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The birds of Fazenda Brejão: a conservation priority area of Cerrado in northwestern Minas Gerais, Brazil

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Abstract: The Cerrado is now considered the most threatened biome of South America. Northwestern Minas Gerais state, in southeastern Brazil, still harbors large areas of extreme importance for biological conservation of the Cerrado. The current study provides the first thorough assessment of the avifauna of a large remnant of Cerrado vegetation in this region, the Fazenda Brejão. Data are based on a bird survey conducted from November 1998 to January 2007. This area is a private property of 20.000 ha preserved that lies in a region recognized for its palm groves, a pristine Cerrado (savannah-like vegetation) and gallery forests. Bird censuses were carried out through random transects censuses, mist-net captures and recording bird vocalizations. It was recorded 273 species, belonging to 56 families. This represents 32% of all 857 bird species recorded for the Cerrado. Palm groves held approximately 42% of all recorded species. We also recorded endemic species of Cerrado as well as adjacent biomes such as the Atlantic Forest and the Caatinga. Regional threatened species were also recorded such as the Greater Rhea *Rhea americana*, the Chestnut-bellied Guan *Penelope ochrogaster*, the Bare-faced Curassow *Crax fasciolata*, the Black-and-white Hawk-eagle *Spizastur melanoleucus*, the Blue-and-yellow Macaw *Ara ararauna*, the Yellow-faced Parrot *Alipiopsitta xanthops* and the Minas Gerais Tyrannulet *Phylloscartes roquettei*. This species diversity reveals the biological importance of the region. The establishment of a natural reserve in the region will be an essential measure to guarantee the biological conservation of one of the best preserved areas of Cerrado to date in southeastern Brazil.

Keywords: avian inventory, biodiversity, Cerrado, São Francisco river.

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Resumo: O Cerrado é considerado um dos biomas mais ameaçados da América do Sul. O noroeste do estado de Minas Gerais, sudeste do Brasil, ainda possui grandes áreas de importância biológica extrema para a conservação do Cerrado. Este estudo apresenta o primeiro levantamento sistemático da avifauna de uma grande área remanescente de Cerrado nesta região, a Fazenda Brejão. Os dados são baseados em levantamentos conduzidos de novembro de 1998 a janeiro de 2007. A área é uma propriedade privada de mais de 20.000 ha preservados que se situa numa região conhecida por suas veredas de buritizais, Cerrado e matas ciliares preservados. O censo de aves foi feito em transeções aleatórias, captura e marcação de indivíduos e gravação de vocalizações. Foram registradas 273 espécies de 56 famílias. O total representa 32% das 857 espécies já registradas no Cerrado. As veredas de buritizais contêm aproximadamente 42% de todas as espécies registradas. Também foram registradas espécies localmente ameaçadas, como a ema *Rhea americana*, o jacu-de-barriga-castanha *Penelope ochrogaster*, o mutum-de-penacho *Crax fasciolata*, o gavião-pato *Spizastur melanoleucus*, a arara-canindé *Ara ararauna*, o papagaio-galego *Alipiopsitta xanthops*, e o cara-dourada *Phylloscartes roquettei*. Essa diversidade de espécies revela a importância biológica da região. A consolidação de unidades de conservação na região será medida essencial para garantir a conservação da biodiversidade de umas das áreas mais bem preservadas do Cerrado até o momento no sudeste do Brasil.

Palavras-chave: inventário de aves, biodiversidade, Cerrado, rio São Francisco.

Introduction

The Cerrado biome encompasses more than 1.8 million km² in Central Brazil, northeastern Paraguay and eastern Bolivia (Ab'Saber 1977). Most of the region is covered by savannah-like vegetation locally known as 'Cerrado' [see (Eiten 1972) for a detailed description of the vegetation] and holds an extremely rich diversity of organisms with high levels of plant and animal endemism (Oliveira & Marquis 2002). The Cerrado is now considered the most threatened biome of South America (Oliveira & Marquis 2002). Nevertheless, its high diversity is not distributed uniformly across the region because the biome is made of a complex mosaic of xeric (dry open grasslands to open and dense scrublands) and mesic habitats (evergreen gallery forests, palm groves, and semi-deciduous to deciduous dry forest patches growing in rich-soil areas (Oliveira Filho & Ratter 2002). Such a diversity of environmental conditions may result in a variety of patterns of species diversity (Rodrigues & Faria 2007).

Despite its importance, the Cerrado region holds the lowest number of protected areas in Brazil (Machado et al. 2004a, Olmos 2006), and the protected areas established at present do not embrace its habitat diversity (Drummond et al. 2005).

Northwestern Minas Gerais state, in southeastern Brazil, still harbors large areas of extreme importance for biological conservation (Drummond et al. 2005). The region still holds populations of rare and threatened mammals such as the Marsh Deer *Blastocerus dichotomus*, peccaries and other large species (Vieira et al. 2005). Also, numerous threatened birds occur in the area such as the Yellow-faced Parrot *Alipiopsitta xanthops* (Carrara et al. 2007) and one of the few populations of the Chestnut-bellied Guan *Penelope ochrogaster* along the São Francisco River (Collar et al. 1992, Olmos 1998, Antas 2006). The Cerrado is now regarded as the last frontier for agricultural enterprises in Brazil, mainly for soybeans (Machado et al. 2004b, Marris 2005).

Bird inventories are still scarce in Cerrado (Silva 1995a, Silva & Santos 2005, Bagno 1998, Silveira 1998, Rodrigues et al. 2005) and it is paramount to increase our knowledge of the distribution of the endemic species of this biome.

From 1991 to 1994, two of us (CDE and MGD) carried out a bird survey at Fazenda Brejão, a remnant area of more than 20,000 ha of pristine Cerrado vegetation in northwestern Minas Gerais state. They recorded 223 bird species (unpublished data), and this work was instrumental in including the area as a waterbird monitoring area (Wetlands for the Americas 1993).

The current study provides the first thorough assessment of the avifauna of Fazenda Brejão across a complex of vegetation types, including the palm grove swamps, with information on their seasonality and frequency of occurrence.

Material and Methods

Fazenda Brejão (FB) is a 32,000 ha private area at the municipality of Brasilândia de Minas (17° 01' 48" S and 45° 54' 04" W at 550 m above sea level) in northwestern state of Minas Gerais, southeastern Brazil. The region, originally dominated by woodlands and palm groves at present suffers from deforestation initiated in the early 1960's by the construction of the political capital of Brazil, Brasília. About 10,000 ha of FB holds a commercial *Eucalyptus* plantation, with the remaining 21,747 ha being of undisturbed vegetation characterized by a woodland (5-8 m tall) with closed scrub and scattered trees known as 'Cerrado *stricto sensu*', crossed by patches of palm groves, and gallery forests along the Paracatu River (a major tributary of middle São Francisco River basin). Seasonal flooded areas occur along the plane of the Paracatu River. These areas, as well as the palm groves swamp account for the name of the site: Fazenda Brejão, which

in Portuguese means 'large swampy farm'. Total annual precipitation is around 1,200 mm, but much variation can occur from year to year. Most of the rain (80%) falls from November to March, while there is virtually no rain between May and August. Therefore, the region is characterized by strong seasonality, and only two seasons can be distinguished: the rainy and dry seasons (Carrara et al. 2007).

Field work was carried out from November 1998 to January 2007, for a total of 30 visits to FB of five to seven days each. We conducted random transects, point count and mist-netting surveys in the main vegetation types of FB. Birds were identified with the aid of binoculars, and tape recordings. Recordings of the bird voices were made using a Sony TCM-5000 tape-recorder and a Sennheiser ME-66 directional microphone. Some voucher specimens were collected and are housed at the bird collection of the 'Departamento de Zoologia' of 'Universidade Federal de Minas Gerais' (DZUFMG). Blood samples of many specimens have been deposited in the 'Banco de DNA do Laboratório de Biologia e Evolução Molecular' of the 'Departamento de Biologia Geral of Universidade Federal de Minas Gerais' (Santos et al. 2002).

Each mist netted bird received a numbered metal ring from the Brazilian Environmental Agency (IBAMA/CEMAVE license n. 12743-1) and was subsequently released. Brood patch and molt were recorded for each captured bird.

For each species was assigned an abundance class according to its frequency of occurrence following Hilty & Brown (1986) and Rodrigues et al. (2005). The frequency of occurrence for each species was calculated as the number of surveys in which a given species was detected in any of the methods: A, (common) recorded 75-100% of the visits; C, (fairly common) 50-74 %; E, (uncommon) 25-49%; R, (rare) recorded on less than 25% of the visits; O, (occasional) wanderers or vagrants recorded without any clear pattern in occurrence.

Seasonal patterns are based on our original data, but to understand global migration patterns we consulted several key references (Ridgely & Tudor 1989, 1994, Sick 1993, Stotz et al. 1996).

Taxonomic order follows the Brazilian Committee for Ornithological Records (CBRO 2008). Endemic status of birds for the Cerrado follows (Silva & Bates 2002); for the Atlantic forest we follow (Silva et al. 2004) and for the Caatinga we use Sick (1993). Conservation status at regional scale follows Machado et al. (1998) and at national scale we follow MMA (2003) and at global scale we follow BirdLife International (2000).

Results

1. Species richness

We recorded a total of 273 species, belonging to 56 families (Table 1). Most observed species belonged to the Order Passeriformes (140) and the family Tyrannidae (49) followed by Thraupidae (15), Trochilidae (13), and Furnariidae (12). Non passerine aquatic birds were represented by 30 species (11%). We captured 101 species and 692 individual captures in 7,265.7 net-hours (Table 1).

Seventy species were considered common, 50 fairly common, 60 uncommon, 57 rare and 36 occasional (Table 1). Fifty-seven percent of the species were recorded throughout the year (127 every month and 29 species recorded on intercalated months). The remaining species occurred in a specific season or without any apparent pattern. We recorded reproductive activity (brood patch or nesting) for 51 species (Table 1).

Ten species are threatened in the State of Minas Gerais, and two species are threatened in Brazil. Nine species are endemic to the Cerrado, one to the Atlantic forest and three to the Caatinga dry lands of northwestern Brazil (Table 1).

Birds of northwestern Minas Gerais

Table 1. Bird species of Fazenda Brejão, southeastern Brazil, with information on habitat associations, seasonality, annual occurrence, and conservation status. Taxonomy follows CBRO (2008). C & E (Conservations status and endemism): ABR: threatened in Brazil; AMG: threatened in Minas Gerais state; ECe: cerrado endemic; ECa: Caatinga endemic; EMa: Atlântic Forest endemic. A (Relative abundance): A, (common) recorded 75-100% of the visits; C, (fairly common) 50-74%; E, (uncommon) 25-49%; R, (rare) recorded on less than 25% of the visits; O, (occasional) wanderers or vagrants recorded without any clear pattern.

Tabela 1. Espécies de aves da Fazenda Brejão, sudeste do Brasil, com informações sobre o habitat, sazonalidade, ocorrência anual e status de conservação. Taxonomia segue CBRO (2008). C & E (Status de conservação e endemismo): ABR: ameaçado no Brasil; AMG: ameaçado em Minas Gerais; ECe: endêmico do Cerrado; ECa: endêmico da Caatinga; EMa: endêmico da Mata Atlântica. A (Abundância relativa): A, (comum) registrado 75-100% do total de visitas; C, (bem comum) 50-74%; E, (incomum) 25-49%; R, (raro) registrado em menos de 25% das visitas; O, (ocasional) registrados sem nenhum padrão claro.

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
RHEIDAE (1)							
<i>Rhea americana</i> (Linnaeus, 1758)	Greater Rhea	AMG	C	C H	jan-dec	oct-dec	-
TINAMIDAE (5)							
<i>Crypturellus undulatus</i> (Temminck, 1815)	Undulated Tinamou	-	C	M C V	jan-dec	-	-
<i>Crypturellus parvirostris</i> (Wagler, 1827)	Small-billed Tinamou	-	A	M C	jan-dec	-	1
<i>Crypturellus tataupa</i> (Temminck, 1815)	Tataupa Tinamou	-	A	M C	jan-dec	-	-
<i>Rhynchotus rufescens</i> (Temminck, 1815)	Red-winged Tinamou	-	E	C H	apr-dec	-	-
<i>Nothura maculosa</i> (Temminck, 1815)	Spotted Nothura	-	E	C H	jan-dec	-	-
ANHIAMIDAE (1)							
<i>Anhima cornuta</i> (Linnaeus, 1766)	Horned Screamer	-	E	M C V A	jan-dec	-	-
ANATIDAE (4)							
<i>Dendrocygna viduata</i> (Linnaeus, 1766)	White-faced Whistling-Duck	-	E	A	dec-jul	-	-
<i>Dendrocygna autumnalis</i> (Linnaeus, 1758)	Black-bellied Whistling-Duck	-	E	A	nov-may	-	-
<i>Cairina moschata</i> (Linnaeus, 1758)	Muscovy Duck	-	E	A	jul-apr	-	-
<i>Amazonetta brasiliensis</i> (Gmelin, 1789)	Brazilian Duck	-	C	A	jan-dec	-	-
CRACIDAE (3)							
<i>Penelope supercilialis</i> Temminck, 1815	Rusty-margined Guan	-	E	M C	jan-dec	-	-
<i>Penelope ochrogaster</i> Pelzeln, 1870	Chestnut-bellied Guan	ABR, AMG, ECe	R	M	feb,dec	-	-
<i>Crax fasciolata</i> Spix, 1825	Bare-faced Curassow	AMG	R	M	apr,oct	-	-
PHALACROCORACIDAE (1)							
<i>Phalacrocorax brasilianus</i> (Gmelin, 1789)	Olivaceous Cormorant	-	R	A	jan-dec	-	-
ANHINGIDAE (1)							
<i>Anhinga anhinga</i> (Linnaeus, 1766)	Anhinga	-	R	A	apr-dec	-	-
ARDEIDAE (9)							
<i>Tigrisoma lineatum</i> (Boddaert, 1783)	Rufescent Tiger-Heron	-	R	M V	oct,dec, feb	-	-
<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	Black-crowned Night-Heron	-	O	M V	jul	-	-

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Butorides striata</i> (Linnaeus, 1758)	Striated Heron	-	E	M V	feb,may	-	-
<i>Bubulcus ibis</i> (Linnaeus, 1758)	Cattle Egret	-	R	C V A	may,aug-oct	-	-
<i>Ardea cocoi</i> Linnaeus, 1766	White-necked Heron	-	E	A	may-aug	-	-
<i>Ardea alba</i> Linnaeus, 1758	Great Egret	-	C	V A	jan-dec	-	-
<i>Syrigma sibilatrix</i> (Temminck, 1824)	Whistling Heron	-	A	C A H	jan-dec	-	-
<i>Pilherodius pileatus</i> (Boddaert, 1783)	Capped Heron	-	R	M V A	may-aug	-	-
<i>Egretta thula</i> (Molina, 1782)	Snowy Egret	-	C	V A	jan-dec	-	-
THRESKIORNITHIDAE (3)							
<i>Mesembrinibis cayennensis</i> (Gmelin, 1789)	Green Ibis	-	E	M V A	jan-dec	-	-
<i>Phimosus infuscatus</i> (Lichtenstein, 1823)	Bare-faced Ibis	-	O	A	oct	-	-
<i>Theristicus caudatus</i> (Boddaert, 1783)	Buff-necked Ibis	-	A	M C V A H	jan-dec	-	-
CICONIIDAE (2)							
<i>Jabiru mycteria</i> (Lichtenstein, 1819)	Jabiru	AMG	R	M A H	jan-dec	-	-
<i>Mycteria americana</i> Linnaeus, 1758	American Wood-Ibis	AMG	E	A H	jan-oct	-	-
CATHARTIDAE (3)							
<i>Cathartes aura</i> (Linnaeus, 1758)	Turkey Vulture	-	C	M C V A H	jan-dec	-	-
<i>Cathartes burrovianus</i> Cassin, 1845	Lesser Yellow-headed Vulture	-	R	C	feb,may	-	-
<i>Coragyps atratus</i> (Bechstein, 1793)	Black Vulture	-	A	M C V A H	jan-dec	-	-
ACCIPITRIDAE (10)							
<i>Leptodon cayanensis</i> (Latham, 1790)	Grey-headed Kite	-	R	M V	jan-dec	-	-
<i>Elanus leucurus</i> (Vieillot, 1818)	White-tailed Kite	-	O	C	feb	-	-
<i>Rostrhamus sociabilis</i> (Vieillot, 1817)	Snail (Everglade) Kite	-	R	A H	feb,may	-	-
<i>Ictinia plumbea</i> (Gmelin, 1788)	Plumbeous Kite	-	E	M C V	aug-dec	-	-
<i>Geranospiza caerulescens</i> (Vieillot, 1817)	Crane Hawk	-	R	C H	feb,dec	-	-
<i>Buteogallus urubitinga</i> (Gmelin, 1788)	Great Black Hawk	-	O	M A	may	-	-
<i>Heterospizias meridionalis</i> (Latham, 1790)	Savanna Hawk	-	A	C V A H	jan-dec	-	-
<i>Rupornis magnirostris</i> (Gmelin, 1788)	Roadside Hawk	-	A	M C V A H	jan-dec	-	-
<i>Buteo albicaudatus</i> Vieillot, 1816	White-tailed Hawk	-	O	C V	may	-	-

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Spizaetus melanoleucus</i> (Vieillot, 1816)	Black-and-white Hawk-Eagle	AMG	R	M C V	may,jul	-	-
FALCONIDAE (6)							
<i>Caracara plancus</i> (Miller, 1777)	Crested Caracara	-	A	M C V A H	jan-dec	-	-
<i>Milvago chimachima</i> (Vieillot, 1816)	Yellow-headed Caracara	-	A	M C V A H	jan-dec	-	-
<i>Herpetotheres cachinnans</i> (Linnaeus, 1758)	Laughing Falcon	-	A	M C V A H	jan-dec	-	-
<i>Micrastur semitorquatus</i> (Vieillot, 1817)	Collared Forest-Falcon	-	R	M C	feb,apr, jul	-	-
<i>Falco sparverius</i> Linnaeus, 1758	American Kestrel	-	A	C A H	jan-dec	-	-
<i>Falco femoralis</i> Temminck, 1822	Aplomado Falcon	-	E	C A H	jan-dec	-	-
ARAMIDAE (1)							
<i>Aramus guarauna</i> (Linnaeus, 1766)	Limpkin	-	O	A	apr	-	-
RALLIDAE (2)							
<i>Aramides ypecaha</i> (Vieillot, 1819)	Giant Wood-Rail	-	R	M A	jan-dec	-	-
<i>Porzana albicollis</i> (Vieillot, 1819)	Ash-throated Crake	-	E	V A	jan-dec	-	-
CARIAMIDAE (1)							
<i>Cariama cristata</i> (Linnaeus, 1766)	Red-legged Seriema	-	A	C A H	jan-dec	jun	-
CHARADRIIDAE (2)							
<i>Vanellus cayanus</i> (Latham, 1790)	Cayenne Plover	-	O	A	aug	-	-
LARIDAE (1)							
<i>Vanellus chilensis</i> (Molina, 1782)	Southern Lapwing	-	A	C V A H	jan-dec	jan	1
RECURVIROSTRIDAE (1)							
<i>Himantopus melanurus</i> Vieillot, 1817	White-backed Stilt	-	R	A	jan-dec	-	-
SCOLOPACIDAE (2)							
<i>Tringa solitaria</i> Wilson, 1813	Solitary Sandpiper	-	O	A H	dec	-	-
<i>Tringa melanoleuca</i> (Gmelin, 1789)	Greater Yellowlegs	-	O	A	jan	-	-
JACANIDAE (1)							
<i>Jacana jacana</i> (Linnaeus, 1766)	Wattled Jacana	-	C	A	feb-aug	-	-
<i>Phaetusa simplex</i> (Gmelin, 1789)	Large-billed Tern	-	O	A	aug	-	-
COLUMBIDAE (9)							
<i>Columbina talpacoti</i> (Temminck, 1811)	Ruddy Ground-Dove	-	A	C V	jan-dec	-	2
<i>Columbina squammata</i> (Lesson, 1831)	Scaled Dove	-	A	C V	jan-dec	-	3
<i>Columbina picui</i> (Temminck, 1813)	Picui Ground-Dove	-	E	C H	oct-mar	-	-

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Claravis pretiosa</i> (Ferrari-Perez, 1886)	Blue Ground-Dove	-	R	M	dec-apr	-	3
<i>Uropelia campestris</i> (Spix, 1825)	Long-tailed Ground-Dove	-	R	C H	jan-dec	-	-
<i>Patagioenas picazuro</i> (Temminck, 1813)	Picazuro Pigeon	-	A	M C V	jan-dec	-	-
<i>Patagioenas cayennensis</i> (Bonnaterre, 1792)	Pale-vented Pigeon	-	E	M C V	jan-dec	-	-
<i>Zenaida auriculata</i> (Des Murs, 1847)	Eared Dove	-	R	C	oct,dec	-	-
<i>Leptotila verreauxi</i> Bonaparte, 1855	White-tipped Dove	-	A	M C V	jan-dec	-	6
PSITTACIDAE (11)							
<i>Ara ararauna</i> (Linnaeus, 1758)	Blue-and-yellow Macaw	AMG	A	M C V	jan-dec	jun-aug	-
<i>Orthopsittaca manilata</i> (Boddaert, 1783)	Red-bellied Macaw	-	E	M C V	jan-dec	jun	-
<i>Diopsittaca nobilis</i> (Linnaeus, 1758)	Red-shouldered Macaw	-	C	M C V	jan-dec	-	-
<i>Aratinga leucophthalma</i> (Statius Muller, 1776)	White-eyed Parakeet	-	E	M C	jan-dec	-	-
<i>Aratinga aurea</i> (Gmelin, 1788)	Peach-fronted Parakeet	-	A	M C V	jan-dec	-	1
<i>Aratinga cactorum</i> (Kuhl, 1820)	Caatinga (Cactus) Parakeet	ECa	A	M C V	jan-dec	-	-
<i>Forpus xanthopterygius</i> (Spix, 1824)	Blue-winged Parrotlet	-	A	M C V	jan-dec	-	-
<i>Brotogeris chiriri</i> (Vieillot, 1818)	Yellow-chevroned Parakeet	-	A	M C V	jan-dec	-	1
<i>Alipiopsitta xanthops</i> (Spix, 1824)	Yellow-faced Parrot	AMG	A	C V	jan-dec	-	-
<i>Pionus maximiliani</i> (Kuhl, 1820)	Scaly-headed Parrot	-	C	C V	jan-dec	-	-
<i>Amazona aestiva</i> (Linnaeus, 1758)	Turquoise-fronted Parrot	-	A	C V	jan-dec	-	-
CUCULIDAE (5)							
<i>Piaya cayana</i> (Linnaeus, 1766)	Squirrel Cuckoo	-	A	M C V	jan-dec	-	-
<i>Coccyzus melacoryphus</i> Vieillot, 1817	Dark-billed Cuckoo	-	O	C	mar	-	-
<i>Crotophaga ani</i> Linnaeus, 1758	Smooth-billed Ani	-	A	C A H	jan-dec	-	1
<i>Guira guira</i> (Gmelin, 1788)	Guira Cuckoo	-	A	C V	jan-dec	-	-
<i>Tapera naevia</i> (Linnaeus, 1766)	Striped Cuckoo	-	C	M C	jan-dec	-	-
TYTONIDAE (1)							
<i>Tyto alba</i> (Scopoli, 1769)	Barn Owl	-	O	M H	may	may	-
STRIGIDAE (5)							
<i>Megascops choliba</i> (Vieillot, 1817)	Tropical Screech-Owl	-	C	M C V	jan-dec	-	-

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Bubo virginianus</i> (Gmelin, 1788)	Great Horned Owl	-	R	C V	jan-dec	-	-
<i>Glaucidium brasilianum</i> (Gmelin, 1788)	Ferruginous Pygmy-Owl	-	A	M C V	jan-dec	-	5
<i>Athene cunicularia</i> (Molina, 1782)	Burrowing Owl	-	C	C H	jan-dec	-	-
<i>Rhinoptynx clamator</i> (Vieillot, 1808)	Striped Owl	-	O	H	jul	jun	-
NYCTIBIIDAE (1)							
<i>Nyctibius griseus</i> (Gmelin, 1789)	Common Potoo	-	E	M C	jan-dec	-	-
CAPRIMULGIDAE (6)							
<i>Chordeiles pusillus</i> Gould, 1861	Least Nighthawk	-	C	C V	jan-dec	-	-
<i>Podager nacunda</i> (Vieillot, 1817)	Nacunda Nighthawk	-	O	C A	dec	-	-
<i>Nyctidromus albicollis</i> (Gmelin, 1789)	Pauraque	-	A	C V A H	jan-dec	-	-
<i>Caprimulgus rufus</i> Boddaert, 1783	Rufous Nightjar	-	O	H	feb	feb	1
<i>Caprimulgus parvulus</i> Gould, 1837	Little Nightjar	-	R	C H	aug-oct	-	-
<i>Hydropsalis torquata</i> (Gmelin, 1789)	Scissor-tailed Nightjar	-	E	C V	jan-dec	-	-
APODIDAE (3)							
<i>Streptoprocne zonaris</i> (Shaw, 1796)	White-collared Swift	-	O	C A	feb	-	-
<i>Chaetura meridionalis</i> Hellmayr, 1907	Ashy-tailed (Sick's) Swift	-	R	C	jul,oct, dec	-	-
<i>Tachornis squamata</i> (Cassin, 1853)	Fork-tailed Palm-Swift	-	C	C V A H	jul-apr	-	-
TROCHILIDAE (13)							
<i>Phaethornis pretrei</i> (Lesson & Delattre, 1839)	Planalto Hermit	-	C	M C V	oct-jun	oct	13
<i>Eupetomena macroura</i> (Gmelin, 1788)	Swallow-tailed Hummingbird	-	A	M C V	jan-dec	-	21
<i>Florisuga fusca</i> (Vieillot, 1817)	Black Jacobin	Ema	O	M C	aug	-	-
<i>Colibri serrirostris</i> (Vieillot, 1816)	White-vented Violetear	-	E	M C V	may-oct	-	-
<i>Anthracothonax nigricollis</i> (Vieillot, 1817)	Black-throated Mango	-	R	M C	may,aug, dec	-	-
<i>Chrysolampis mosquitus</i> (Linnaeus, 1758)	Ruby-topaz Hummingbird	-	O	C	aug	-	-
<i>Chlorostilbon lucidus</i> (Shaw, 1812)	Glittering-bellied Emerald	-	C	M C V	apr-oct	-	11
<i>Thalurania furcata</i> (Gmelin, 1788)	Fork-tailed Woodnymph	-	C	M	oct-may	-	15
<i>Amazilia versicolor</i> (Vieillot, 1818)	Versicoloured Emerald	-	R	M C	aug,oct	-	4
<i>Amazilia fimbriata</i> (Gmelin, 1788)	Glittering-throated Emerald	-	C	M C V A H	jan-dec	-	77

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Heliactin bilophus</i> (Temminck, 1820)	Horned Sungem	-	O	C	jul	-	-
<i>Helimaster squamosus</i> (Temminck, 1823)	Stripe-breasted Starthroat	-	O	C	jul	-	-
<i>Calliphlox amethystina</i> (Boddaert, 1783)	Amethyst Woodstar	-	O	C	mar	-	-
TROGONIDAE (1)							
<i>Trogon surrucura</i> Vieillot, 1817	Surucua Trogon	-	A	M	jan-dec	-	-
ALCEDINIDAE (3)							
<i>Megaceryle torquata</i> (Linnaeus, 1766)	Ringed Kingfisher	-	C	V A	jan-dec	-	-
<i>Chloroceryle amazona</i> (Latham, 1790)	Amazon Kingfisher	-	E	V A	jan-aug	-	-
<i>Chloroceryle americana</i> (Gmelin, 1788)	Green Kingfisher	-	E	V A	apr-sep	-	-
GALBULIDAE (1)							
<i>Galbula ruficauda</i> Cuvier, 1816	Rufous-tailed Jacamar	-	A	M C V A	jan-dec	-	4
BUCCONIDAE (3)							
<i>Nystalus chacuru</i> (Vieillot, 1816)	White-eared Puffbird	-	C	C V A H	jan-dec	-	-
<i>Nystalus maculatus</i> (Gmelin, 1788)	Spot-backed Puffbird	-	R	M C	aug-apr	-	7
<i>Nonnula rubecula</i> (Spix, 1824)	Rusty-breasted Nunlet	-	E	M	aug-mar	oct	10
RAMPHASTIDAE (1)							
<i>Ramphastos toco</i> Statius Muller, 1776	Toco Toucan	-	A	M C V A H	jan-dec	oct	-
PICIDAE (10)							
<i>Picumnus albosquamatus</i> d'Orbigny, 1840	White-wedged (Arrowhead) Piculet	-	E	M C	jan-dec	oct	3
<i>Melanerpes candidus</i> (Otto, 1796)	White Woodpecker	-	E	M C V A H	dec-aug	-	-
<i>Veniliornis passerinus</i> (Linnaeus, 1766)	Little Woodpecker	-	C	M C	jan-dec	jul	2
<i>Veniliornis mixtus</i> (Boddaert, 1783)	Checkered Woodpecker	-	R	C	may,jul	-	-
<i>Piculus chrysochloros</i> (Vieillot, 1818)	Golden-green Woodpecker	-	E	M C	dec-aug	-	-
<i>Colaptes melanochloros</i> (Gmelin, 1788)	Green-barred Flicker (Woodpecker)	-	C	M C V A H	jan-dec	-	-
<i>Colaptes campestris</i> (Vieillot, 1818)	Campo Flicker	-	A	C V A H	jan-dec	oct	-
<i>Celeus flavescens</i> (Gmelin, 1788)	Blond-crested Woodpecker	-	E	M C	jan-dec	dec	1
<i>Dryocopus lineatus</i> (Linnaeus, 1766)	Lineated Woodpecker	-	A	M C V A H	jan-dec	-	2
<i>Campephilus melanoleucos</i> (Gmelin, 1788)	Crimson-crested Woodpecker	-	E	M C	jan-dec	-	-

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
THAMNOPHILIDAE (6)							
<i>Taraba major</i> (Vieillot, 1816)	Great Antshrike	-	A	M C V A H	jan-dec	-	2
<i>Thamnophilus doliiatus</i> (Linnaeus, 1764)	Barred Antshrike	-	R	C	jan-dec	-	-
<i>Thamnophilus pelzelni</i> Hellmayr, 1924	Planalto Slaty-Antshrike	-	A	M C	jan-dec	aug-may	32
<i>Herpsilochmus atricapillus</i> Pelzeln, 1868	Black-capped Antwren	-	A	M	jan-dec	-	2
<i>Herpsilochmus longirostris</i> Pelzeln, 1868	Large-billed Antwren	ECe	E	V	jan-dec	-	-
<i>Formicivora rufa</i> (Wied, 1831)	Rusty-backed Antwren	-	R	M V	jan-dec	-	-
DENDROCOLAPTIDAE (6)							
<i>Sittasomus griseicapillus</i> (Vieillot, 1818)	Olivaceous Woodcreeper	-	A	M V	jan-dec	sep-feb	13
<i>Xiphocolaptes albicollis</i> (Vieillot, 1818)	White-throated Woodcreeper	-	O	M	jun	-	-
<i>Dendrocolaptes platyrostris</i> Spix, 1825	Planalto Woodcreeper	-	C	M V	jan-dec	feb	14
<i>Lepidocolaptes angustirostris</i> (Vieillot, 1818)	Narrow-billed Woodcreeper	-	A	M C V	jan-dec	mar/oct-dec	-
<i>Lepidocolaptes wagleri</i> (Spix, 1824)	Wagler's Woodcreeper	-	E	M	jan-dec	oct	5
<i>Campylorhamphus trochilirostris</i> (Lichtenstein, 1820)	Red-billed Scythebill	-	E	M	jan-dec	-	-
FURNARIIDAE (12)							
<i>Furnarius figulus</i> (Lichtenstein, 1823)	Wing-banded (Band-tailed) Hornero	-	E	A	jan-dec	-	-
<i>Furnarius leucopus</i> Swainson, 1838	Pale-legged Hornero	-	E	C V A	jan-dec	oct	1
<i>Furnarius rufus</i> (Gmelin, 1788)	Rufous Hornero	-	A	C V A H	jan-dec	dec	1
<i>Schoeniophylax phryganophilus</i> (Vieillot, 1817)	Chotoy Spinetail	-	O	C	jul	-	-
<i>Synallaxis frontalis</i> Pelzeln, 1859	Sooty-fronted Spinetail	-	A	M C V	jan-dec	feb-apr / nov	-
<i>Synallaxis albesens</i> Temminck, 1823	Pale-breasted Spinetail	-	R	C H	jan-dec	-	-
<i>Synallaxis scutata</i> Sclater, 1859	Ochre-cheeked Spinetail	-	A	M A	jan-dec	dec-feb	12
<i>Cranioleuca vulpina</i> (Pelzeln, 1856)	Rusty-backed Spinetail	-	O	M C	feb	-	-
<i>Phacellodomus rufifrons</i> (Wied, 1821)	Rufous-fronted Thornbird	-	A	C H	jan-dec	-	-
<i>Phacellodomus ruber</i> (Vieillot, 1817)	Greater (Yellow- eyed) Thornbird	-	E	C V	jan-dec	oct	2
<i>Hylocryptus rectirostris</i> (Wied, 1831)	Chestnut (Henna)-capped Foliage-gleaner	ECe	A	M	jan-dec	dec	3

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Xenops rutilans</i> Temminck, 1821	Streaked Xenops	-	E	M C	jan-dec	-	-
TYRANNIDAE (49)							
<i>Leptopogon amaurocephalus</i> Tschudi, 1846	Sepia-capped Flycatcher	-	C	M C	oct-jun	-	11
<i>Hemitriccus striaticollis</i> (Lafresnaye, 1853)	Stripe-necked Tody-Tyrant	-	R	V	jan-dec	-	2
<i>Hemitriccus margaritaceiventer</i> (d'Orbigny & Lafresnaye, 1837)	Pearly-vented Tody-tyrant	-	E	M C V	aug-apr	sep-oct	6
<i>Poecilatriccus latirostris</i> (Pelzeln, 1868)	Rusty-fronted Tody-Flycatcher	-	R	M	feb,may	-	1
<i>Todirostrum cinereum</i> (Linnaeus, 1766)	Common Tody-Flycatcher	-	E	M C	jan-dec	-	-
<i>Phyllomyias fasciatus</i> (Thunberg, 1822)	Planalto Tyrannulet	-	C	M C	jan-dec	-	-
<i>Myiopagis caniceps</i> (Swainson, 1835)	Grey Elaenia	-	E	M	jan-dec	-	-
<i>Myiopagis viridicata</i> (Vieillot, 1817)	Greenish Elaenia	-	E	M C	oct-may	oct-jan	20
<i>Elaenia flavogaster</i> (Thunberg, 1822)	Yellow-bellied Elaenia	-	C	C V A H	jan-dec	-	2
<i>Elaenia spectabilis</i> Pelzeln, 1868	Large Elaenia	-	R	M C	oct,dec	-	-
<i>Elaenia parvirostris</i> Pelzeln, 1868	Small-billed Elaenia	-	O	M	may	-	1
<i>Elaenia cristata</i> Pelzeln, 1868	Plain-crested Elaenia	-	R	C	mar-oct	-	-
<i>Elaenia chiriquensis</i> Lawrence, 1865	Lesser Elaenia	-	E	C	aug-apr	dec	2
<i>Camptostoma obsoletum</i> (Temminck, 1824)	Southern Beardless Tyrannulet	-	A	M C	jan-dec	-	9
<i>Suiriri suiriri</i> (Vieillot, 1818)	Chaco Suiriri	ECe	E	C	jan-dec	-	2
<i>Suiriri suiriri</i> (Vieillot, 1818)	Chaco Suiriri	-	E	C	jan-dec	-	1
<i>Suiriri islerorum</i> Zimmer, Whittaker & Oren, 2001	Chapada Flycatcher	-	E	C	mar-jan	-	2
<i>Phaeomyias murina</i> (Spix, 1825)	Mouse-coloured Tyrannulet	-	E	C	jan-dec	oct	7
<i>Capsiempis flaveola</i> (Lichtenstein, 1823)	Yellow Tyrannulet	-	O	C	feb	-	1
<i>Phylloscartes roquettei</i> Snethlage, 1928	Minas Gerais Tyrannulet	ABR, AMG	R	M	jul-jan	-	-
<i>Tolmomyias sulphurescens</i> (Spix, 1825)	Yellow-olive Flycatcher	-	C	M C	jan-dec	apr/oct	10
<i>Tolmomyias flaviventris</i> (Wied, 1831)	Yellow-breasted Flycatcher	-	R	M C	aug,oct, dec	-	1
<i>Myiophobus fasciatus</i> (Statius Muller, 1776)	Bran-coloured Flycatcher	-	R	C	jan-dec	-	-
<i>Myiobius barbatus</i> (Gmelin, 1789)	Sulphur-rumped Flycatcher	-	E	M	jan-dec	feb	4
<i>Lathrotriccus euleri</i> (Cabanis, 1868)	Euler's Flycatcher	-	C	M C	jan-dec	-	6

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Cnemotriccus fuscatus</i> (Wied, 1831)	Fuscous Flycatcher	-	E	M C	aug-apr	-	8
<i>Contopus cinereus</i> (Spix, 1825)	Tropical Pewee	-	C	M C	jan-dec	-	5
<i>Pyrocephalus rubinus</i> (Boddaert, 1783)	Vermilion Flycatcher	-	R	H	may-aug	-	-
<i>Satrapa icterophrys</i> (Vieillot, 1818)	Yellow-browed Tyrant	-	O	C V	may	-	-
<i>Xolmis cinereus</i> (Vieillot, 1816)	Grey Monjita	-	C	C H	apr-dec	-	-
<i>Xolmis velatus</i> (Lichtenstein, 1823)	White-rumped Monjita	-	C	C H	oct-jul	-	-
<i>Gubernates yetapa</i> (Vieillot, 1818)	Streamer-tailed Tyrant	-	O	C A	oct	-	-
<i>Fluvicola nengeta</i> (Linnaeus, 1766)	Masked Water-Tyrant	-	R	C V A H	jan, may, oct	-	-
<i>Colonia colonus</i> (Vieillot, 1818)	Long-tailed Tyrant	-	R	C A	may,aug	-	-
<i>Machetornis rixosa</i> (Vieillot, 1819)	Cattle Tyrant	-	R	A H	may-dec	-	-
<i>Myiozetetes similis</i> (Spix, 1825)	Social (Vermilion-crowned) Flycatcher	-	A	M C V A H	jan-dec	-	1
<i>Pitangus sulphuratus</i> (Linnaeus, 1766)	Great Kiskadee	-	A	M C V A H	jan-dec	-	1
<i>Myiodynastes maculatus</i> (Statius Muller, 1776)	Streaked Flycatcher	-	E	M C	aug-mar	oct	14
<i>Megarynchus pitangua</i> (Linnaeus, 1766)	Boat-billed Flycatcher	-	A	M C V A H	jan-dec	-	3
<i>Empidonomus varius</i> (Vieillot, 1818)	Variegated Flycatcher	-	R	M C	mar, sep-oct	-	-
<i>Griseotyrannus aurantioatrocristatus</i> (d'Orbigny & Lafresnaye, 1837)	Crowned Slaty Flycatcher	-	R	C	feb,dec	-	-
<i>Tyrannus albogularis</i> Burmeister, 1856	White-throated Kingbird	-	E	C V A H	oct-apr	-	-
<i>Tyrannus melancholicus</i> Vieillot, 1819	Tropical Kingbird	-	A	C V A H	jan-dec	-	-
<i>Tyrannus savana</i> Vieillot, 1808	Fork-tailed Flycatcher	-	E	C V A H	aug-dec	oct	-
<i>Sirystes sibilator</i> (Vieillot, 1818)	Sirystes	-	C	M C	jan-dec	-	1
<i>Casiornis rufus</i> (Vieillot, 1816)	Rufous Casiornis	-	C	M C	jul-apr	oct	17
<i>Myiarchus swainsoni</i> Cabanis & Heine, 1859	Swainson's Flycatcher	-	E	M C	aug-dec	dec	7
<i>Myiarchus ferox</i> (Gmelin, 1789)	Short-crested Flycatcher	-	A	M C	jan-dec	-	14
<i>Myiarchus tyrannulus</i> (Statius Muller, 1776)	Brown-crested Flycatcher	-	C	M C	jan-dec	oct-nov	19
PIPRIDAE (2)							
<i>Neopelma pallescens</i> (Lafresnaye, 1853)	Pale-bellied Tyrant-Manakin	-	R	M	jul	-	1

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Antilophia galeata</i> (Lichtenstein, 1823)	Helmeted Manakin	-	C	M C V	jan-dec	oct-dec	7
TYTIRIDAE (5)							
<i>Tityra inquisitor</i> (Lichtenstein, 1823)	Black-crowned Tityra	-	E	M C	jan-dec	-	-
<i>Tityra cayana</i> (Linnaeus, 1766)	Black-tailed Tityra	-	E	M	oct-jun	-	-
<i>Pachyramphus viridis</i> (Vieillot, 1816)	Green-backed Becard	-	R	M	may,oct	-	1
<i>Pachyramphus polychopterus</i> (Vieillot, 1818)	White-winged Becard	-	C	M C V	jan-dec	apr/nov-dec	-
<i>Pachyramphus validus</i> (Lichtenstein, 1823)	Crested Becard	-	O	C	feb	-	-
VIREONIDAE (2)							
<i>Cyclarhis gujanensis</i> (Gmelin, 1789)	Rufous-browed Peppershrike	-	A	M C V A H	jan-dec	nov	15
<i>Vireo olivaceus</i> (Linnaeus, 1766)	Red-eyed Vireo	-	R	M C	feb,oct	-	2
CORVIDAE (2)							
<i>Cyanocorax cristatellus</i> (Temminck, 1823)	Curl-crested Jay	ECe	A	C A H	jan-dec	-	-
<i>Cyanocorax cyanopogon</i> (Wied, 1821)	White-naped Jay	ECa	R	C	feb,oct	-	-
HIRUNDINIDAE (5)							
<i>Pygochelidon cyanoleuca</i> (Vieillot, 1817)	Blue-and-white Swallow	-	O	C V	may	-	-
<i>Stelgidopteryx ruficollis</i> (Vieillot, 1817)	Southern Rough-winged Swallow	-	A	C V A H	feb-nov	-	-
<i>Progne tapera</i> (Vieillot, 1817)	Brown-chested Martin	-	C	C V A H	jan-dec	-	-
<i>Tachycineta albiventer</i> (Boddaert, 1783)	White-winged Swallow	-	R	V A	jan,may, aug	-	-
<i>Tachycineta leucorrhoa</i> (Vieillot, 1817)	White-rumped Swallow	-	R	V A	jul-oct	-	-
TROGLODYTIDAE (3)							
<i>Troglodytes musculus</i> Naumann, 1823	House Wren	-	A	C H	jan-dec	-	2
<i>Cantorchilus leucotis</i> (Lafresnaye, 1845)	Buff-breasted Wren	-	C	M A	jan-dec	-	3
<i>Donacobius atricapilla</i> (Linnaeus, 1766)	Black-capped Mockingthrush	-	R	C V	jan-dec	-	1
MUSCICAPIDAE (4)							
<i>Poliophtila dumicola</i> (Vieillot, 1817)	Masked Gnatcatcher	-	C	M C	jan-dec	-	-
<i>Turdus rufiventris</i> Vieillot, 1818	Rufous-bellied Thrush	-	E	M V A H	may-feb	-	2
<i>Turdus leucomelas</i> Vieillot, 1818	Pale-breasted Thrush	-	A	M C V A	jan-dec	oct-dec	25
<i>Turdus amaurochalinus</i> Cabanis, 1850	Creamy-bellied Thrush	-	E	M C V	jul-mar	-	2
MIMIDAE (1)							
<i>Mimus saturninus</i> (Lichtenstein, 1823)	Chalk-browed Mockingbird		A	C V A H	jan-dec	-	-

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
MOTACILLIDAE (1)							
<i>Anthus lutescens</i> Pucheran, 1855	Yellowish Pipit		O	C A	aug	-	-
COEREVIDAE (1)							
<i>Coereba flaveola</i> (Linnaeus, 1758)	Bananaquit		C	M C	jan-dec	-	2
THRAUPIDAE (15)							
<i>Schistochlamys melanopsis</i> (Latham, 1790)	Black-faced Tanager		O	V	oct	-	-
<i>Neothraupis fasciata</i> (Lichtenstein, 1823)	White-banded Tanager	ECe	E	C	mar-jul	-	-
<i>Nemosia pileata</i> (Boddaert, 1783)	Hooded Tanager		A	M C	jan-dec	-	-
<i>Thlypopsis sordida</i> (d'Orbigny & Lafresnaye, 1837)	Orange-headed Tanager		R	M	jul	-	-
<i>Cypsnagra hirundinacea</i> (Lesson, 1831)	White-rumped Tanager		R	C	may-jan	-	-
<i>Piranga flava</i> (Vieillot, 1822)	Lowland Hepatic-Tanager		E	C H	feb-may, aug	-	-
<i>Eucometis penicillata</i> (Spix, 1825)	Grey-headed Tanager		C	M V	jan-dec	oct-dec	10
<i>Tachyphonus rufus</i> (Boddaert, 1783)	White-lined Tanager		A	M C V	jan-dec	nov-dec	6
<i>Ramphocelus carbo</i> (Pallas, 1764)	Silver-beaked Tanager		E	M C V	jan-dec	oct	3
<i>Thraupis sayaca</i> (Linnaeus, 1766)	Sayaca Tanager		A	M C V A H	jan-dec	oct-dec	9
<i>Thraupis palmarum</i> (Wied, 1823)	Palm Tanager		C	M C V A H	jan-dec	nov	2
<i>Tangara cayana</i> (Linnaeus, 1766)	Burnished-buff Tanager		A	M C V A H	jan-dec	-	5
<i>Dacnis cayana</i> (Linnaeus, 1766)	Blue Dacnis		A	M C V	jan-dec	oct	7
<i>Hemithraupis guira</i> (Linnaeus, 1766)	Guira Tanager		A	M C	jan-dec	nov	7
<i>Conirostrum speciosum</i> (Temminck, 1824)	Chestnut-vented Conebill		C	M C	jan-dec	-	2
EMBEREZIDAE (10)							
<i>Zonotrichia capensis</i> (Statius Muller, 1776)	Rufous-collared Sparrow		A	C H	jan-dec	-	1
<i>Ammodramus humeralis</i> (Bosc, 1792)	Grassland Sparrow		C	C	jan-dec	-	-
<i>Emberizoides herbicola</i> (Vieillot, 1817)	Wedge-tailed Grass-Finch		R	C H	jan-dec	-	-
<i>Volatinia jacarina</i> (Linnaeus, 1766)	Blue-black Grassquit		C	M C	jan-dec	-	5
<i>Sporophila plumbea</i> (Wied, 1830)	Plumbeous Seedeater		O	C	oct	-	-
<i>Sporophila lineola</i> (Linnaeus, 1758)	Lined Seedeater		O	C	feb	-	-
<i>Sporophila nigricollis</i> (Vieillot, 1823)	Yellow-bellied Seedeater	-	R	C H	feb, nov	-	-

Table 1. Continued...

Families and species	Common names	Conservation and endemism	Abundance	Habitat	Month of record	Reproduction	Number captured birds
<i>Sporophila angolensis</i> (Linnaeus, 1766)	Lesser (Chestnut-bellied) Seed-Finch	AMG	O	C V	dec	-	1
<i>Charitospiza eucosma</i> Oberholser, 1905	Coal-crested Finch	ECe	C	C H	feb-mar,jul/oct	-	-
<i>Coryphospingus pileatus</i> (Wied, 1821)	Grey Pileated-Finch	-	C	C H	jan-dec	-	8
CARDINALIDAE (3)							
<i>Saltator coerulescens</i> Vieillot, 1817	Greyish Saltator	-	C	M C V	jan-dec	-	-
<i>Saltator similis</i> d'Orbigny & Lafresnaye, 1837	Green-winged Saltator	-	C	M C	jan-dec	-	1
<i>Saltator atricollis</i> Vieillot, 1817	Black-throated Saltator	ECe	A	C H	jan-dec	-	1
PARULIDAE (4)							
<i>Parula pitaiayumi</i> (Vieillot, 1817)	Tropical Parula	-	E	M C	jan-dec	-	1
<i>Geothlypis aequinoctialis</i> (Gmelin, 1789)	Masked Yellowthroat	-	R	C V	aug,oct	-	-
<i>Basileuterus hypoleucus</i> Bonaparte, 1830	White-bellied Warbler	-	A	M	jan-dec	-	13
ICTERIDAE (8)							
<i>Basileuterus flaveolus</i> (Baird, 1865)	Flavescent Warbler	-	A	M C	jan-dec	dec	25
<i>Psarocolius decumanus</i> (Pallas, 1769)	Crested Oropendola	-	A	M C V	jan-dec	-	-
<i>Procapicus solitarius</i> (Vieillot, 1816)	Solitary (Solitary Black) Cacique	-	R	M A	jan-dec	-	-
<i>Cacicus haemorrhous</i> (Linnaeus, 1766)	Red-rumped Cacique	-	C	M V A	jan-dec	-	-
<i>Icterus cayanensis</i> (Linnaeus, 1766)	Epaulet Oriole	-	E	M V	jan-dec	-	-
<i>Icterus jamacaii</i> (Gmelin, 1788)	Troupial	ECa	A	C V	jan-dec	-	-
<i>Gnorimopsar chopi</i> (Vieillot, 1819)	Chopi Blackbird	-	A	C V A H	jan-dec	oct	3
<i>Molothrus bonariensis</i> (Gmelin, 1789)	Shiny Cowbird	-	R	H	nov-feb	-	3
<i>Sturnella superciliaris</i> (Bonaparte, 1850)	White-browed Blackbird	-	R	C A H	dec-apr	-	-
FRINGILLIDAE (1)							
<i>Euphonia chlorotica</i> (Linnaeus, 1766)	Purple-throated Euphonia	-	A	M C	jan-dec	may	15

Most species were recorded in just one (71) or two (93) habitat types, while the rest were found in three (47), four (42) and five (20) habitat types (Figure 1, Table 1). The highest percent of habitat specialists was found in aquatic habitats (16.1%), followed by the gallery forests (14.6%) and the *Cerrado* vegetation (14.1%). Only 2.7% of the recorded birds were exclusive to palm groves.

2. Important records

1. Greater Rhea *Rhea Americana* (Linnaeus, 1758)

Considered threatened in the state of Minas Gerais (Machado et al. 1998). We observed several groups of adult males and young from October to December in all sampled years. Brood size ranged from five to 17 birds.

Birds of northwestern Minas Gerais

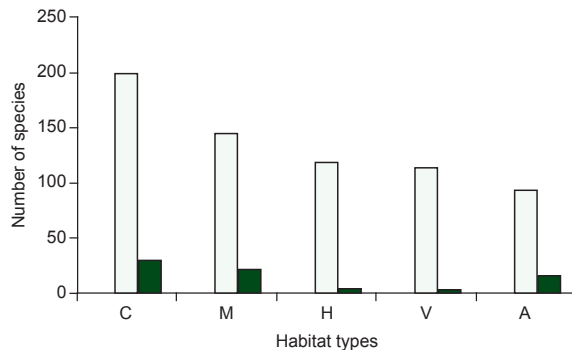


Figure 1. Occurrence of bird species per habitat in Fazenda Brejão, southeastern Brazil. C (woodlands), M (gallery forests), H (human settlements), V (palm grove swamps), A (aquatic habitats). White bars are total number of species; black bars are the exclusive species for that habitat.

Figura 1. Ocorrência de aves em cada habitat da Fazenda Brejão, sudeste do Brasil. C (cerrados), M (matas ciliares), H (habitações humanas), V (buritizais), A (habitats aquático). Barras brancas representam o número total de espécies; barras pretas representam o número de espécies exclusivas.

2. Chestnut-bellied Guan *Penelope ochrogaster* Pelzeln, 1870

It is a globally threatened species where population size has been estimated in fewer than 2,000 birds, split in three isolated populations in Central Brazil, Pantanal and the São Francisco River basin (Olmos 1998, Antas 2006). One solitary Chestnut-bellied Guan was observed in two occasions in the gallery forest along the Paracatu River, suggesting a small population. Recent records of this species in the São Francisco basin are very scarce, and this population is considered critically endangered (Antas 2006).

3. Bare-faced Curassow *Crax fasciolata* Spix, 1825

It is considered threatened in Minas Gerais due to its ever growing rarity, mainly because of habitat loss and illegal hunting (Machado et al. 1998). There are records for the western (Marini 2001) and northwestern region of Minas Gerais (Mattos et al. 1991). At FB it was recorded only in the gallery forest along the Paracatu River, where a male was seen in October 2004 and heard April 2005 and July 2006. A pair was photographed by a camera trap in January 14, 2005 (A. Paglia unpublished data).

4. Jabiru *Jabiru mycteria* (Lichtenstein, 1819)

Although common in southwestern Brazil it is threatened in Minas Gerais. The species was first recorded in 1992, and in the following year a nest with an adult and three nestlings was recorded. This was the first documented nest of this species for the state of Minas Gerais (Encarnação & Diniz 1988). Another nest was found in 2004, 200 m from the previous one, possibly belonging to the same pair, since it is known that Jabiru are very faithful to the nest site (Sick 1993). The nest was built in a large *jatobá* *Hymenaea stigonocarpa* tree, approximately 15 m high from the ground. Two nestlings left the nest by the end of August.

5. Wood Stork *Mycteria americana* Linnaeus, 1758

The species is threatened in the state of Minas Gerais (Rodrigues & Michelin 2005). A nesting colony is known from the city of Vazante, about 140 km from FB (Encarnação & Diniz 1998). The species occurs at FB from January to October. The

highest numbers were recorded in October 2004, where 50 birds were seen in a temporary lagoon beside the Paracatu River, about 10 km from FB.

6. Black-and-white Hawk-eagle *Spizaetus melanoleucus* (Vieillot, 1816)

It is a very rare species in Minas Gerais and considered threatened (Vasconcelos & Veado 2001). It was recorded in two occasions in 2004, soaring over the scrubland in May and over the Paracatu River in June.

7. Blue-and-yellow Macaw *Ara ararauna* (Linnaeus, 1758)

Although it is a species with a wide distributional range, its population has declined in many areas mainly due to habitat loss and the illegal pet trade (BirdLife International 2000). It has been extirpated from some Brazilian states, such as Santa Catarina (Naka et al. 2002). The Blue-and-yellow Macaw is also declining in Minas Gerais, and nowadays its population has become restricted to the northwest region (Rodrigues & Goulart 2005, Rodrigues 2008). The Blue-and-yellow Macaw is a frequent inhabitant of FB, where the palm grove swamps are its prime habitat. We have seen pairs breeding in dead *Mauritia flexuosa* palm trees. The palm trees are also used for overnight roosting sites. Highest numbers are recorded late October, when the fruits of 'pequi' *Caryocar brasiliensis* (Caryocaraceae) start to ripen. Other food resources for this species are the fruits of 'cumbuca' *Dypteryx alata* (Leguminosae) in March, the 'buriti' *M. flexuosa* in August and October, the 'pau-terrinha' *Qualea parviflora*, 'pau-terra' *Q. grandiflora*, and 'pau-doce' *Vochysia cinnamomea*, all in August. The availability of fruits in August coincides with the fledging of young. The Blue-and-yellow Macaw does not use communal roosting sites as observed for other parrots at FB (Carrara et al. 2007).

8. Cactus Parakeet *Aratinga cactorum* (Kuhl, 1820)

It is considered endemic to the Caatinga dry lands of northeastern Brazil (Sick 1993, Stotz et al. 1996). It is a common species in the tall scrublands of FB, and it was recorded throughout all months of the year. It formed mixed species flocks together with the Peach-fronted Parakeet *Aratinga aurea*. The Cactus Parakeet was recorded eating fruits of 'aroeira' *Myracrodruon urundeuva* (Anacardiaceae) in the gallery forests of the Paracatu River in August.

9. Yellow-faced Parrot *Alipiopsitta xanthops* (Spix, 1824)

It is considered endemic to the Cerrado region (Silva & Bates 2002) and threatened in Minas Gerais due to habitat loss and the illegal pet trade (Machado et al. 1998). It is a common species at FB, recorded throughout the year, usually seen in flocks of 10 to 15 birds. A flock of approximately 50 birds were recorded daily in March 2002 at a fig tree (*Ficus* sp. Moraceae) located at the FB headquarters. This flock was also recorded eating fruits of 'jaboticaba' *Myrciaria cauliflora*, guava *Psidium guajava* (both Myrtaceae), and unripe fruits of mango *Mangifera indica* (Anacardiaceae). The Yellow-faced Parrot use *Eucalyptus* stands for overnight roosting together with the Blue-fronted Parrot *Amazona aestiva*. At least 160 birds using this roosting site were counted (Carrara et al. 2007).

10. Black Jacobin *Florisuga fusca* (Vieillot, 1817)

It is a typical hummingbird species of the Atlantic forest of eastern Brazil, even considered endemic to that biome (Stotz et al. 1996). The Black Jacobin was recorded twice at FB: July 2003 in a scrubland area and in August 2003 flying over the gallery

forest of the Paracatu River. This and previous records (Bagno & Marinho-Filho 2001) demonstrate that the range of this species extends a fair distance beyond the Atlantic Forest borders, indicating that its endemic status must be reevaluated.

11. Suiriri Flycatcher *Suiriri suiriri* (Vieillot, 1818)

This species has a complex taxonomy, and three forms are acknowledged: *S. s. suiriri*, *S. s. affinis* e *S. s. bahiae* (Fitzpatrick 2004). The nominal form occurs mainly in the Chaco, from central Bolivia, Paraguay, northern Argentina to southern Brazil and Uruguay. *S. s. affinis* is widely distributed over the Brazilian Cerrado and eastern Bolivia, but it is also found in savanna habitats in Amazon forest in northern Brazil and southern Suriname (Hayes 2001, Zimmer et al. 2001, Fitzpatrick 2004). *S. s. bahiae*, found in the dry Caatinga of northeastern Brazil, is not a consensual form, and may be a hybrid of *affinis* and *suiriri* (Hayes 2001, Zimmer et al. 2001, Fitzpatrick 2004). *S. s. affinis* is a common species at FB, where it can be observed in pairs or small groups as described by Lopes & Marini (2005 and 2006). In FB we also found a few individuals bearing the nominal form characteristics, such as a smaller body size, whitish underparts, grayish rump, and entirely dark tail feathers. Two of these birds that were tape recorded and collected were associated in the same flock, with two other birds with *affinis* characteristics, which were also collected. It is important to note that FB is the only site in central and northeastern Brazil where white-bellied birds were recently observed. The few records of white-bellied individuals for northeastern Brazil are old museum skins, sometimes considered white-bellied *bahiae* or authentic members of the nominal form (Pinto & Camargo 1961, Hayes 2001).

12. Minas Gerais Tyrannulet *Phylloscartes roquettei* Sneath, 1928

The Minas Gerais Tyrannulet was until the 1990's known only from the type locality, in northern Minas Gerais, but was subsequently found in several new localities (Raposo et al. 2002, Luiz et al. 2006, Vasconcelos et al. 2006). It is considered a critically endangered species (BirdLife International 2000). Two individuals were observed on 24 July 2006 in the riparian forests of the Paracatu River (17° 04' 26" S and 45° 54' 13" W). On the following day, two additional individuals were observed foraging some 200 m from this site. This riparian forest is 15-20 m tall and semi-deciduous, with some areas covered by terrestrial bromeliads (*gravatás*). This and other unpublished records of the Minas Gerais Tyrannulet are best described in Lopes et al. (2008).

Discussion

The survey revealed high bird species richness for the FB. Moreover, the region harbors threatened, rare and endemic species which reinforces the high conservation relevance of the area for the Cerrado biome.

The number of species at FB corresponds to 32% of all species to date recorded for the entire Cerrado region of South America (Silva 1995b). Avian diversity in the FB area is as high as that documented for some already established protected areas of Brazilian Cerrado: 'Serra do Cipó' national park (226 species, Rodrigues et al. 2005); 'Serra da Canastra' national park (282 species, Silveira 1998); 'Águas Emendadas' biological reserve (300 species, Bagno 1998, Lopes et al. 2005).

Sixteen species recorded between 1991 and 1994 by two of us (CDE and MGD) were not recorded in the present survey. Among those there are aquatic species such as the two grebes *Tachybaptus dominicus* (Linnaeus, 1766), *Podilymbus podiceps* (Linnaeus, 1758), and the Masked Duck *Nomonyx dominica*. Some species need voucher

confirmation because it would represent large range extensions such as *Patagioenas plumbea* (Vieillot, 1818), *Chordeiles acutipennis* (Hermann, 1783), *Amazilia lactea* (Lesson, 1832), *Picumnus cirratus* Temminck, 1825, and *Serpophaga subcristata* (Vieillot, 1817). *Sicalis citrina* Pelzeln, 1870 occurs mainly at high elevations and also would need a voucher confirmation. Other species are of probable occurrence in the area, and some of them were not recorded, possibly due to their low density in the area such as the Black-collared Hawk *Busarellus nigricollis* (Latham, 1790), the Spotted Sandpiper *Actitis macularius* (Linnaeus, 1766), the White-tailed Goldenthrout *Polytmus guainumbi* (Pallas, 1764), the White-headed Marsh-Tyrant *Arundinicola leucocephala* (Linnaeus, 1764), the Gray-eyed Greenlet *Hylophilus amaurocephalus* (Nordmann, 1835), and the Cinnamon Tanager *Schistochlamys ruficapillus* (Vieillot, 1817). Also, the Red-cowled Cardinal *Paroaria dominicana* (Linnaeus, 1758), a typical species of the dry Caatinga biome of northeastern Brazil (Ridgely & Tudor 1989) is at the edge of its distribution at FB. We also cannot disregard the hypothesis that this bird was a freed cage bird.

It is important to comment on the possible local extinction of the Red-and-green Macaw *Ara chloroptera*. Its original range has been diminished as a consequence of habitat loss and the illegal pet trade (Machado et al. 1998). There are records from 20 years ago for FB, the last one being of an individual paired with a Blue-and-yellow Macaw.

Some species appear to use FB only as a stopover site. Members of the Scolopacidae recorded at FB breed at high latitudes in North America and winter in the southern latitudes of South America. The seasonal lagoons at FB are the preferred habitats for these species. Other species appear at FB during the austral winter (e.g. the Vermilion Flycatcher *Pyrocephalus rubinus*). These species arrive in northwestern Minas Gerais to escape from the cold winter of the south (Sick 1993). We did not find these species in reproductive condition at FB.

Most migrant species arrive at FB at the end of the dry season. Some birds arrive up to December (Plumbeous Kite *Ictinia plumbea*, Fork-tailed Flycatcher *Tyrannus savana*, Swainson's Flycatcher *Myiarchus swainsoni*); others arrive from December to April (Blue Ground-Dove *Claravis pretiosa*, White-browed Blackbird *Sturnella superciliosa*); and others occur from September to April (Picui Ground-dove *Columbina picui*, Lesser Elaenia *Elaenia chiriquensis*, Greenish Elaenia *Myiopagis viridicata*, Streaked Flycatcher *Myiodynastes maculatus*, White-throated Kingbird *Tyrannus albogularis*). The arrival of these species is coincident with the peak of insect and fruit availability in the Cerrado (Macedo 2002), and many of them breed in the area (as confirmed by the presence of a brood patch). Also, more than 85% of the species started breeding activities at the end of the dry season and beginning of the raining season (unpublished data), which is the usual pattern of breeding for most Cerrado species (Marini & Durães 2001).

The high species richness of birds recorded at FB may be related to the diversity of habitats and to the size of the area. The location of FB also seems to be important. The Paracatu River still holds large areas of gallery forests, which support a high number of forest-dependent species (Rodrigues & Faria 2007). The seasonal flooding of this river is an important event for the aquatic birds. This event is of vital importance for fish reproduction, a prime food item for many storks, herons and grebes. The storks seem to depend on this water cycle for reproduction (Sick 1993). Thus, aquatic habitats and the gallery forests, although less representative in terms of area within FB compared to the woodlands, held at least 18 exclusive species.

Among the most important habitats at FB, the palm groves are of prime importance for many birds, despite having few exclusive species. The palm groves occur along flat areas near springs in swampy grounds or in dense stands along the gallery forest. This habitat, once

common in the northwest of Minas Gerais state, is now becoming rare (Goulart 2005). The palm grove swamps serve as an important role in the maintenance of the bird diversity of FB, serving as overnight roosting sites, as a source of food (its fruits) and water, and as a site for reproduction for many bird species (see also (Carvalho 1991, Sick 1993). Almost 42% of the bird species at FB were recorded in the palm groves. Some of these birds are closely tied to the palm groves (e.g., the Blue-and-yellow Macaw, Red-bellied Macaw *Orthopsittaca manilata*, and Fork-tailed Palm-swift *Tachornis squamata*, all of them use the palms as nesting sites). Many other birds such as parrots (11 species) also use the palm fruit as a food item. Two passerine birds, Large-billed Antwren *Herpsilochmus longirostris* and Stripe-necked Tody-tyrant *Hemitriccus striaticollis*, appear to be restricted to the palm groves.

FB is also important for large species which need large home ranges such as the Greater Rhea *Rhea americana*, Horned Screamer *Anhima cornuta*, Blue-and-Yellow Macaw, parrots and many raptorial species.

The Cerrado region of central Brazil is rapidly being replaced with crops and pasture. Over the past 35 years, more than half of the Cerrado's original area of two million square kilometers has been converted to agriculture (Machado et al. 2004b). It is now among the world's top regions for the production of beef and soybeans (WWF 1995). Just 2.2% of the Cerrado is protected, and it is losing ground faster than the Amazon rainforest to the north. At the current rate of loss, this ecosystem could be gone by 2030 (Machado et al. 2004b). This reality is not different for the northwest of Minas Gerais, a vast region of the industrialized southeastern Brazil yet to be 'developed'. The lands surrounding FB are already in the process of transformation, and one can predict that FB will become an 'island' of native vegetation.

Within FB, one of the main threats is the overgrazing of the understory by cattle that invade the area. This is because FB is not completely surrounded by fences. Thus, cattle are practically allowed free year-round access to the area, a practice that has resulted in trampling of soil and vegetation, destruction of the river banks, and lack of tree regeneration (including the palm trees). Illegal hunting conducted by local neighbors is also an important threat yet to be evaluated. We recorded destruction of Macaw nests built in palm trees by poachers several times. Possibly, this has the potential to reduce the population viability of the Macaws in the area.

The present work is one of the rare faunal surveys ever done for northwestern Minas Gerais (see also Mattos et al. 1991). Many researchers have called attention to this region, which is considered a priority area for biological conservation (Drummond et al. 2005). The results showed here support for the importance of palm grove habitats for the maintenance of bird diversity, a habitat that has been overlooked by Brazilian authorities since the time of the establishment of protected areas. Northwestern Minas Gerais lacks federal large reserves in this important region (Camargos 2001).

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