariensis</i> (Gmelin, 1789)	Chupim	OMN	C2	LC	V – AB
<i>Chrysomus</i> Swainson, 1837					
<i>Chrysomus ruficapillus</i> (Vieillot, 1819)	Garibaldi	OMN	C2	LC	A – VAB
Parulidae Wetmore, Friedmann, Lincoln, Miller, Peters, van Rossem, Van Tyne & Zimmer, 1947					

<i>Geothlypis</i> Cabanis, 1847					
<i>Geothlypis aequinoctialis</i> (Gmelin, 1789)	Pia-cobra	INS	C2	LC	A - AB
<i>Setophaga</i> Swainson, 1827					
<i>Setophaga pitiayumi</i> (Vieillot, 1817)	Mariquita	INS	F2	LC	A - PS
<i>Myiothlypis</i> Cabanis, 1850					
<i>Myiothlypis flaveola</i> (Baird, 1865)	Canário-do mato	INS	F2	LC	A - VAB
<i>Myiothlypis leucoblephara</i> (Vieillot, 1817)	Pula-pula-assobiador	INS	F2	LC	A - AB
<i>Basileuterus</i> Cabanis, 1849					
<i>Basileuterus culicivorus</i> (Deppe, 1830)	Pula-pula	INS	F1	LC	A - VAB
Mitrospingidae Barker, Burns, Klicka, Lanyon & Lovette, 2013					
Cardinalidae Ridgway, 1901					
<i>Piranga</i> Vieillot, 1808					
<i>Piranga flava</i> (Vieillot, 1822)	Sanhaço-de-fogo	OMN	F2	LC	A - AB
<i>Habia</i> Blyth, 1840					
<i>Habia rubica</i> (Vieillot, 1817)	Tiê-de-bando	OMN	F2	LC	A - PS
<i>Cyanoloxia</i> Bonaparte, 1850					
<i>Cyanoloxia brissonii</i> (Lichtenstein, 1823)	Azulão	OMN	F2	LC	A - AB
Thraupidae Cabanis, 1847					
<i>Nemosia</i> Vieillot, 1816					
<i>Nemosia pileata</i> (Boddaert, 1783)	Saíra-de-chapéu-preto	FRU	F2	LC	A - AB
<i>Emberizoides</i> Temminck, 1822					
<i>Emberizoides herbicola</i> (Vieillot, 1817)	Canário-do-campo	INS	C2	LC	A - AB
<i>Hemithraupis</i> Cabanis, 1850					
<i>Hemithraupis guira</i> (Linnaeus, 1766)	Sairá-de-papo-preto	FRU	F2	LC	A - PS
<i>Hemithraupis ruficapilla</i> (Vieillot, 1818)	Saíra-ferrugem	OMN	F2	LC	A - PS
<i>Saltator</i> Vieillot, 1816					
<i>Saltator similis</i> (d'Orbigny & Lafresnaye, 1837)	Trinca-ferro	OMN	F2	LC	A - PS
<i>Coereba</i> Vieillot, 1809					
<i>Coereba flaveola</i> (Linnaeus, 1758)	Cambacica	OMN	C2	LC	A - VAB
<i>Volatinia</i> Reichenbach, 1850					
<i>Volatinia jacarina</i> (Linnaeus, 1766)	Tiziu	OMN	C2	LC	V - AB
<i>Trichothraupis</i> Cabanis, 1850					
<i>Trichothraupis melanops</i> (Vieillot, 1818)	Tiê-de-topete	OMN	F2	LC	A - AB
<i>Coryphospingus</i> Cabanis, 1851					
<i>Coryphospingus cucullatus</i> (Statius Muller, 1776)	Tico-tico-rei	GRA	F2	LC	A - PS
<i>Tachyphonus</i> Vieillot, 1816					
<i>Tachyphonus rufus</i> (Boddaert, 1783)	Pipira-preta	ONI	F2	LC	V - PS
<i>Tachyphonus coronatus</i> (Vieillot, 1822)	Tiê-preto	OMN	F2	LC	A - VPS
<i>Ramphocelus</i> Desmarest, 1805					
<i>Ramphocelus bresilia</i> (Linnaeus, 1766)	Tiê-sangue	FRU	F2	LC	A - PS
<i>Sporophila</i> Cabanis, 1844					
<i>Sporophila nigricollis</i> (Vieillot, 1823)	Papa-capim-capuchinho	GRA	C2	LC	A - AB
<i>Sporophila angolensis</i> (Linnaeus, 1766)	Cúrio	OMN	F2	LC	A - PS
<i>Sporophila caerulea</i> (Vieillot, 1823)	Coleirinho	GRA	C2	LC	A - VAB
<i>Sporophila lineola</i> (Linnaeus, 1758)	Bigodinho	GRA	C2	LC	A - VAB
<i>Sporophila leucoptera</i> (Vieillot, 1817)	Chorão	GRA	C2	LC	A - AB
<i>Thlypopsis</i> Cabanis, 1851					
<i>Thlypopsis sordida</i> (d'Orbigny & Lafresnaye, 1837)	Saí-canário	OMN	F2	LC	A - AB
<i>Thlypopsis pyrrhocomma</i> (Burns, Unitt & Mason, 2016)	Cabecinha-castanha	FRU	F2	LC	A - PS
<i>Donacospiza</i> Cabanis, 1851					
<i>Donacospiza albifrons</i> (Vieillot, 1817)	Tico-tico-do-banhado	GRA	C2	LC	A - AB
<i>Conirostrum</i> d'Orbigny & Lafresnaye, 1838					
<i>Conirostrum speciosum</i> (Temminck, 1824)	Figuinha-de-rabo-castanho	OMN	F2	LC	A - AB
<i>Sicalis</i> Boie, 1828					
<i>Sicalis flaveola</i> (Linnaeus, 1766)	Canário-da-terra	GRA	C2	LC	V - PS
<i>Sicalis luteola</i> (Sparman, 1789)	Tipio	GRA	C2	LC	A - AB
<i>Thraupis</i> Boie, 1826					
<i>Thraupis sayaca</i> (Linnaeus, 1766)	Sanhaço-cinzento	OMN	F2	LC	A - VAB
<i>Thraupis palmarum</i> (Wied, 1821)	Sanhaço-do-coqueiro	OMN	C2	LC	A - VAB
<i>Stilpnia</i> Burns, Unitt & Mason, 2016					
<i>Stilpnia cayana</i> (Linnaeus, 1766)	Saíra-amarelo	OMN	F2	LC	A - AB

Diet: Sick (1997): CAR - Carnivorous; DET - Detritivorous; FRU - Frugivorous; GRA - Granivorous; INS - Insectivorous; NEC - Nectarivorous; OMN - Omnivorous. Habitat: A - Aquatic; F1 - Exclusively forestry; C1 - Exclusively grassland; F2 - Essentially forestry; C2 - Essentially grassland. Endangered status (IUCN, 2024): Least concern (LC). Register type: A - Auditory and V - Visual. Edge: PS - Present species or AB - Absent species.

The survey by Bonança and Beig (2010), carried out in three parks in Cabreúva, registered 121 bird species distributed into 48 families. The same was reported by Aleixo and Vielliard (1995) in a qualitative survey in the Santa Genebra Forest, at Campinas, state of São Paulo, resulting in 134 species sampled, in an area of 251 hectares, 48.5% of the species live in the forest and 28.3% live on the edges. In the present study, 55 (29%) species occupied the forest edges, comprising 40 Passeriformes species, 4 Apodiformes, 3 Columbiformes, 3 Piciformes, 2 Strigiformes, 1 Nyctibiiformes, 1 Galbuliformes, and 1 Psittaciformes. The study conducted by Morante-Filho, Benchimol, and Faria (2020) revealed that most forest birds have a low probability of inhabiting deforested areas, and birds that occupy the forest, such as understory insectivorous and frugivorous, are more likely to disappear than those living in forest edges.

Cavarzere, Moraes, and Donatelli (2009), in 110 sampling hours, recorded 229 bird species, distributed among 56 families, and 20 orders. The methodology was different from that adopted here, making it possible to have a larger spatial sampling with several scattered points. The different methodology and the larger area, with 2,118 hectares compared to the 29.4 hectares of Sítio do Sol, may explain this difference in results.

Donatelli, Ferreira, Dalbeto, and Posso (2007) sampled two fragments of semi-deciduous seasonal forest, in Buri, state of São Paulo, with 4,668 and 3,478 hectares, respectively. They distributed 100 observation points across the areas and recorded 180 bird species of 49 families at Fazenda Rio das Pedras, and 126 bird species of 39 families, at Fazenda Santa Maria II. The percentage of birds inhabiting forest regions was the highest among all the studies compared.

More recently, Dario (2021) carried out studies in forest fragments at the intermediate stage of ecological succession, anthropic areas, such as pasture and agriculture, in an ecotonal zone in the state of São Paulo, and observed a lower richness, 144 bird species, distributed in 45 families and 22 orders. This lower richness can be related to the shorter survey time and different methods used.

Even with a smaller area, the species richness recorded at Sítio do Sol is greater than that reported by studies conducted in geographically closer areas and similar in terms of vegetation characterization. The distribution of taxonomic groups is similar between the compared studies, with the Passeriformes order and the Tyrannidae family being the most common. The forest environment also contained a greater concentration of species. All the previously mentioned studies involved surveys conducted in Atlantic Forest patches with different sizes and showed that even small fragments supported a great bird richness.

A review by Pizo and Tonetti (2020) indicated that the bird richness in Atlantic Forest patches, in general, is high. However, most species are more sensitive to fragmentation. These authors stated that the size and shape of the patches affect the amount of edge, as smaller and more irregular patches have a greater relative coverage of the edge area. This may explain the relationship between bird richness and area studied here. The variation in altitude of Serra do Japi is another point to discuss. Many studies have demonstrated that the altitude gradient slope exerts a crucial influence on the development of bird communities and trophic guilds in terms of their diversity, composition, and distribution (Basnet, Rokaya, Bhattarai, & Münzbergová, 2016; Ghimire et al., 2021).

Even though no species recorded in the present study is threatened with extinction, according to IUCN (2024), many are in population decline. This is worrisome because Serra do Japi is subjected to strong urban pressure (Paes & Eichenberger, 2021), which worsens the situation of these birds.

Conclusion

Many studies indicate that there is a high bird richness in Atlantic Forest patches, which is corroborated by the present study. There was a great diversity of taxa, with a predominance of the Passeriformes order and the Tyrannidae family. The functional groups were concentrated in insectivorous and omnivorous species, respectively. The low number of frugivorous species in the area is something to highlight, as they are important for environmental maintenance.

None of the recorded species are in danger of extinction but many are experiencing a population decline, according to IUCN (2024), which is worrying for these forest patch populations. The fauna survey is one of the first steps towards conservation, as it involves knowing the species present in the area. Developing more surveys and management plans for the species present is important to preserve these birds.

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