

The resilience of bird species in a Brazilian Atlantic Forest remnant in the face of accelerated extinctions in the Neotropics

Supplementary Online Material 2.

Methods

Since the split of the Gray-backed Sparrow (*Arremon polionotus*) from its congener Saffron-billed Sparrow (*A. flavirostris*), recent inventories in Caetetus only confirmed the occurrence of the first species. Thus, all previous records of the Saffron-billed Sparrow were converted into the Gray-backed Sparrow. In the absence of evidence, undocumented records of the Rufous-crowned Greenlet (*Hylophilus poicilotis*), a taxon that does not occur in the interior of São Paulo (Willis and Oniki 2003), were considered the Gray-eyed Greenlet (*H. amaurocephalus*).

Results and discussion

Table S1. Dates of visits to the Caetetus Ecological Station and their respective sampling effort according to the method used.

Observer	Date	Method	Effort
R. J. Donatelli	21 Apr 2006 – 24 Aug 2023	Mist nets	828 hours
C. H. Millán	29 Apr – 01 May, 2016	10-species lists	10 lists
V. Cavarzere	15 – 17 July, 2022	10-species lists	47 lists

The number of species contained in the primary and secondary lists, in 25 orders and 65 families, represent 40 per cent of all species recorded in São Paulo state (Silveira and Uezu 2011). The primary list includes three threatened species in São Paulo state (São Paulo 2018). The secondary list has another three threatened species at state level (São Paulo 2018), two of which were exclusively recorded by Willis and Oniki (1981). There are no species threatened at national (Brasil 2022) or global levels (IUCN 2023).

Most documented records were those from Wikiaves (173 species) followed by eBird (80 species, of which 10 were exclusive to this platform) and iNaturalist (four species). Xeno-canto had seven species from “Gália” (one of the municipalities where the Ecological Station is located), without specification to Caetetus. The authors of the present study photographed or recorded 35 species. Undocumented records by the Centro de Estudos Ornitológicos totalled 77 species.

Table S2. The chronological accumulation of bird species from 1976 to 2013 according to types of sources at the Caetetus Ecological Station. Reference numbers are cross-referenced to Supplemental 1. S = species richness. Literature (lit.), citizen science (CS), unpublished authors (AA), and accumulated (accum.) records. Year indicates the first year in which a given species was recorded.

Year	S accum.	S lit.	Reference	CS	S CS	AA	S AA
1976	184	184	2				
1976	185	1	6				
1978	185	1	1				
1979	185	1	1				
1979	185	1	3				

?	185	7	4,5			
1989	185	1	8			
1990	185	2	7			
1996	185	1	9	eBird	12	
?	185	2	10			
1992-1998	226	226	11			
1997	275	259	20			
1999	279	290	23			
2000	279	3	12,15,16			
2001	279	5	13,17			
?	291	196	14			
2005	291	229	18,19,21,22,24	WA	2	
2006	291			WA	6	R. J. Donatelli 26
2008	291					R. J. Donatelli 39
2014	291			XC	1	
2014	291			WA	8	
2015	294	36	25	CEO	77	R. J. Donatelli 17
2015	294			eBird	7	
2015	294			WA	86	
2015	294			XC	6	
2016	304	41	25			R. J. Donatelli; C. H. Millán 73
2016	304			eBird	32	
2016	304			WA	25	
2017	307			eBird	20	
2017	307			WA	20	
2018	311			eBird	5	R. J. Donatelli 10
2018	311			WA	8	
2019	323			eBird	54	R. J. Donatelli 10
2019	323			iNat	1	
2019	323			WA	11	
2020	324			eBird	18	F. Schunck 28
2021	326			eBird	16	
2021	326			WA	5	
2022	330			eBird	45	V. Cavarzere; R. J. Donatelli 104
2023	344			eBird	159	R. J. Donatelli 22
2023	346			iNat	3	
2023	346			WA	2	

The Elaenia is a migratory species and the Swallow inhabits open areas (Sick 1997). Regarding the other two species which have not been detected since 1976, it is probable these forest habitat-specialists may no longer occur in the area (Brooks et al. 1999). The reduction in the relative abundance of some forest species, including large frugivores, has been suggested (Cavarzere et al. 2012), which represents a considerable loss of ecological

functions, such as frugivory (Pizo 2004). It is interesting that only two resident forest species have not been recorded after 47 years, a much less abrupt shift than seen elsewhere. In a large (~1560 ha) fragment protected over 100 years, where habitat changed due to isolation produced the non-random loss of 27 per cent of forest bird species (Curtis et al. 2021). In the nearby Barreiro Rico farm (1400 ha), up to 20 (10 per cent) of forest bird species were no longer detected over 45 years (Antunes 2005). Similar percentages were found for different seasonal forests in Brazil (see Table 1).

Trails which used to lead to the innermost forests of the fragment are no longer kept open, hindering surveys within the most protected sections of the forest. Given no observer has visited those areas, and the possibility of the existence of different habitats, new species to the locality may yet be encountered.

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