

Birds of a habitat mosaic in the threatened Cerrado of central São Paulo, Brazil

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O município de Brotas está localizado na região central do Estado de São Paulo, sudeste do Brasil, região do domínio do Cerrado. Nela são encontrados alguns dos tipos de vegetação mais ameaçados do Estado, como florestas estacionais e ambientes de cerrado *sensu lato*. Apresentamos um compêndio com 309 espécies de aves registradas dentro deste município com base em trabalhos de campo não sistematizados realizados desde 2010, assim como registros recuperados em museus, literatura e base de dados *online*. Demonstramos que a maioria das espécies endêmicas de Cerrado e / ou ameaçadas está quase restrita à maior unidade de conservação da região (Estação Ecológica de Itirapina), pois restam poucos ambientes que as suportariam fora de áreas protegidas. Sugerimos ainda a imediata inserção de áreas desprotegidas e contíguas à Estação Ecológica de Itirapina para a proteção de populações adicionais de algumas das espécies ameaçadas e endêmicas deste domínio.

Ab'Saber¹ classified as 'the morpho-climatic domain of the *cerrados*' a large area that includes much of central Brazil and parts of eastern Bolivia and north-east Paraguay. Major references listing all bird species recorded in the domain have followed his classification^{22–24}, excluding those found in similar vegetation in the states of Pará, São Paulo and Paraná (Brazil). Under this view, *cerrado* vegetation enclaves in southern Brazil within the Atlantic Forest domain are considered as relictual outside the core Cerrado^{9,13,28,30} due to their characteristic phyto-physiognomies and the presence of birds endemic to this vegetation. Other less well-known *cerrado* enclaves exist elsewhere in Brazil, e.g. in the municipality of Camaçari, near Salvador, Bahia (G. P. Moraes pers. obs.) and within the Caatinga of north-east Brazil, in the municipality of Rio do Fogo, north-east Rio Grande do Norte¹⁶.

Estimates of vegetation loss in the Brazilian *Cerrado* vary from 55% to >80% of its entire original area of c.205 million ha. Modification has not been homogeneous throughout the region, being greater (up to 90%) in the south and less disturbed (as little as 10%) in the north^{11,14,20}. In São Paulo, where 14% of the state was originally covered by *cerrado*, this total has been reduced to 1%⁵, but different estimates have been produced of the remaining phyto-physiognomic forms of *cerrado*. Formerly occupying 13.7% during the 1960s⁴, *cerrado* vegetation was reduced to 4.2% in the 1970s²¹ and, by the end of the last decade, was estimated to represent 11.5% distributed across some 7,500 fragments of *cerrado sensu stricto*, *cerradão* woodland and *campo cerrado*⁸.

Among the most important protected areas in São Paulo is Itirapina Ecological Station (IES, 22°13'S 47°54'W), a 2,300-ha *cerrado* remnant

comprised primarily of *campo cerrado*, *campo sujo* and *campo limpo*, i.e. grassland physiognomies. The station lies within the municipalities of Itirapina (22°15'S 47°49'W) and Brotas (22°17'S 48°07'W), in central São Paulo. Willis³⁰ and Motta *et al.*¹³ surveyed the IES intensively in 1982–2007, reporting 231 bird species (11 endemic to Cerrado), of which some are perhaps already locally extinct, e.g. Lesser Nothura *Nothura minor* and Campo Miner *Geositta poeciloptera* have not been recorded since 1990 and 1987, respectively. That part of IES in Brotas is mostly *cerrado sensu stricto*, but the municipality supports a wide variety of *cerrado* phyto-physiognomies largely protected within privately owned properties due to the area's tourism appeal. Here we report the avifauna recorded at Brotas based on non-systematic surveys conducted over six years. We show that, although the species richness is relatively high, many species (particularly endangered ones) are uncommon and are restricted to the IES.

Methods

Brotas is a municipality located entirely within the Cerrado in São Paulo, south-east Brazil, c.210 km from the state capital. It lies between important tributaries of the Tietê River, such as the Jacaré-Pepira and Lobo rivers, at an altitude of c.750 m (Fig. 1). The region's landscape is dominated by basaltic plateaux locally known as *cuestas*, which drain into the Paraná and Uruguay rivers. *Cuestas* are flat-topped and reach up to 200 m above the general terrain; many exhibit strong weathering and now outline the Morros Testemunhos, resembling the better-known *chapadas* of central Brazil (Fig. 2). Original vegetation comprised semi-deciduous forests on the slopes of *cuestas*, with *cerrado* and *cerradão* woodland at the base of

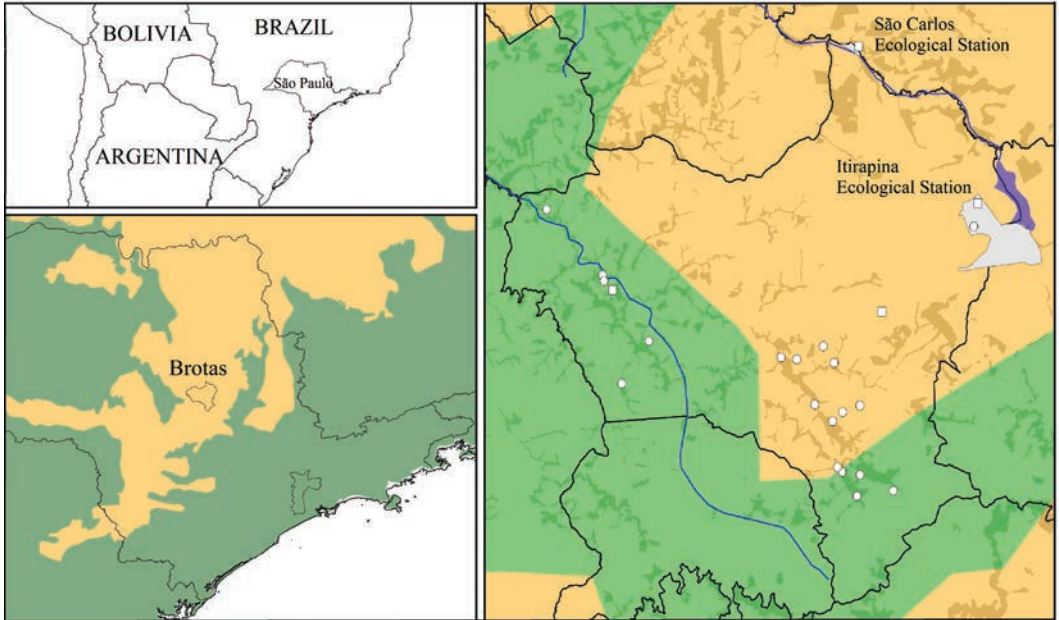


Figure 1. The state of São Paulo, south-eastern Brazil, showing the location of the municipality of Brotas in relation to the state capital. Brotas lies entirely within the Cerrado, shown in orange. The inset of Brotas shows its main river, the Jacaré-Pepira, while orange = savanna; green = transition between savanna and semi-deciduous forest; darker areas = *cerrado* vegetation; grey = São Carlos Ecological Station and Itirapina Ecological Station; squares = literature records; and circles = sites surveyed by the authors. The arrow indicates the location of Lagoa Dourada.

the Morros Testemunhos. Gallery forests formerly lined watercourses, but due to intense agricultural development have been mostly cleared. Only on the steepest terrain, as well as in a few remaining *cerrados*, are forest remnants still present. According to Köppen's classification, climate is wet subtropical, with well-defined wet (October–March) and dry (April–September) seasons. Mean annual rainfall and temperature are 1,460 mm and 22°C, respectively^{3,19,32}. Matrix habitats include extensive sugarcane, *Eucalyptus* and *Citrus* spp. plantations, as well as pastures and successional second-growth *cerrado sensu lato*. Environments susceptible to flooding are common along rivers (Fig. 2).

We have surveyed birds non-systematically using transect counts between 2010 and 2016 in forest interior, forest edges, *cerrado sensu lato* and several other types of environments within the municipality. We also included G. M. Kirwan's records from sporadic visits (c.25 days in the field) to Brotas in 2003–10. We identified birds visually (using binoculars) and aurally. Several species were documented by photographs or sound-recordings now deposited on the Wikiaves (www.wikiaves.com.br) online database. In addition, we searched for records from Brotas in the literature and on Wikiaves. Taxonomy follows the most recent list of the CBRO¹⁵.

Results

Literature and museum records are available for 249 species belonging to 58 families^{2,17–19,31}. Studies of the avifauna at IES^{13,30} are insufficiently specific as to location to know whether species were recorded in Itirapina or Brotas municipality, or both. As of 18 October 2016, the Wikiaves database contained photographs or sound-recordings of 289 species from Brotas (we excluded Grey-fronted Dove *Leptotila rufaxilla* and White-spotted Woodpecker *Veniliornis spilogaster* because the photographs suggest congeneric White-tipped Dove *L. verreauxi* and Little Woodpecker *V. passerinus*, respectively). This citizen science website accounted for 64 exclusive records. Our own surveys, including G. M. Kirwan's personal records, registered 184 species, with seven exclusive records, for a total of 313 bird species in 62 families. Of these, 16 (5%) species are endemic to the Atlantic Forest¹² and another six (2%) endemic to the Cerrado²². According to the IUCN list of threatened species⁶, three species that occur at Brotas are Near Threatened and two are Vulnerable. The state red list mentions 29 threatened species that occur at Brotas, of which 11 are Vulnerable, 12 Endangered and seven Critically Endangered. Another 16 are considered Near Threatened and one Data Deficient²⁶ (see Appendix).



Figure 2. Habitats surveyed within the municipality of Brotas. (A) *cerradão* woodland, (B) gallery forest along the Jacaré-Pepira River, (C) semi-deciduous forest and (D) *cuestas*.

Discussion

Significant environmental heterogeneity in Brotas clearly accounts for its avian diversity. Unlike continuous blocks of Atlantic Forest in south-east and south-west São Paulo, in Brotas forest-based species occur patchily, across a mosaic of remnants and environments. For example, Atlantic Forest endemics occur in semi-deciduous forest fragments or gallery forests, while Cerrado birds are typical of several formations in the municipality. Threatened Cerrado species, however, are almost confined to IES or a contiguous unprotected *cerrado* known as Lagoa Dourada (22°11.5'S 47°55'W). Populations of Collared Crescentchest *Melanopareia torquata*, Black-throated Saltator *Saltatricula atricollis*, White-rumped Tanager *Cypsnagra hirundinacea* and White-banded Tanager *Neothraupis fasciata*, all threatened in São Paulo, warrant protection. Except the saltator, these species typically occur in *cerrado sensu stricto*, a much-reduced habitat in the state.

Sympatry of five species of antshrikes (*Thamnophilus*) is striking and demonstrates the habitat mosaic at Brotas, from semi-deciduous forest (Variable Antshrike *T. caerulescens* and Planalto Slaty Antshrike *T. pelzelni*) and *cerradão*

woodland (*T. pelzelni*) to swamps (Rufous-capped Antshrike *T. ruficapillus*), scrub (Rufous-winged Antshrike *T. torquatus*) and forest borders and savannas (Barred Antshrike *T. doliatus*). Another interesting case of congeneric sympatry is that of White-bellied Seedeater *Sporophila pileata* and Copper Seedeater *S. bouvreuil*. Brotas represents one of the few localities where both species occur in the state of São Paulo¹⁰.

Noteworthy records

Greater Rhea *Rhea americana*.—Motta-Junior *et al.*¹³ believed that the species' release between the 1950s and 1960s accounts for its current presence at IES. It is common there, occurring in small flocks in *campo sujo* and *campo limpo*. The record at Brotas involved a bird that left IES and ventured into a nearby *Eucalyptus* plantation (S. F. Rosatti; WA747259).

Little Cuckoo *Coccyzina minuta*.—Only recently recorded in the states of São Paulo and Minas Gerais, it prefers riverine forests and flooded environments²⁷. Its status in São Paulo is unknown and future surveys might reveal its presence elsewhere in the state.

Checked Woodpecker *Veniliornis mixtus*.—The only population currently known in São Paulo's central Cerrado. Forages in areas with sparse trees (e.g. *campo cerrado* and *cerrado sensu stricto*), where it is easily overlooked unless vocalising¹⁹.

Large-billed Antwren *Herpsilochmus longirostris*.—Although widely sympatric in north-east São Paulo with Black-capped Antwren *H. atricapillus*, this Cerrado endemic is more common in the central Cerrado of Brazil, with the latter more frequent in the east of the country³³. Large-billed Antwren also inhabits gallery forests, whereas *H. atricapillus* occurs in semi-deciduous forest and *cerradão* woodland.

Collared Crescentchest *Melanopareia torquata*.—Formerly widespread in the *cerrado* of São Paulo⁷ but now confined to Águas de Santa Bárbara Ecological Station, IES and a privately owned area in the municipality of Lençóis Paulista. Records at Brotas include those of Ragusa-Neto¹⁸ in IES, and from Willis & Oniki's³¹ surveys in 1982–83 at Fazenda Lagoas (22°17'S 48°00'W), a locality that, by the time their book was published, had already been converted into *Citrus* orchards.

Suiriri Flycatcher *Suiriri suiriri*.—Although widespread in São Paulo, there are few records from Brotas, within and outside IES²⁶. Unlike in central Brazil, in São Paulo the species occurs in relatively modified landscapes with *Eucalyptus* spp. trees.

Bearded Tachuri *Polystictus pectoralis*.—Regular at IES, where recorded by Ragusa-Neto¹⁹ and Motta Junior *et al.*¹³. Due to its dependence on *campo limpo*, a highly threatened habitat outside IES, the species may be confined to the latter in this region.

White-striped Warbler *Myiothlypis leucophrys*.—Previously considered absent from the left bank of the Tietê River³¹, the species is found in central São Paulo, exclusively in flooded gallery forests. In Brotas, the species occurs in gallery forests inundated with water, even in urban areas (D. Pinheiro; WA2080821).

White-rumped Tanager *Cypsnagra hirundinacea*.—In Brotas, recorded at Lagoa Dourada, near the IES, and heard once, in January 2014, within the Ecological Station, in an area where *campo cerrado* is predominant.

White-banded Tanager *Neothraupis fasciata*.—In São Paulo currently almost exclusively recorded at IES²⁶. However, we detected a small population at Lagoa Dourada.

Conclusion

The high avian diversity at Brotas reflects the varied environments in the municipality. Conservation of these habitats is crucial to maintain such richness, but because the area is already well known for ecotourism (e.g. <http://www.brotas.com.br/>), we hope to specifically encourage birdwatching in the near future, thereby providing an economic incentive to further protection. We recommend the immediate inclusion of Lagoa Dourada within the IES, to protect additional populations of endemic and threatened Cerrado species otherwise only found inside the latter. Several *cerrado* remnants, especially in the north-east of the municipality, have yet to be surveyed (Fig. 1). These are of primary interest to fully document the avifauna of Brotas.

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Appendix

List of bird species recorded in the municipality of Brotas, central São Paulo state, south-east Brazil. Sources: Al = Almeida *et al.*², CM = VC pers. obs., PP = Pozza & Pires¹⁷, R1 = Ragusa-Neto¹⁸, R2 = Ragusa-Neto¹⁹, Wk = Wikiaves, Fe = FA pers. obs., WO = Willis & Oniki²¹ and GK = G. M. Kirwan pers. obs. SP = species threatened at the state level; IUCN = globally threatened species. Atlantic Forest (AF) and Cerrado (Ce) endemics. Evidence: A = aural, P = photograph, R = sound-recording, V = sight record, S = museum specimen.

Scientific name	English name	Source	SP	IUCN	Endemism	Evidence
RHEIDAE (1)						
<i>Rhea americana</i>	Greater Rhea	Wk	CR	NT		P
TINAMIDAE (4)						
<i>Crypturellus parvirostris</i>	Small-billed Tinamou	C,Wk				R
<i>Crypturellus tataupa</i>	Tataupa Tinamou	Al,PP				-
<i>Rhynchotus rufescens</i>	Red-winged Tinamou	GK		VU		V
<i>Nothura maculosa</i>	Spotted Nothura	PP,Wk,WO				P
ANATIDAE (4)						
<i>Dendrocygna viduata</i>	White-faced Whistling Duck	Wk,WO				P
<i>Cairina moschata</i>	Muscovy Duck	Wk				P
<i>Amazonetta brasiliensis</i>	Brazilian Teal	Al,PP,Wk,WO				P
<i>Nomonyx dominica</i>	Masked Duck	WO		NT		-
CRACIDAE (1)						
<i>Penelope superciliosa</i>	Rusty-margined Guan	C,Wk		NT		P
PODICIPEDIDAE (1)						
<i>Tachybaptus dominicus</i>	Least Grebe	Wk,WO				P
CICONIIDAE (2)						
<i>Jabiru mycteria</i>	Jabiru	C,Wk		EN		P
<i>Mycteria americana</i>	Wood Stork	C,Wk		NT		P
PHALACROCORACIDAE (1)						
<i>Nannopterum brasilianus</i>	Neotropic Cormorant	PP,Wk				P
ANHINGIDAE (1)						
<i>Anhinga anhinga</i>	Anhinga	PP,Wk				P
ARDEIDAE (8)						
<i>Tigrisoma lineatum</i>	Rufescent Tiger Heron	PP,Wk				P
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	PP,Wk				P
<i>Butorides striata</i>	Striated Heron	PP,Wk				P
<i>Bubulcus ibis</i>	Cattle Egret	C,Wk				P
<i>Ardea cocoi</i>	Cocoi Heron	Wk				P
<i>Ardea alba</i>	Great Egret	Al,C,PP,Wk				P
<i>Syrigma sibilatrix</i>	Whistling Heron	Al,C,PP,Wk				P
<i>Egretta thula</i>	Snowy Egret	Al,Wk				P
THRESKIORNITHIDAE (3)						
<i>Plegadis chihi</i>	White-faced Ibis	Al				-
<i>Mesembrinibis cayennensis</i>	Green Ibis	Al,C,PP,Wk				P,R
<i>Theristicus caudatus</i>	Buff-necked Ibis	C,Wk				P
CATHARTIDAE (3)						
<i>Cathartes aura</i>	Turkey Vulture	C,Wk,WO				P
<i>Coragyps atratus</i>	Black Vulture	Al,C,PP,Wk,WO				P,R
<i>Sarcorampus papa</i>	King Vulture	C,Wk		EN		P
ACCIPITRIDAE (11)						
<i>Leptodon cayanensis</i>	Grey-headed Kite	Wk				P
<i>Elanus leucurus</i>	White-tailed Kite	R2				-
<i>Harpagus diodon</i>	Rufous-thighed Kite	Wk				P
<i>Accipiter striatus</i>	Sharp-shinned Hawk	Fe,Wk				P
<i>Ictinia plumbea</i>	Plumbeous Kite	C,Wk,WO				P
<i>Geranospiza caerulescens</i>	Crane Hawk	Wk				P

Scientific name	English name	Source	SP	IUCN	Endemism	Evidence
<i>Heterospizias meridionalis</i>	Savanna Hawk	C,PP,Wk,WO				P
<i>Urubitinga urubitinga</i>	Great Black Hawk	Wk				P
<i>Rupornis magnirostris</i>	Roadside Hawk	Al,C,PP,R2,Wk,WO				P
<i>Geranoaetus albicaudatus</i>	White-tailed Hawk	R2,Wk				-
<i>Buteo brachyurus</i>	Short-tailed Hawk	C,Wk,WO				P,R
RALLIDAE (9)						
<i>Aramides cajaneus</i>	Grey-necked Wood Rail	Al,PP,Wk				P
<i>Aramides saracura</i>	Slaty-breasted Wood Rail	Wk			AF	P
<i>Laterallus viridis</i>	Russet-crowned Crane	Wk				P,R
<i>Laterallus melanophaius</i>	Rufous-sided Crane	Wk,WO				P
<i>Laterallus leucopyrrhus</i>	Red-and-white Crane	Al				-
<i>Mustelirallus albicollis</i>	Ash-throated Crane	Wk				R
<i>Pardirallus nigricans</i>	Blackish Rail	Wk				R
<i>Gallinula galeata</i>	Common Gallinule	Al,C,PP,Wk,WO				P
<i>Porphyrio martinicus</i>	Purple Gallinule	Al				-
CHARADRIIDAE (1)						
<i>Vanellus chilensis</i>	Southern Lapwing	Al,C,PP,Wk,WO				P
RECURVIROSTRIDAE (1)						
<i>Himantopus melanurus</i>	White-backed Stilt	Wk				P
SCOLOPACIDAE (2)						
<i>Gallinago paraguaiiae</i>	South American Snipe	WO				-
<i>Gallinago undulata</i>	Giant Snipe	Fe				A
<i>Tringa solitaria</i>	Solitary Sandpiper	Wk				P
JACANIDAE (1)						
<i>Jacana jacana</i>	Wattled Jacana	PP,Wk,WO				P
COLUMBIDAE (10)						
<i>Columbina talpacoti</i>	Ruddy Ground Dove	Al,C,PP,Wk,WO				P
<i>Columbina squammata</i>	Scaled Dove	Al,C,Wk,WO				P
<i>Columbina picui</i>	Picui Ground Dove	Fe				V
<i>Columba livia</i>	Rock Pigeon	C,Wk				P
<i>Patagioenas picazuro</i>	Picazuro Pigeon	Al,C,PP,Wk,WO				P,R
<i>Patagioenas cayennensis</i>	Pale-vented Pigeon	Al,C,PP,Wk				P
<i>Zenaida auriculata</i>	Eared Dove	C,PP,Wk,WO				P
<i>Leptotila verreauxi</i>	White-tipped Dove	Al,C,PP,Wk				P
<i>Leptotila rufaxilla</i>	Grey-fronted Dove	Al,PP				-
<i>Geotrygon montana</i>	Ruddy Quail-Dove	Wk				R
CUCULIDAE (6)						
<i>Coccyca minuta</i>	Little Cuckoo	Wk				P
<i>Piaya cayana</i>	Squirrel Cuckoo	Al,C,PP,R2,Wk,WO				P,R
<i>Coccyzus melacoryphus</i>	Dark-billed Cuckoo	PP,Wk				P
<i>Crotophaga ani</i>	Smooth-billed Ani	Al,C,PP,Wk,WO				P
<i>Guira guira</i>	Guira Cuckoo	Al,C,PP,Wk,WO				P
<i>Tapera naevia</i>	Striped Cuckoo	Al,C,PP,Wk				P
TYTONIDAE (1)						
<i>Tyto furcata</i>	American Barn Owl	PP,Wk,WO				P
STRIGIDAE (6)						
<i>Megascops choliba</i>	Tropical Screech Owl	Wk				P
<i>Pulsatrix koeniswaldiana</i>	Tawny-browed Owl	Wk			AF	P
<i>Bubo virginianus</i>	Great Horned Owl	Wk	VU			P
<i>Strix huhula</i>	Black-banded Owl	Wk	NT			R
<i>Athene cucularia</i>	Burrowing Owl	Al,C,PP,Wk,WO				P,R
<i>Asio clamator</i>	Striped Owl	R2				-

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NYCTIBIIDAE (1)						
<i>Nyctibius griseus</i>	Common Potoo	Wk				P
CAPRIMULGIDAE (6)						
<i>Nyctiphrynus ocellatus</i>	Ocellated Poorwill	Wk				P
<i>Nyctidromus albigollis</i>	Pauraque	Al,C,PP,Wk				P
<i>Hydropsalis parvula</i>	Little Nightjar	Wk				P
<i>Hydropsalis torquata</i>	Scissor-tailed Nightjar	C,Wk				P
<i>Podager nacunda</i>	Nacunda Nighthawk	Wk				P
<i>Chordeiles minor</i>	Common Nighthawk	Wk				P
APODIDAE (5)						
<i>Cypseloides fumigatus</i>	Sooty Swift	GK				V
<i>Cypseloides senex</i>	Great Dusky Swift	C,Wk	NT			P
<i>Streptoprocne zonaris</i>	White-collared Swift	C,PP,Wk				P
<i>Chaetura meridionalis</i>	Sick's Swift	C,Wk				P
<i>Tachornis squamata</i>	Fork-tailed Palm Swift	Wk	VU			P
TROCHILIDAE (16)						
<i>Phaethornis pretrei</i>	Planalto Hermit	Al,C,PP,Wk,WO				P
<i>Eupetomena macroura</i>	Swallow-tailed Hummingbird	Al,C,PP,Wk				P
<i>Aphantochroa cirrochloris</i>	Sombre Hummingbird	C,Wk				P
<i>Florisuga fusca</i>	Black Jacobin	Al,C,Wk				P
<i>Colibri serrirostris</i>	White-vented Violetear	C,PP,Wk,WO				P,R
<i>Anthracothorax nigricollis</i>	Black-throated Mango	C,Wk				P
<i>Chlorostilbon lucidus</i>	Glittering-bellied Emerald	Al,C,PP,Wk,WO				P
<i>Thalurania glaucopis</i>	Violet-capped Woodnymph	Al,C,PP,Wk			AF	P,R
<i>Hylocharis chrysura</i>	Gilded Hummingbird	C,Wk,WO				P,R
<i>Leucochloris albigollis</i>	White-throated Hummingbird	Al,Wk				P
<i>Polytmus guainumbi</i>	White-tailed Goldenthrout	Wk	VU			P
<i>Amazilia versicolor</i>	Versicoloured Emerald	Wk				P
<i>Amazilia fimbriata</i>	Glittering-throated Emerald	Al,PP,Wk				P
<i>Amazilia lactea</i>	Sapphire-spangled Emerald	C,PP,Wk,WO				P,R
<i>Helimaster squamosus</i>	Stripe-breasted Starthroat	C,Wk				P
<i>Calliphlox amethystina</i>	Amethyst Woodstar	Wk				P
TROGONIDAE (1)						
<i>Trogon surrucura</i>	Surucua Trogon	Al,C,PP				-
ALCEDINIDAE (3)						
<i>Megaceryle torquata</i>	Ringed Kingfisher	Al,PP,Wk				P
<i>Chloroceryle amazona</i>	Amazon Kingfisher	Al,C,PP,Wk,WO				P
<i>Chloroceryle americana</i>	Green Kingfisher	Wk				P
MOMOTIDAE (1)						
<i>Baryphthengus ruficapillus</i>	Rufous-capped Motmot	Al,PP,Wk				P
GALBULIDAE (1)						
<i>Galbula ruficauda</i>	Rufous-tailed Jacamar	Al,C,PP,Wk				P
BUCONIIDAE (2)						
<i>Nystalus chacuru</i>	White-eared Puffbird	R2,Wk,WO				P
<i>Malacoptila striata</i>	Crescent-chested Puffbird	Al,Wk				P
RAMPHASTIDAE (1)						
<i>Ramphastos toco</i>	Toco Toucan	Al,C,PP,Wk				P
PICIDAE (10)						
<i>Picumnus cirratus</i>	White-barred Piculet	PP				-
<i>Picumnus albosquamatus</i>	White-wedged Piculet	Al,C,R2,Wk				P,R
<i>Melanerpes candidus</i>	White Woodpecker	Al,PP,Wk,WO				P
<i>Veniliornis passerinus</i>	Little Woodpecker	C,PP,R2,Wk,WO				P

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<i>Veniliornis mixtus</i>	Checkered Woodpecker	R2	CR			-
<i>Colaptes melanochloros</i>	Green-banded Woodpecker	C,PP,R2,Wk				P
<i>Colaptes campestris</i>	Campo Flicker	Al,C,PP,R2,Wk,WO				P
<i>Dryocopus lineatus</i>	Lineated Woodpecker	Al,C,PP,Wk,WO				P
<i>Campēphilus robustus</i>	Robust Woodpecker	Al,WI	NT		AF	P
<i>Campēphilus melanoleucos</i>	Crimson-crested Woodpecker	Wk	VU			P
CARIAMIDAE (1)						
<i>Cariama cristata</i>	Red-legged Seriema	Al,C,PP,Wk,WO				P,R
FALCONIDAE (6)						
<i>Caracara plancus</i>	Southern Caracara	C,PP,Wk				P
<i>Milvago chimachima</i>	Yellow-headed Caracara	Al,C,PP,R2,Wk,WO				P,R
<i>Herpetotheres cachinnans</i>	Laughing Falcon	Al,C,R2,Wk				P,R
<i>Microstus semitorquatus</i>	Collared Forest Falcon	Wk				R
<i>Falco sparverius</i>	American Kestrel	Al,R2,Wk,WO				P
<i>Falco femoralis</i>	Aplomado Falcon	C,PP,R2,Wk				P
PSITTACIDAE (8)						
<i>Ara ararauna</i>	Blue-and-yellow Macaw	Wk	CR			P
<i>Psittacara leucophthalmus</i>	White-eyed Parakeet	Al,C,PP,Wk,WO				P
<i>Eupsittula aurea</i>	Peach-fronted Parakeet	PP				-
<i>Forpus xanthopterygius</i>	Blue-winged Parrotlet	Al,C,PP,Wk,WO				P,R
<i>Brotogeris chiriri</i>	Yellow-chevroned Parakeet	Al,C,PP,Wk,WO				P,R
<i>Pionus maximiliani</i>	Scaly-headed Parrot	Al,PP,Wk				P
<i>Amazona amazonica</i>	Orange-winged Parrot	Wk	VU			P
<i>Amazona aestiva</i>	Blue-fronted Parrot	Al,C,Wk	NT			P,R
THAMNOPHILIDAE (12)						
<i>Formicivora rufa</i>	Rusty-backed Antwren	C,PP,R2,Wk,WO				P
<i>Dysithamnus mentalis</i>	Plain Antwren	Al,C,PP,Wk				P,R
<i>Herpilochmus atricapillus</i>	Black-capped Antwren	Al,C,PP,Wk,WO				P
<i>Herpilochmus longirostris</i>	Large-billed Antwren	Wk	EN		Ce	P,R
<i>Thamnophilus doliatus</i>	Barred Antshrike	Al,C,PP,Wk,WO				P,R
<i>Thamnophilus ruficapillus</i>	Rufous-capped Antshrike	C,Wk				P,R
<i>Thamnophilus torquatus</i>	Rufous-winged Antshrike	Wk	NT			P
<i>Thamnophilus pelzelni</i>	Planalto Slaty Antshrike	Al,C,PP,Wk,WO				P,R
<i>Thamnophilus caerulescens</i>	Variable Antshrike	Al,C,PP,Wk,WO				P,R
<i>Taraba major</i>	Great Antshrike	Al,C,PP,Wk				P,R
<i>Mackenziaena severa</i>	Tufted Antshrike	C,Wk			AF	P,R
<i>Pyriglena leucoptera</i>	White-shouldered Fire-eye	Al,C,Wk				R
MELANOPAREIIDAE (1)						
<i>Melanopareia torquata</i>	Collared Crescentchest	R2,WO	EN		Ce	-
CONOPOPHAGIDAE (1)						
<i>Conopophaga lineata</i>	Rufous Gnateater	Al,C,PP,Wk,WO				P
DENDROCOLAPTIDAE (5)						
<i>Sittasomus griseicapillus</i>	Olivaceous Woodcreeper	Al,C,PP,Wk				P
<i>Campylorhamphus falcularius</i>	Black-billed Scythebill	Wk			AF	P
<i>Lepidocolaptes angustirostris</i>	Narrow-billed Woodcreeper	Al,C,PP,Wk,WO				P,R
<i>Dendrocolaptes platyrostris</i>	Planalto Woodcreeper	WO				?
<i>Xiphocolaptes albicollis</i>	White-throated Woodcreeper	PP				-
XENOPIIDAE (1)						
<i>Xenops rutilans</i>	Streaked Xenops	Al,C,Wk,WO				P
FURNARIIDAE (13)						
<i>Furnarius figulus</i>	Wing-banded Hornero	Wk				R
<i>Furnarius rufus</i>	Rufous Hornero	C,PP,R2,Wk,WO				P

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<i>Lochmias nematura</i>	Sharp-tailed Streamcreeper	C,Wk				P
<i>Clibanornis rectirostris</i>	Chestnut-capped Foliage-gleaner	Wk	NT			P
<i>Automolus leucopthalmus</i>	White-eyed Foliage-gleaner	Al,C,PP,Wk				P,R
<i>Phacellodomus ferrugineigula</i>	Orange-breasted Thornbird	Wk			AF	P,R
<i>Anumbius annumbi</i>	Firewood-gatherer	Wk	NT			P
<i>Certhiaxis cinnamomeus</i>	Yellow-chinned Spinetail	Al,C,PP,Wk,WO				P
<i>Synallaxis ruficapilla</i>	Rufous-capped Spinetail	Al,C,PP,Wk			AF	P
<i>Synallaxis frontalis</i>	Sooty-fronted Spinetail	Al,C,PP,Wk,WO				P,R
<i>Synallaxis albescens</i>	Pale-breasted Spinetail	C,PP,R2,Wk,WO	NT			P
<i>Synallaxis spixi</i>	Spix's Spinetail	Al,C,Wk,WO				P
<i>Cranioleuca vulpina</i>	Rusty-backed Spinetail	Wk				P,R
PIPRIDAE (4)						
<i>Neopelma pallescens</i>	Pale-bellied Tyrant-Manakin	Al,Wk	VU			P
<i>Manacus manacus</i>	White-bearded Manakin	Wk				P
<i>Chiroxiphia caudata</i>	Swallow-tailed Manakin	Al,C,PP,Wk			AF	P,R
<i>Antilophia galeata</i>	Helmeted Manakin	Al,C,Wk,WO	NT		Ce	P
TITYRIDAE (3)						
<i>Schiffornis virescens</i>	Greenish Schiffornis	Al			AF	-
<i>Pachyrhamphus polychopterus</i>	White-winged Becard	Al,C,Wk				P,R
<i>Pachyrhamphus validus</i>	Crested Becard	Wk				P,R
PLATYRINCHIDAE (1)						
<i>Platyrinchus mystaceus</i>	White-throated Spadebill	Al,PP,Wk				P
RHYNCHOCYCLIDAE (9)						
<i>Leptopogon amaurocephalus</i>	Sepia-capped Flycatcher	C,PP,Wk				P,R
<i>Corythobis delalandi</i>	Southern Antpipit	PP				-
<i>Tolmomyias sulphureus</i>	Yellow-olive Flycatcher	C,Wk				P
<i>Todirostrum poliocephalum</i>	Yellow-lored Tody-Flycatcher	Al,C,Wk			AF	P
<i>Todirostrum cinereum</i>	Common Tody-Flycatcher	C,PP,Wk				P
<i>Myiornis auricularis</i>	Eared Pygmy Tyrant	C,Wk			AF	A,P,V
<i>Hemitriccus diops</i>	Drab-breasted Pygmy Tyrant	PP			AF	-
<i>Hemitriccus nidipendulus</i>	Hangnest Tody-Tyrant	C,Wk			AF	P
<i>Hemitriccus margaritaceiventer</i>	Pearly-vented Tody-Tyrant	PP,Wk,WO				P
TYRANNIDAE (43)						
<i>Hirundinea ferruginea</i>	Cliff Flycatcher	C,Wk,WO				P
<i>Camptostoma obsoletum</i>	Southern Beardless Tyrannulet	Al,C,PP,R2,Wk,WO				P
<i>Elaenia flavogaster</i>	Yellow-bellied Elaenia	Al,C,PP,R2,Wk,WO				P,R
<i>Elaenia spectabilis</i>	Large Elaenia	PP,Wk,WO				P,R
<i>Elaenia parvirostris</i>	Small-billed Elaenia	PP,Wk				P
<i>Elaenia mesoleuca</i>	Olivaceous Elaenia	Wk				P,R
<i>Elaenia cristata</i>	Plain-crested Elaenia	R2,WO	EN			-
<i>Elaenia chiriquensis</i>	Lesser Elaenia	C,Wk				P,R
<i>Elaenia obscura</i>	Highland Elaenia	C,Wk,WO				P,R
<i>Suiriri suiriri</i>	Suiriri Flycatcher	R2,Wk,WO	CR			P
<i>Myiopagis viridicata</i>	Greenish Elaenia	Al,C,Wk				P
<i>Phaeomyias murina</i>	Mouse-coloured Tyrannulet	Wk				P,R
<i>Culicivora caudacuta</i>	Sharp-tailed Tyrant	GK	CR	VU		V
<i>Polystictus pectoralis</i>	Bearded Tachuri	R2	CR	NT		-
<i>Serpophaga subcristata</i>	White-crested Tyrannulet	C,R2,Wk,WO				P
<i>Myiarchus swainsoni</i>	Swainson's Flycatcher	C,Wk				P
<i>Myiarchus ferrox</i>	Short-crested Flycatcher	Al,C,PP,Wk				P,R
<i>Myiarchus tyrannulus</i>	Brown-crested Flycatcher	Al,C,PP,Wk,WO				P,R
<i>Casiornis rufus</i>	Rufous Casiornis	Wk,WO	NT			P

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<i>Pitangus sulphuratus</i>	Great Kiskadee	Al,C,PP,Wk,WO				P,R
<i>Machetornis rixosa</i>	Cattle Tyrant	Al,C,Wk,WO				P
<i>Myiodynastes maculatus</i>	Streaked Flycatcher	Al,C,PP,Wk				P,R
<i>Megarynchus pitangua</i>	Boat-billed Flycatcher	Al,C,Wk,WO				P
<i>Myiozetetes cayanensis</i>	Rusty-margined Flycatcher	Al				-
<i>Myiozetetes similis</i>	Social Flycatcher	Al,C,PP,Wk,WO				P
<i>Tyrannus albogularis</i>	White-throated Kingbird	Wk				P
<i>Tyrannus melancholicus</i>	Tropical Kingbird	Al,C,PP,Wk,WO				P,R
<i>Tyrannus savana</i>	Fork-tailed Flycatcher	Al,C,PP,Wk,WO				P
<i>Griseotyrannus aurantioatrocristatus</i>	Crowned Slaty Flycatcher	Wk				P
<i>Empidonomus varius</i>	Variiegated Flycatcher	C,Wk,WO				P
<i>Colonia colonus</i>	Long-tailed Tyrant	Al,C,PP,Wk,WO				P
<i>Myiophobus fasciatus</i>	Bran-coloured Flycatcher	C,PP,Wk,WO				P,R
<i>Pyrocephalus rubinus</i>	Vermilion Flycatcher	Wk				P
<i>Fluvicola nengeta</i>	Masked Water Tyrant	C,Wk				P
<i>Arundinicola leucocephala</i>	White-headed Marsh Tyrant	Al,Wk				P
<i>Gubernetes yetapa</i>	Streamer-tailed Tyrant	C,PP,Wk,WO				P,R
<i>Alectrurus tricolor</i>	Cock-tailed Tyrant	R2	CR	VU		-
<i>Cnemotriccus fuscatus</i>	Fuscous Flycatcher	Al,C,PP,Wk				P,R
<i>Lathrotriccus euleri</i>	Euler's Flycatcher	Al,C,PP,Wk				P
<i>Knipolegus lophotes</i>	Crested Black Tyrant	C,PP,Wk,WO				P
<i>Satrapa icterophrys</i>	Yellow-browed Tyrant	PP,Wk,WO				P
<i>Xolmis cinereus</i>	Grey Monjita	C,Wk				P
<i>Xolmis velatus</i>	White-rumped Monjita	Al,C,Wk,WO				P
VIREONIDAE (3)						
<i>Cyclarhis gujanensis</i>	Rufous-browed Peppershrike	Al,C,PP,R2,Wk,WO				P,R
<i>Hylophilus amaurocephalus</i>	Grey-eyed Greenlet	Wk,WO				P,R
<i>Vireo chivi</i>	Chivi Vireo	Al,C,PP,Wk,WO				P,R
CORVIDAE (2)						
<i>Cyanocorax cristatellus</i>	Curl-crested Jay	Al,C,PP,Wk,WO			Ce	P,R
<i>Cyanocorax chrysops</i>	Plush-crested Jay	Al,C,Wk,WO				P,R
HIRUNDINIDAE (10)						
<i>Pygochelidon cyanoleuca</i>	Blue-and-white Swallow	Al,C,PP,Wk,WO				P
<i>Alopochelidon fucata</i>	Tawny-headed Swallow	Wk,WO				P
<i>Stelgidopteryx ruficollis</i>	Southern Rough-winged Swallow	C,PP,Wk,WO				P
<i>Progne tabera</i>	Brown-chested Martin	Wk				P
<i>Progne chalybea</i>	Grey-breasted Martin	C,Wk,WO				P
<i>Tachycineta albiventer</i>	White-winged Swallow	Wk				P
<i>Tachycineta leucorrhoa</i>	White-rumped Swallow	C,Wk				P,R
<i>Riparia riparia</i>	Bank Swallow	Wk				P
<i>Hirundo rustica</i>	Barn Swallow	C,Wk				P,V
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	GK				V
TROGLODYTIDAE (2)						
<i>Troglodytes musculus</i>	Southern House Wren	Al,C,PP,R2,Wk,WO				P,R
<i>Cantorchilus leucotis</i>	Buff-breasted Wren	C,PP,Wk				P,R
DONACOBIIDAE (1)						
<i>Donacobius atricapilla</i>	Black-capped Donacobius	Al,PP,Wk				P
POLIOPTILIDAE (1)						
<i>Polioptila dumicola</i>	Masked Gnatcatcher	Wk				P,R
TURDIDAE (5)						
<i>Turdus flavipes</i>	Yellow-legged Thrush	Wk				P
<i>Turdus leucomelas</i>	Pale-breasted Thrush	Al,C,PP,Wk,WO				P

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<i>Turdus rufiventris</i>	Rufous-bellied Thrush	Al,C,PP,Wk				P,R
<i>Turdus amaurochalinus</i>	Creamy-bellied Thrush	C,Wk,WO				P,R
<i>Turdus albicollis</i>	White-necked Thrush	Wk				P
MIMIDAE (1)						
<i>Mimus saturninus</i>	Chalk-browed Mockingbird	Al,C,PP,R2,Wk,WO				P
MOTACILLIDAE (1)						
<i>Anthus lutescens</i>	Yellowish Pipit	Wk				R
PASSERELLIDAE (3)						
<i>Zonotrichia capensis</i>	Rufous-collared Sparrow	Al,C,PP,R1,R2,Wk,WO				P
<i>Ammodramus humeralis</i>	Grassland Sparrow	C,PP,R1,R2,Wk,WO				P,R
<i>Arremon flavirostris</i>	Saffron-billed Sparrow	Al,C,PP,Wk				P,R
PARULIDAE (5)						
<i>Setophaga pitayumi</i>	Tropical Parula	Wk,WO				P
<i>Geothlypis aequinoctialis</i>	Masked Yellowthroat	C,PP,Wk,WO				P,R
<i>Basileuterus culicivorus</i>	Golden-crowned Warbler	Al,C,PP,Wk,WO				P,R
<i>Myiothlypis flaveola</i>	Flavescent Warbler	Al,C,PP,Wk,WO				P,R
<i>Myiothlypis leucophrys</i>	White-striped Warbler	Wk	EN		Ce	P
ICTERIDAE (9)						
<i>Cacicus haemorrhous</i>	Red-rumped Cacique	Al,Wk				P
<i>Icterus pyrrhopterus</i>	Variable Oriole	Al,Wk				P
<i>Gnorimopsar chopi</i>	Chopi Blackbird	Al,PP,Wk,WO	NT			P
<i>Agelasticus cyanopus</i>	Unicoloured Blackbird	Wk	NT			P
<i>Chrysomus ruficapillus</i>	Chestnut-capped Blackbird	PP,Wk				P
<i>Pseudoleistes guirahuro</i>	Yellow-rumped Marshbird	Al,C,PP,Wk				P
<i>Molothrus rufoaxillaris</i>	Screaming Cowbird	Wk				P
<i>Molothrus bonariensis</i>	Shiny Cowbird	Al,C,PP,Wk				P
<i>Sturnella supercilialis</i>	White-browed Blackbird	Wk				P
THRAUPIDAE (39)						
<i>Pipraeidea melanonota</i>	Fawn-breasted Tanager	C,Wk				P
<i>Neothraupis fasciata</i>	White-banded Tanager	Wk,WO	EN	NT		P
<i>Schistochlamys melanops</i>	Black-faced Tanager	Wk	EN			P
<i>Schistochlamys ruficapillus</i>	Cinnamon Tanager	C,Wk				P
<i>Paroaria capitata</i>	Yellow-billed Cardinal	Wk	DD			P
<i>Tangara sayaca</i>	Sayaca Tanager	Al,C,PP,Wk,WO				P
<i>Tangara palmarum</i>	Palm Tanager	C,PP,Wk				P
<i>Tangara cayana</i>	Burnished-buff Tanager	Al,C,PP,R1,R2,Wk,WO				P
<i>Nemosia pileata</i>	Hooded Tanager	Al,C,PP,Wk,WO				P
<i>Conirostrum speciosum</i>	Chestnut-vented Conebill	Al,PP,Wk,WO				P
<i>Sicalis citrina</i>	Stripe-tailed Yellow Finch	R2,WO	NT			-
<i>Sicalis flaveola</i>	Saffron Finch	C,Wk				P,R
<i>Sicalis luteola</i>	Grassland Yellow Finch	C,Wk				P
<i>Hemithraupis guira</i>	Guira Tanager	PP				-
<i>Hemithraupis ruficapilla</i>	Rufous-headed Tanager	C,PP,Wk			AF	P
<i>Volatinia jacarina</i>	Blue-black Grassquit	Al,C,PP,R1,R2,Wk,WO				P
<i>Eucometis penicillata</i>	Grey-headed Tanager	C,PP,Wk	EN			P
<i>Trichothraupis melanops</i>	Black-goggled Tanager	C,PP,Wk				P
<i>Coryphospingus cucullatus</i>	Red-crested Finch	Al,C,PP,R2,Wk,WO				P
<i>Tachyphonus rufus</i>	White-lined Tanager	Wk				P
<i>Tachyphonus coronatus</i>	Ruby-crowned Tanager	Al,C,Wk,WO			AF	P
<i>Ramphocelus carbo</i>	Silver-beaked Tanager	Al,C,PP,Wk,WO				P,R
<i>Tersina viridis</i>	Swallow Tanager	C,Wk,WO				P
<i>Dacnis cayana</i>	Blue Dacnis	Al,C,PP,Wk,WO				P

Scientific name	English name	Source	SP	IUCN	Endemism	Evidence
<i>Coereba flaveola</i>	Bananaquit	C,PP,Wk,WO				P
<i>Tiaris fuliginosus</i>	Sooty Grassquit	Wk				P
<i>Sporophila lineola</i>	Lined Seedeater	Al,C,Wk				P
<i>Sporophila plumbea</i>	Plumbeous Seedeater	R1,R2	EN			-
<i>Sporophila caeruleascens</i>	Double-collared Seedeater	Al,C,PP,R2,Wk,WO				P,R
<i>Sporophila leucoptera</i>	White-bellied Seedeater	R2,Wk				P
<i>Sporophila bouvreuil</i>	Copper Seedeater	C,Wk	VU			P
<i>Sporophila pileata</i>	Pearly-bellied Seedeater	R2,Wk	EN			P
<i>Sporophila angolensis</i>	Chestnut-bellied Seed Finch	C,PP,Wk	VU			P,R
<i>Emberizoides herbicola</i>	Wedge-tailed Grass Finch	C,R1,R2,Wk,WO				P,R
<i>Saltator atricollis</i>	Black-throated Saltator	Al,C,R2,Wk,WO	VU		Ce	P
<i>Saltator similis</i>	Green-winged Saltator	PP,Wk				P
<i>Saltator fuliginosus</i>	Black-throated Grosbeak	Al,PP			AF	-
<i>Thlypsopsis sordida</i>	Orange-headed Tanager	Al,Wk,WO				P
<i>Cypsnagra hirundinacea</i>	White-rumped Tanager	C,R1,R2,Wk,WO	EN			P
CARDINALIDAE (3)						
<i>Habia rubica</i>	Red-crowned Ant Tanager	Al,PP,Wk				P
<i>Cyanoloxia glaucocaeerulea</i>	Glaucous-blue Grosbeak	Wk				P
<i>Cyanoloxia brissonii</i>	Ultramarine Grosbeak	C,Wk	VU			P
FRINGILLIDAE (5)						
<i>Spinus magellanicus</i>	Hooded Siskin	C,Wk,WO				P
<i>Euphonia chlorotica</i>	Purple-throated Euphonia	Al,C,PP,Wk,WO				P,R
<i>Euphonia violacea</i>	Violaceous Euphonia	C,Wk				P
<i>Euphonia cyanocephala</i>	Golden-rumped Euphonia	Wk				P
<i>Chlorophonia cyanea</i>	Blue-naped Chlorophonia	C				A
PASSERIDAE (1)						
<i>Passer domesticus</i>	House Sparrow	C,Wk,WO				P,R