

Assessment of Avian Occurrence in the Brazilian Chaco

Abstract

This study shows the magnitude of the avifauna occurring in the Brazilian Chaco biome, located in the central region of South America. The Chaco formation is present in Brazil, Paraguay, Bolivia and Argentina, comprising a large phyto physiognomy of nearly 800,000 km², of which 9,000 km² is located in Brazil, near the town of Porto Murtinho, a transition zone of the Pantanal wetland. It is formed by spiny trees which lose their small leaves during the dry season. During our field work we registered 326 species of wild birds, and, when added to other published surveys, this number totalizes 355 species living within the Brazilian Chaco. The most common species were Tyrannidae (13.2%), followed by Thraupidae (9.2%) and Icteridae (4.9%). Fourteen officially listed threatened bird species were detected during our field work. Our results contribute to the knowledge on bird diversity living in the Brazilian Chaco, and to the potential attraction for sustainable tourism, as an incentive to protect the avifauna and their habitats, achieving conservation for the biodiversity of the region.

Keywords: Avifauna; Birdwatching; Chaco; Conservation; Threatened bird species

Research Article

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Introduction

The Chaco is one of the largest biomes in South America, rich in biodiversity, but facing increasing environmental disruptions due to demographic expansion and unsustainable use of natural resources. Wild species of birds can attract tourism as one element to conserve nature, providing economic incentives since biodiversity can represent important socioeconomic and environmental activities [1,2]. The Chaco is an arid subtropical biome in the center of South America, dominated by savanna vegetation and rare low forest. It is the second largest biome in South America [3]. This steppe Savanna vegetation formation, as it is known, comprises 520,000km² (46%) in Argentina, 230,000km² (32%) in Paraguay, 90,000km² (15%) in Bolivia and 9,000km² (7%) in Brazil. There is a predominance of xenomorphic vegetation, with deciduous trees, cacti and bromeliads [3-6]. The vast Quaternary plain between the Paraguay Parana rivers and the foothills of the western ranges, known as the 'Gran Chaco', is a natural region, 700 km wide in the east west direction and roughly 1,500 km from north to south, comprising an area estimated to range from 800,000 to 1,000,000km² [3,4,7].

In its extreme eastern portion is the Paraguay River in Brazilian territory [3], south of the Pantanal wetland, in the sub regions Porto Murtinho and Nabileque, and this comprises the wet Chaco [5,8]. It is a transition area among the surrounding biomes of the Pantanal wetland, namely the Cerrado (savanna), and the Dry Forests there is an interception among the vegetation formations, forming ecotones that cannot easily be identified by sight. There is high density of the palm tree "caranda" (*Copernicia alba* Morong), and other trees such as "paratudo" (*Handroanthus aureus* Mattos) and "piuva" (*H. heptaphylla* (Vell.) Mattos) [3,6]. The Chaco forest in north eastern Argentina and Paraguay, entering Brazilian territory, near the city of Porto Murtinho, is dominated by a

hardwood tree red quebracho (*Schinopsis balansae* Engl) which is typical of this region [3,8]. The Brazilian Chaco has lately received increasing research attention, especially in plant sciences, but there have been few studies on wild birds. Some studies have even stressed the lack of avian surveys for that region [9,10]. The last survey carried out in the Brazilian Chaco region reached 282 bird species [11]. This list of species includes previously collected secondary data [9,12]. The aim of the present study is to contribute to the knowledge of the rich and diverse avifauna of the Brazilian Chaco region, to pursue conservation and to attract tourists to the region, and thus to implement sustainable use through tourism and birdwatching activities.

Materials and Methods

Study area

This study was conducted throughout the Chaco region of Porto Murtinho, in the southwestern part of the state of Mato Grosso do Sul, in Brazil [3]. The regional climate is hot and dry, with annual average rainfall of 970.3 mm and temperature of 25 °C, with a rainy season from November to February [13]. The environmental seasonality within this region is more marked by rainfall than by change in temperature. Different kinds of habitats were surveyed, including riparian forest, open dry and flooded fields, savanna (Cerrado) and steppe savanna (Chaco), forest and areas under human use, such as pastures (Figure 1).

Field surveys

Short term and intensive bird surveys were carried out in the field from 2002 to 2015. Six expeditions were conducted with variable length of duration, covering terrestrial and fluvial routes, starting at 06h00 and going until 11h00, and then from 14h00 until 17h30. The search for nocturnal species ran from

19h00 until 22h00. Occasional and opportunistic bird registers were also recorded during our journeys, including directed visual observation and bird vocalization signals. The detected species

were photographed whenever possible, to serve as evidence of occurrence. The surveyed areas are shown in Table 1.

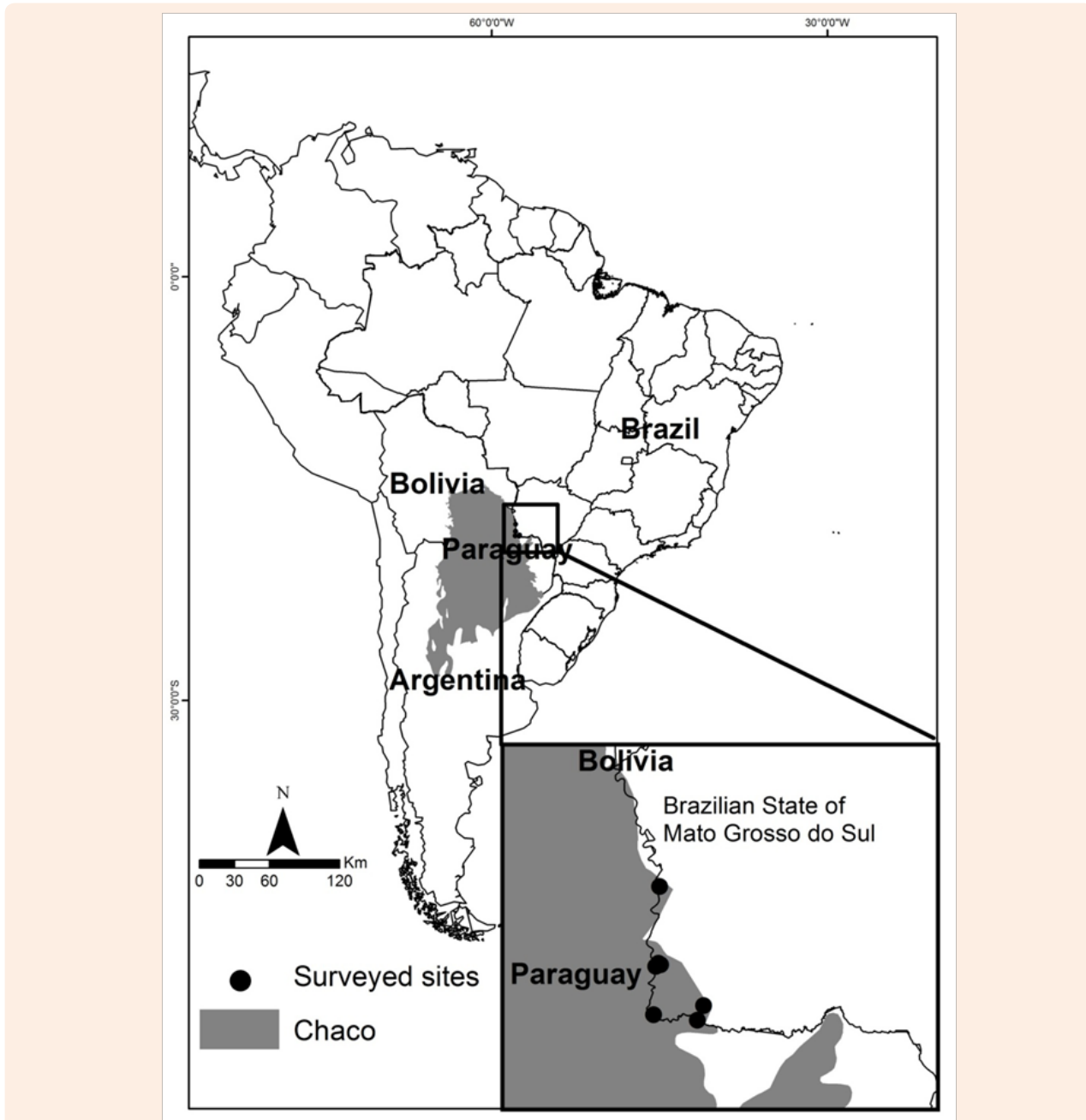


Figure 1: The Chaco in South America comprising the countries of Argentina, Bolivia, Paraguay and Brazil.

Characteristics of the surveyed sites

Cachoeirado apa municipal park: This Park is located at the margins of the Perdido and Apa rivers, on the border between Brazil and Paraguay. The habitats include gallery forest, seasonal forest and savanna formations (Cerrado) with influence of Chaco

environment. The Park is included in the rural area, lying 85 km from the urban zone of Porto Murтинho.

Urban area of porto murтинho and paraguay river banks: The urban zone of the town of Porto Murтинho is located on the left bank of the Paraguay River, and despite the presence of 15,000

inhabitants, there are still some remnants of natural vegetation. Some key-trees are present: species of *Prosopis*, *Zizyphus*, *Schinopsis*, *Aspidosperma* and others.

Barranco branco station: This site is characterized by typical Chaco vegetation, including the predominance of the caranda palm *Copernicia alba* (common in steppe park savanna) on the left bank of the Paraguay River. Flooded fields are present along with

the typical phyto physiognomies of Chaco: woody-grassy savanna, steppe scrub savanna and forested steppe savanna.

Ingazeira station: This area also presents typical Chaco vegetation such as riparian forest, deciduous forest, savanna forest; swamp sand flooded open fields with significant presence of woody-grassy savanna, steppe scrub savanna, steppe park savanna and forested steppe savanna.

Table 1: Surveyed area covered by field work from 2002 to 2015 throughout the Brazilian Chaco region near Porto Murtinho.

| Surveyed Sites | Duration of the Survey (days) | Survey Period | Geographic Coordinates |
|--|-------------------------------|---|--------------------------------|
| Cachoeira do Apa Municipal Park | 4 | August 2002, January 2003 | 22°10'21.08"S 57°30'58.5"W |
| Urban area of Porto Murtinho | 2-Jan | August 2002, January 2003, February 2008, June 2015, October 2015 | 21°41'42.01"S 57°52'42.2"W |
| Margin of the Paraguay River | 2-Jan | Oct-15 | 21°42'37.7"S 57°54'8.7"W |
| Barranco Branco Station | 4 | February 2008, June 2015 | 21°5'58.6"S 57°50'37.8"W |
| Ingazeira Station | 3 | February 2008, June 2015 | 22°4'53.6"S 57°56'23.1"W |
| Dam to Control Flooding and Rural Area | 2-Jan | February 2008, June 2015, October 2015 | 21°41'18.1"S 57°52'46.8"W |
| Road BR- 267/MS | 1 | February 2008, June 2015, Oct-15 | 21°41'59.33"S 57°51'47.38"W |
| Cerro Pora Cattle Ranch | 4 | December 2015 | 22°01'44.0"S 57°31'22.0"W |
| Cangalha Cattle Ranch | 4 | December 2015 | 22°08'21"S 57°34'50"W |

Dam to control flooding and rural area: The vegetation cover of this study site is mainly formed by steppe woody-grassy savanna, steppe park savanna, forest steppe savanna and steppe scrub savanna. Besides the presence of the palm caranda *Copernicia alba*, other trees were noted such as *Proposis* spp. and *Zizyphus oblongifolius*.

Road BR-267/MS: Along this road and its surroundings there is vegetation cover like savanna (Cerrado), remnants of seasonal deciduous forest, and transitions to the Pantanal wetland.

Cerro pora cattle ranch: This region shows a predominance of savanna (Cerrado), seasonal deciduous forest and gallery forest. The Chaco vegetation is restricted to some transition to Cerrado. Open fields are present. The area is used for cattle ranching.

Cangalha cattle ranch: This area is also used for cattle ranching, with some vegetation cover still present, including Cerrado and flooded fields. The species names and taxonomic arrangements adopted here follow [14].

Results and Discussion

Chaco or "chaku", in the Quechua language, means hunting territory, with high bird richness. The Brazilian part of the Chaco harbors different habitats for bird species, with influence

of the savanna floral province (Cerrado) and the Pantanal wetland. However, the dry vegetation formation of the Chaco has its own characteristics: it is an environment that is more xeric than hydric, with some plant species like *S. balansae*, *Aspidosperma quebracho-blanco*, *Caesalpinia paraguariensis*, *Acacia* spp., *Prosopis* spp. and others. We registered 326 bird species during our survey. The most representative bird families were Tyrannidae (13.2%), Thraupidae (9.2%) and Icteridae (4.9%). Among the non Passeriformes the families with most representatives were Accipitridae (8.3%), Picidae (7.7%) and Psittacidae (7.7%). The Tyrannidae is the largest bird taxonomic family of the Neotropics, representing about 18% of the passeri forms of South America [15]. This family includes frugivore and phytovore species [14]. Among the Icteridae are the blackbirds, much sought after by birdwatchers. The list of the bird species encountered during our survey is summarized in Table 2. The number of bird species (326), registered in our present field survey, contributes to the ornithological knowledge of the region. Our results show that 253 species had already been registered in a previous survey [11]. Comparing our study to another survey carried out in the Argentine Chaco [16], which accounted for the occurrence of 96 species living in the understory of the forest, 69 species were coincident with our present study. Comparing our results to Bolivia, 80 species out of a total of 110 species found in

a Bolivian Chaco survey [17] were also recorded in our present study. In connection with the Paraguay part of the Chaco, 233 bird species were registered there [18], and 194 species of those were also registered in this present study. Therefore, our survey shows the occurrence of 73 bird species which represent a new register for the Brazilian Chaco. Thus, the present survey plus the previous one for the Brazilian Chaco [11] totalize 355 bird species for the region. The species *Saltator multicolor* deserves special reference, as it was recently found in the region, and its photographic register is documented in Wiki Aves [19]. This is an endemic species living in xeric forest of the Chaco [7,20,21]. Our present study also registered the occurrence of representative or endemic species of the Chaco, previously registered by

other researchers [7,20,22,23], such as *Rhea americana* (cf. *R. americana araneipes*), *Nothura boraquira*, *Ortalis canicollis*, *Phaethornis subochraceus*, *Nystalus striatipectus*, *Melanerpes cactorum*, *Celeus lugubris*, *Campephilus leucopogon*, *Cariama cristata*, *Thectocercus acuticaudatus*, *Aratinga nenday*, *Pyrrhura devillei*, *Myiopsitta monachus*, *Amazona aestiva* (cf. *Amazona aestiva xanthopteryx*), *Thamnophilus doliatus*, *Thamnophilus caerulescens* (cf. *T. caerulescens paraguayensis*), *Campylorhamphus trochilirostris* (cf. *C. trochilirostris lafresnayanus*), *Xiphocolaptes major*, *Pseudoseisura unirufa*, *Xenopsaris a. albinucha*, *Suiriri suiriri*, *Xolmis irupero*, *Paroaria capitata*, *Saltatricula multicolor* and *Microspingus melanoleucus*.

Table 2: Surveyed area covered by field work from 2002 to 2015 throughout the Brazilian Chaco region near Porto Murtinho.

| Taxon | English Name | Habitat | Status | Trophic guild | Surveyed Sites |
|----------------------------------|------------------------------|------------------|--------|---------------|-------------------|
| Rheiformes | | | | | |
| Rheidae | | | | | |
| <i>Rhea Americana</i> | Greater Rhea | | | ONI | 1,2,5,7,8 |
| Tinamiformes | | | | | |
| Tinamidae | | | | | |
| <i>Crypturellus Undulatus</i> | Undulated Tinamou | FO | | ONI | 1,4,5,8,9 |
| <i>Crypturellus Parvirostris</i> | Small-Billed Tinamou | OP Ce | | ONI | 1,2,5,6,8 |
| <i>Crypturellus Tataupa</i> | Tataupa Tinamou | FO | | ONI | 1,4,5,8,9 |
| <i>Rhynchotus Rufescens</i> | Red-Winged Tinamou | OP Ce | | ONI | 7,8 |
| <i>Nothura Boraquira</i> | White-Bellied Nothura | FO, OP Ce, OP Ch | | ONI | 1,9 |
| <i>Nothura Maculosa</i> | Spotted Nothura | OP Ce | | ONI | 1,7,8,9 |
| Anseriformes | | | | | |
| Anhimidae | | | | | |
| <i>Chauna Torquata</i> | Southern Screamer | A | | ONI | 1,2,6,7 |
| Anatidae | | | | | |
| <i>Dendrocygna Autumnalis</i> | Black-Bellied Whistling-Duck | A | R | ONI | 1,2,5,7,8 |
| <i>Cairina Moschata</i> | Muscovy Duck | A | R | ONI | 1,2,5,6,7,9,9 |
| <i>Callonetta Leucophrys</i> | Ringed Teal | A | AM | ONI | 7 |
| <i>Amazonetta Brasiliensis</i> | Brazilian Teal | A | R | ONI | 2,5 |
| <i>Nomonyx Dominicus</i> | Masked Duck | A | R | ONI | 7 |
| Galliformes | | | | | |
| Cracidae | | | | | |
| <i>Penelope Superciliaris</i> | Rusty-Margined Guan | FO | | FRU | 1,8,9 |
| <i>Aburria Cumanensis</i> | Blue-Throated Piping-Guan | FO | | FRU | 1,2,3,4,5,6,9 |
| <i>Ortalis Canicollis</i> | Chaco Chachalaca | FO, OP Ce, OP Ch | | FRU | 1,2,3,4,5,6,7,8,9 |
| <i>Crax Fasciolata</i> | Bare-Faced Curassow | FO | | FRU | 1,4,5 |
| Podicipediformes | | | | | |
| Podicipedidae | | | | | |
| <i>Tachybaptus Dominicus</i> | Least Grebe | A | R | ONI | 5,7 |

| | | | | | |
|----------------------------------|------------------------------|------------------|-----|---------|-------------------|
| Ciconiiformes | | | | | |
| Ciconiidae | | | | | |
| <i>Ciconia Maguari</i> | Maguari Stork | A | ICA | PIS/CAR | 5,7 |
| <i>Jabiru Mycteria</i> | Jabiru | A | ICA | PIS/CAR | 2,5,6,7 |
| <i>Mycteria Americana</i> | Wood Stork | A | ICA | PIS | 4,5,6,7 |
| Suliformes | | | | | |
| Phalacrocoracidae | | | | | |
| <i>Nannopterum Brasilianus</i> | Neotropic Cormorant | A | R | PIS | 1,3,4,5,6 |
| Anhingidae | | | | | |
| <i>Anhinga Anhinga</i> | Anhinga | A | | PIS | 1,3,4,5,6,7 |
| Pelecaniformes | | | | | |
| Ardeidae | | | | | |
| <i>Tigrisoma Lineatum</i> | Rufescent Tiger-Heron | A | | PIS/CAR | 1,3,5,6,7,8,9 |
| <i>Cochlearius cochlearius</i> | Boat-Billed Heron | A | | PIS/CAR | 1 |
| <i>Nycticorax Nycticorax</i> | Black-Crowned Night-Heron | A | | ONI | 1,2,3,5 |
| <i>Butorides Striata</i> | Striated Heron | A | ICA | ONI | 1,2,3,4,5,6,7 |
| <i>Bubulcus Ibis</i> | Cattle Egret | AA | ICA | INS | 2,5,7,8,9 |
| <i>Ardea Cocoli</i> | Cocoli Heron | A | | PIS/CAR | 1,3,4,5,7 |
| <i>Ardea Alba</i> | Great Egret | A | ICA | PIS/CAR | 1,2,3,4,5,6,7,8,9 |
| <i>Syrigma Sibilatrix</i> | Whistling Heron | A, OP Ce, OP Ch | | ONI | 1,2,4,5,7,8 |
| <i>Pilherodius Pileatus</i> | Capped Heron | A | | PIS/CAR | 1,5,7 |
| <i>Egretta Thula</i> | Snowy Egret | A | ICA | PIS/CAR | 1,2,3,4,5,6,7 |
| Threskiornithidae | | | | | |
| <i>Plegadis Chihi</i> | White-Faced Ibis | A | ICA | ONI | 7 |
| <i>Mesembrinibis Cayennensis</i> | Green Ibis | A, FO | R | ONI | 1,5 |
| <i>Phimosus Infuscatus</i> | Bare-Faced Ibis | A | R | ONI | 2,5,6,7,8 |
| <i>Theristicus Caerulescens</i> | Plumbeous Ibis | A, FO | | ONI | 1,2,3,4,5,6,7,8,9 |
| <i>Theristicus Caudatus</i> | Buff-Necked Ibis | A, OP Ce, OP Ch | | ONI | 1,2,5,7,8 |
| <i>Platalea Ajaja</i> | Roseate Spoonbill | A | ICA | ONI | 1,2,5,7 |
| Cathartiformes | | | | | |
| Cathartidae | | | | | |
| <i>Cathartes Aura</i> | Turkey Vulture | FO, OP Ce, OP Ch | AM | DET | 1,2,4,5,7,8,9 |
| <i>Cathartes Burroviannus</i> | Lesser Yellow-Headed Vulture | FO, OP Ce, OP Ch | | DET | 1,2,3,4,5,6,7,8,9 |
| <i>Coragyps Atratus</i> | Black Vulture | AA, OP Ce, OP Ch | | DET | 1,2,3,4,5,6,7,8,9 |
| <i>Sarcoramphus Papa</i> | King Vulture | OP Ce | | DET | 1,8 |
| Accipitriformes | | | | | |
| Pandionidae | | | | | |
| <i>Pandion Haliaetus</i> | Osprey | A | S | PIS | 1,3,4 |
| Accipitridae | | | | | |
| <i>Leptodon Cayanensis</i> | Gray-Headed Kite | FO | | CAR | 1 |

| | | | | | |
|-----------------------------------|------------------------|------------------|-----|---------|-------------------|
| <i>Chondrohierax Uncinatus</i> | Hook-Billed Kite | FO | | CAR | 5,7 |
| <i>Gampsonyx Swainsonii</i> | Pearl Kite | FO, OP Ce, OP Ch | | CAR | 1,2 |
| <i>Elanus Leucurus</i> | White-Tailed Kite | OP Ce, OP Ch | | CAR | 2,5,7,8 |
| <i>Accipiter Striatus</i> | Sharp-Shinned Hawk | FO | | CAR | 5 |
| <i>Ictinia Plumbea</i> | Plumbeous Kite | OP Ce, OP Ch | R | CAR/INS | 1,4,7,8,9 |
| <i>Busarellus Nigricollis</i> | Black-Collared Hawk | A | | PIS/CAR | 1,2,3,4,5,6,7 |
| <i>Rostrhamus Sociabilis</i> | Snail Kite | A | R | MAL | 1,2,5,6,7 |
| <i>Geranospiza Caerulescens</i> | Crane Hawk | FO, OP Ce, OP Ch | | CAR | 1,2,4,5,7 |
| <i>Heterospizias Meridionalis</i> | Savanna Hawk | OP Ce, OP Ch | | CAR | 1,2,3,4,5,6,7,8,9 |
| <i>Urubitinga Urubitinga</i> | Great Black Hawk | OP Ce, OP Ch | | CAR | 1,2,4,5,7 |
| <i>Urubitinga Coronata</i> | Crowned Eagle | OP Ce, OP Ch | | CAR | 5 |
| <i>Rupornis Magnirostris</i> | Roadside Hawk | OP Ce, OP Ch | | CAR | 1,2,4,5,6,7,8,9 |
| <i>Geranoaetus Albicaudatus</i> | White-Tailed Hawk | OP Ce | | CAR | 1,2,7,8,9 |
| Gruiformes | | | | | |
| Aramidae | | | | | |
| <i>Aramus Guarauna</i> | Limpkin | A | R | MAL | 1,2,4,5,6,7,9 |
| Rallidae | | | | | |
| <i>Aramides Ypecaha</i> | Giant Wood-Rail | A | | ONI | 1,2,4,5,7,8,9 |
| <i>Aramides Cajaneus</i> | Gray-Necked Wood-Rail | A | | ONI | 1,2,5 |
| <i>Laterallus Melanophaius</i> | Rufous-Sided Crake | A | | ONI | 5 |
| <i>Mustelirallus Albigollis</i> | Ash-Throated Crake | A | | ONI | 2,5,8 |
| <i>Pardirallus Maculatus</i> | Spotted Rail | A | ICA | ONI | 5,7 |
| <i>Pardirallus Nigricans</i> | Blackish Rail | A | ICA | ONI | 5,7 |
| <i>Gallinula Galeata</i> | Common Gallinule | A | ICA | ONI | 2,5,7 |
| <i>Porphyrio Martinicus</i> | Purple Gallinule | A | ICA | ONI | 1,2,5,6,7 |
| Heliornithidae | | | | | |
| <i>Heliornis Fulica</i> | Sungrebe | A | ICA | ONI | 1,4 |
| Charadriiformes | | | | | |
| Charadriidae | | | | | |
| <i>Vanellus Cayanus</i> | Pied Lapwing | A | ICA | ONI | 1,4,5,7 |
| <i>Vanellus Chilensis</i> | Southern Lapwing | AA, OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| <i>Charadrius Collaris</i> | Collared Plover | A | ICA | ONI | 4,5 |
| Recurvirostridae | | | | | |
| <i>Himantopus Melanurus</i> | White-Backed Stilt | A | R | ONI | 1,5,6,7 |
| Scolopacidae | | | | | |
| <i>Gallinago Paraguaiae</i> | South American Snipe | A | ICA | ONI | 7 |
| <i>Bartramia Longicauda</i> | Upland Sandpiper | OP Ce, OP Ch | S | ONI | 7 |
| <i>Tringa Solitaria</i> | Solitary Sandpiper | A | S | ONI | 1,5,7,8 |
| <i>Tringa Melanoleuca</i> | Greater Yellowlegs | A | S | ONI | 7 |
| <i>Tringa Flavipes</i> | Lesser Yellowlegs | A | S | ONI | 1,7 |
| <i>Calidris Fuscicollis</i> | White-Rumped Sandpiper | A | S | ONI | 7 |

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|-------------------------|----------------------------|----------------------|---|---------|-------------------|
| Calidris Melanotos | Pectoral Sandpiper | A | S | ONI | 7 |
| Calidris Himantopus | Stilt Sandpiper | A | S | ONI | 7 |
| Jacanidae | | | | | |
| Jacana Jacana | Wattled Jacana | A | | ONI | 1,2,4,5,6,7,8,9 |
| Sternidae | | | | | |
| Sternula Superciliaris | Yellow-Billed Tern | A | R | PIS | 1,2,3,5 |
| Phaetusa Simplex | Large-Billed Tern | A | R | PIS | 1,2,3,5 |
| Rynchopidae | | | | | |
| Rynchops Niger | Black Skimmer | A | R | PIS | 1,3,7 |
| Columbiformes | | | | | |
| Columbidae | | | | | |
| Columbina Minuta | Plain-Breasted Ground-Dove | OP Ce, OP Ch | | ONI | 5,6,9 |
| Columbina Talpacoti | Ruddy Ground-Dove | OP Ce, OP Ch | R | ONI | 1,2,3,4,5,6,7,8,9 |
| Columbina Squammata | Scaled Dove | OP Ce, OP Ch | | ONI | 1,2,4,5,6,8,9 |
| Columbina Picui | Picui Ground-Dove | OP Ce, OP Ch | R | ONI | 1,2,3,4,5,6,7,8,9 |
| Claravis Pretiosa | Blue Ground-Dove | FO, OP Ce, OP Ch | R | ONI | 1,4,5,8 |
| Columba Livia | Rock Pigeon | AA | | ONI | 2 |
| Patagioenas Picazuro | Picazuro Pigeon | AA, FO, OP Ce, OP Ch | R | ONI | 1,2,4,5,6,7,8,9 |
| Patagioenas Cayennensis | Pale-Vented Pigeon | AA, FO, OP Ce, OP Ch | R | ONI | 1,2,4,5,7,8,9 |
| Zenaida Auriculata | Eared Dove | AA, OP Ce, OP Ch | R | ONI | 1,2,3,4,5,6,7,8,9 |
| Leptotila Verreauxi | White-Tipped Dove | FO, OP Ce, OP Ch | | ONI | 1,2,4,5,6,8,9 |
| Leptotila Rufaxilla | Gray-Fronted Dove | FO, OP Ce | | ONI | 1,8,9 |
| Cuculiformes | | | | | |
| Cuculidae | | | | | |
| Piaya Cayana | Squirrel Cuckoo | FO | | ONI | 1,2,4,5,8,9 |
| Coccyzus Melacoryphus | Dark-Billed Cuckoo | OP Ce, OP Ch | R | ONI | 6 |
| Crotophaga Major | Greater Ani | A, FO | R | ONI | 1,3,5 |
| Crotophaga Ani | Smooth-Billed Ani | AA, OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| Guira Guira | Guira Cuckoo | AA, OP Ce, OP Ch | | ONI | 1,2,4,5,6,7,8,9 |
| Tapera Naevia | Striped Cuckoo | A, OP Ce, OP Ch | | ONI | 1,4,5,6 |
| Strigiformes | | | | | |
| Tytonidae | | | | | |
| Tyto Furcata | American Barn Owl | AA, OP Ce, OP Ch | | CAR | 1,2,4 |
| Strigidae | | | | | |
| Megascops Choliba | Tropical Screech-Owl | FO, OP Ce, OP Ch | | CAR/INS | 1,2,4,5 |
| Pulsatrix Perspicillata | Spectacled Owl | FO | | CAR | 1 |
| Bubo Virginianus | Great Horned Owl | FO | | CAR | 1,4,5,6 |
| Glaucidium Brasilianum | Ferruginous Pygmy-Owl | FO, OP Ce, OP Ch | | CAR | 1,2,4,5,8 |
| Athene Cunicularia | Burrowing Owl | AA, OP Ce, OP Ch | | CAR/INS | 1,2,6,7,8,9 |
| Nyctibiiformes | | | | | |
| Nyctibiidae | | | | | |

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|--------------------------|-----------------------------|----------------------|----|---------|-------------------|
| Nyctibius Griseus | Common Potoo | OP Ce, OP Ch | | INS | 1,2,4,5,8,9 |
| Caprimulgiformes | | | | | |
| Caprimulgidae | | | | | |
| Antrostomus Rufus | Rufous Nightjar | | | | |
| Nyctidromus Albicollis | Common Pauraque | FO, OP Ce, OP Ch | | INS | 1,2,4,5,8,9 |
| Hydropsalis Parvula | Little Nightjar | FO, OP Ce, OP Ch | S | INS | 1,2,4,5,8,9 |
| Hydropsalis Maculicaudus | Spot-Tailed Nightjar | FO, OP Ce, OP Ch | | INS | 5 |
| Hydropsalis Torquata | Scissor-Tailed Nightjar | FO, OP Ce, OP Ch | | INS | 1,2,4,5 |
| Podager Nacunda | Nacunda Nighthawk | OP Ce, OP Ch | AM | INS | 1,2,4,5,8,9 |
| Apodiformes | | | | | |
| Apodidae | | | | | |
| Chaetura Meridionalis | Sick's Swift | OP Ce | S | INS | 7, 8 |
| Trochilidae | | | | | |
| Phaethornis Subochraceus | Buff-Bellied Hermit | FO | | NEC | 1 |
| Eupetomena Macroura | Swallow-Tailed Hummingbird | AA, OP Ce, OP Ch | | NEC | 2, 6 |
| Chlorostilbon Lucidus | Glittering-Bellied Emerald | AA, OP Ce, OP Ch | | NEC | 1,2,4,5,6,8,9 |
| Thalurania Furcata | Fork-Tailed Woodnymph | FO | | NEC | 1,8,9 |
| Hylocharis Chrysura | Gilded Hummingbird | AA, OP Ce, OP Ch | | NEC | 1,2,4,5,6,7,8,9 |
| Heliomaster Fuscifer | Blue-Tufted Starthroat | FO | | NEC | 1,5 |
| Trogoniformes | | | | | |
| Trogonidae | | | | | |
| Trogon Curucui | Blue-Crowned Trogon | FO | | ONI | 1,2,3,4,5,8,9 |
| Coraciiformes | | | | | |
| Alcedinidae | | | | | |
| Megaceryle Torquata | Ringed Kingfisher | A | | PIS | 1,2,3,4,5,7,8 |
| Chloroceryle Amazona | Amazon Kingfisher | A | | PIS | 1,3,5 |
| Chloroceryle Aenea | American Pygmy Kingfisher | A | | PIS | 1 |
| Chloroceryle Americana | Green Kingfisher | A | | PIS | 1,3,5 |
| Chloroceryle Inda | Green-And-Rufous Kingfisher | A | | PIS | |
| Momotidae | | | | | 1 |
| Momotus Momota | Amazonian Motmot | FO | | ONI | 1,2,3,4,5,7,8 |
| Galbuliformes | | | | | |
| Galbulidae | | | | | |
| Galbula Ruficauda | Rufous-Tailed Jacamar | FO | | INS | |
| Bucconidae | | | | | 1 |
| Nystalus Chacuru | White-Eared Puffbird | OP Ce | | ONI | 8 |
| Nystalus Striatipectus | Chaco Puffbird | OP Ce, OP Ch | | ONI | 1,2,4,5,8,9 |
| Piciformes | | | | | |
| Ramphastidae | | | | | |
| Ramphastos Toco | Toco Toucan | AA, FO, OP Ce, OP Ch | | ONI/FRU | 1,2,3,4,5,6,7,8,9 |

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| Pteroglossus Castanotis | Chestnut-Eared Aracari | FO | | ONI/FRU | 1,2,4,5,8,9 |
| Picidae | | | | | |
| Picumnus Cirratus | White-Barred Piculet | OP Ce, OP Ch | | INS | 1,4,5 |
| Picumnus Albosquamatus | White-Wedged Piculet | OP Ce, OP Ch | | INS | 1,3,5 |
| Melanerpes Candidus | White Woodpecker | AA, OP Ce, OP Ch | | INS | 1,2,4,5,7,8,9 |
| Melanerpes Cactorum | White-Fronted Woodpecker | OP Ch | | INS | 5 |
| Veniliornis Passerinus | Little Woodpecker | FO, OP Ce, OP Ch | | INS | 1,2,4,5,8,9 |
| Veniliornis Mixtus | Checkered Woodpecker | OP Ce, OP Ch | | INS | 2,4,5,6 |
| Piculus Chrysochloros | Golden-Green Woodpecker | FO | | INS | 1,4,5,6,8,9 |
| Colaptes Melanochloros | Green-Barred Woodpecker | AA, FO, OP Ce, OP Ch | | INS | 1,2,4,5,6,7,8,9 |
| Colaptes Campestris | Campo Flicker | AA, OP Ce, OP Ch | | INS | 1,2,4,5,6,7,8,9 |
| Celeus Lugubris | Pale-Crested Woodpecker | FO | | INS | 1,3,4,5,8,9 |
| Dryocopus Lineatus | Lineated Woodpecker | FO | | INS | 1,8,9 |
| Campephilus Melanoleucos | Crimson-Crested Woodpecker | FO, OP Ce, OP Ch | | INS | 1,2,4,5,8,9 |
| Campephilus Leucopogon | Cream-Backed Woodpecker | FO, OP Ch | | INS | 5 |
| Cariamiformes | | | | | |
| Cariamidae | | | | | |
| Cariama Cristata | Red-Legged Seriema | OP Ce, OP Ch | | ONI | 1,2,4,5,6,7,8,9 |
| Falconiformes | | | | | |
| Falconidae | | | | | |
| Caracara Plancus | Southern Caracara | OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| Milvago Chimachima | Yellow-Headed Caracara | OP Ce, OP Ch | | ONI | 1,2,4,5,6,7 |
| Herpetotheres Cachinnans | Laughing Falcon | OP Ce, OP Ch | | CAR | 1,2,4,5,6,7,8,9 |
| Micrastur Semitorquatus | Collared Forest-Falcon | FO | | CAR | 1,4 |
| Falco Sparverius | American Kestrel | OP Ce, OP Ch | R | CAR | 1,2,4,5,6,7,8,9 |
| Falco Ruficularis | Bat Falcon | OP Ce, OP Ch | | CAR | 1 |
| Falco Femoralis | Aplomado Falcon | | ICA | CAR | 1,2,4,5,7,8,9 |
| Psittaciformes | | | | | |
| Psittacidae | | | | | |
| Anodorhynchus Hyacinthinus | Hyacinth Macaw | FO, OP Ce, OP Ch | | FRU | 1,7 |
| Ara Chloropterus | Red-And-Green Macaw | OP Ce, OP Ch | | FRU | 1,2,4,5,6,7,8,9 |
| Primolius Auricollis | Yellow-Collared Macaw | FO, OP Ce, OP Ch | | FRU | 1,4,5,7 |
| Thectocercus Acuticaudatus | Blue-Crowned Parakeet | FO, OP Ce, OP Ch | | FRU | 1,2,4,5 |
| Psittacara Leucophthalmus | White-Eyed Parakeet | FO, OP Ce, OP Ch | | FRU | 1,2,4,5,6,8,9 |
| Aratinga Nenday | Nanday Parakeet | OP Ce, OP Ch | | FRU | 1,2,3,4,5,7,8,9 |
| Eupsittula Aurea | Peach-Fronted Parakeet | OP Ce, OP Ch | | FRU | 8,9 |
| Pyrrhura Devillei | Blaze-Winged Parakeet | FO, OP Ce, OP Ch | | FRU | 1,4,5,8,9 |
| Myiopsitta Monachus | Monk Parakeet | AA, FO, OP Ce, OP Ch | | FRU | 1,2,3,4,5,6,7,8,9 |
| Forpus Xanthopterygius | Blue-Winged Parrotlet | OP Ce | | FRU | 8,9 |
| Brotogeris Chiriri | Yellow-Chevroned Parakeet | AA, OP Ce, OP Ch | | FRU | 1,2,3,4,5,6,7,8,9 |

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| Pionus Maximiliani | Scaly-Headed Parrot | FO, OP Ce, OP Ch | | FRU | 1,2,3,4,5,6,7,8,9 |
| Amazona Aestiva | Turquoise-Fronted Parrot | FO, OP Ce, OP Ch | | FRU | 1,2,4,5,6,8,9 |
| Passeriformes | | | | | |
| Thamnophilidae | | | | | |
| Formicivora Rufa | Rusty-Backed Antwren | OP Ce, OP Ch | | INS | 1,2,8,9 |
| Thamnophilus Doliatus | Barred Antshrike | FO, OP Ce, OP Ch | | INS | 1,2,3,4,5,6,8,9 |
| Thamnophilus Caerulescens | Variable Antshrike | FO, OP Ce, OP Ch | | INS | 1,4,5,8,9 |
| Taraba Major | Great Antshrike | FO, OP Ce, OP Ch | | INS | 1,2,3,4,5,6,8,9 |
| Cercomacra Melanaria | Mato Grosso Antbird | FO | | INS | 1,5 |
| Dendrocolaptidae | | | | | |
| Sittasomus Griseicapillus | Olivaceous Woodcreeper | FO, OP Ce, OP Ch | | INS | 1,2,3,4,5,6,8,9 |
| Campylorhamphus Trochilirostris | Red-Billed Scythebill | FO | | INS | 1,4,5 |
| Lepidocolaptes Angustirostris | Narrow-Billed Woodcreeper | OP Ce, OP Ch | | INS | 1,2,4,5,6,7,8,9 |
| Dendrocolaptes Platyrostris | Planalto Woodcreeper | FO | | INS | 8,9 |
| Xiphocolaptes Major | Great Rufous Woodcreeper | FO, OP Ce, OP Ch | | INS | 1,2,4,5,8,9 |
| Furnariidae | | | | | |
| Furnarius Leucopus | Pale-Legged Hornero | FO | | ONI | 1 |
| Furnarius Rufus | Rufous Hornero | AA, FO, OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| Pseudoseisura Unirufa | Rufous Cacholote | FO, OP Ce, OP Ch | | INS | 1,2,4,5 |
| Phacellodomus Rufifrons | Rufous-Fronted Thornbird | OP Ce, OP Ch | | INS | 1,2,4,5,6,8,9 |
| Phacellodomus Ruber | Greater Thornbird | OP Ce, OP Ch | | INS | 1,2,4,5,8,9 |
| Anumbius Annumbi | Firewood-Gatherer | OP Ce, OP Ch | | INS | 5,7 |
| Schoeniophylax Phryganophilus | Chotoy Spinetail | OP Ce, OP Ch | | INS | 1,2,4,5,7,8 |
| Certhiaxis Cinnamomeus | Yellow-Chinned Spinetail | A | | INS | 1,2,3,4,5,7,8,9 |
| Synallaxis Frontalis | Sooty-Fronted Spinetail | FO, OP Ce, OP Ch | | INS | 1,2,6,8,9 |
| Synallaxis Hypospodia | Cinereous-Breasted Spinetail | A | | INS | 5,8,9 |
| Synallaxis Albilora | White-Lored Spinetail | FO | | INS | 1,3,4,5,8,9 |
| Cranioleuca Vulpina | Rusty-Backed Spinetail | A, FO | | INS | 1,4,5 |
| Pipridae | | | | | |
| Pipra Fasciicauda | Band-Tailed Manakin | FO | | FRU | 1 |
| Tityridae | | | | | |
| Tityra Inquisitor | Black-Crowned Tityra | FO, OP Ce, OP Ch | | ONI | 1,4,5,8,9 |
| Tityra Cayana | Black-Tailed Tityra | FO, OP Ce, OP Ch | | ONI | 1,4,5,8,9 |
| Pachyramphus Viridis | Green-Backed Becard | FO, OP Ce, OP Ch | | INS | 1,4,5,8,9 |
| Pachyramphus Polychopterus | White-Winged Becard | FO, OP Ce, OP Ch | AM | INS | 1,2,4,5,8,9 |
| Pachyramphus Validus | Crested Becard | FO, OP Ce | AM | INS | 8,9 |
| Xenopsaris Albinucha | White-Naped Xenopsaris | OP Ce, OP Ch | | INS | 7 |
| Platyrinchidae | | | | | |
| Platyrinchus Mystaceus | White-Throated Spadebill | FO | | INS | 1,8,9 |

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|-------------------------------------|-------------------------------|----------------------|-----|---------|-------------------|
| Rhynchocyclidae | | | | | |
| Leptopogon Amaurocephalus | Sepia-Capped Flycatcher | FO | AM | INS | 1,4,5,8,9 |
| Tolmomyias Sulphurescens | Yellow-Olive Flycatcher | FO | | INS | 1,5,8,9 |
| Todirostrum Cinereum | Common Tody-Flycatcher | AA, FO, OP Ce | | INS | 1,2,8,9 |
| Hemitriccus Margaritaceiventris | Pearly-Vented Tody-Tyrant | OP Ce, OP Ch | | INS | 1,2,4,5,6,8,9 |
| Tyrannidae | | | | | |
| Inezia Inornata | Plain Tyrannulet | OP Ce, OP Ch | AM | INS | 1,4,5,8,9 |
| Euscarthmus Meloryphus | Tawny-Crowned Pygmy-Tyrant | OP Ce, OP Ch | AM | INS | 1,4,5,8,9 |
| Camptostoma Obsoletum | Southern Beardless-Tyrannulet | FO, OP Ce, OP Ch | | INS | 1,2,3,4,5,6,8,9 |
| Elaenia Flavogaster | Yellow-Bellied Elaenia | OP Ce | ICA | INS/FRU | 8,9 |
| Elaenia Spectabilis | Large Elaenia | FO, OP Ce | AM | INS/FRU | 1,8,9 |
| Elaenia Chilensis | Chilean Elaenia | OP Ce, OP Ch | ICA | INS | 1 |
| Elaenia Parvirostris | Small-Billed Elaenia | OP Ce, OP Ch | ICA | INS | 5,7 |
| Elaenia Chiriquensis | Lesser Elaenia | OP Ce | ICA | INS | 8,9 |
| Suiriri Suiriri | Suiriri Flycatcher | OP Ce, OP Ch | ICA | INS | 4,5,8,9 |
| Myiopagis Gaimardii | Forest Elaenia | FO | | INS | 1,8,9 |
| Myiopagis Viridicata | Greenish Elaenia | FO | AM | INS | 1,4,5,8,9 |
| Phaeomyias Murina | Mouse-Colored Tyrannulet | OP Ce, OP Ch | AM | INS | 1,4,5,8,9 |
| Polystictus Pectoralis | Bearded Tachuri | OP Ce, OP Ch | AM | INS | 5 |
| Serpophaga Subcristata | White-Crested Tyrannulet | OP Ce, OP Ch | AM | INS | 1,4,5,8,9 |
| Legatus Leucophaeus | Piratic Flycatcher | FO, OP Ce, OP Ch | AM | INS | 1,8,9 |
| Myiarchus Swainsoni | Swainson's Flycatcher | FO, OP Ce, OP Ch | AM | INS | 1,4,8,9 |
| Myiarchus Ferox | Short-Crested Flycatcher | FO, OP Ce, OP Ch | | INS | 1,8,9 |
| Myiarchus Tyrannulus | Brown-Crested Flycatcher | OP Ce, OP Ch | | INS | 1,2,4,5,6,8,9 |
| Sirystes Sibilator | Sibilant Sirystes | FO | ICA | INS | 8,9 |
| Casiornis Rufus | Rufous Casiornis | FO, OP Ce, OP Ch | AM | INS | 1,2,3,4,5,6,7,8,9 |
| Pitangus Sulphuratus | Great Kiskadee | AA, FO, OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| Machetornis Rixosa | Cattle Tyrant | AA, OP Ce, OP Ch | ICA | INS | 1,2,3,4,5,6,7,8,9 |
| Myiodynastes Maculatus | Streaked Flycatcher | FO, OP Ce, OP Ch | AM | INS | 1,2,4,5,6,7,8,9 |
| Megarynchus Pitangua | Boat-Billed Flycatcher | FO, OP Ce, OP Ch | ICA | ONI | 1,2,3,4,5,6,7,8,9 |
| Myiozetetes Cayanensis | Rusty-Margined Flycatcher | A, FO | R | INS | 1,4,5,8,9 |
| Myiozetetes Similis | Social Flycatcher | A, FO | R | INS | 1 |
| Tyrannus Melancholicus | Tropical Kingbird | AA, OP Ce, OP Ch | AM | INS | 1,2,3,4,5,6,7,8,9 |
| Tyrannus Savana | Fork-Tailed Flycatcher | AA, OP Ce, OP Ch | AM | INS | 1,2,4,5,7,8,9 |
| Griseotyrannus Aurantioatrocrisatus | Crowned Slaty Flycatcher | AA, OP Ce, OP Ch | AM | INS | 1,2,4,5,6,7,8,9 |
| Empidonomus Varius | Variegated Flycatcher | OP Ce, OP Ch | AM | INS | 1,4,5,6,7,8,9 |
| Myiophobus Fasciatus | Bran-Colored Flycatcher | OP Ce, OP Ch | | INS | 1,5 |

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| <i>Sublegatus Modestus</i> | Southern Scrub-Flycatcher | OP Ce, OP Ch | AM | INS | 1,4,5,8,9 |
| <i>Pyrocephalus Rubinus</i> | Vermilion Flycatcher | OP Ce, OP Ch | AM | INS | 1,2,4,5,7,8,9 |
| <i>Fluvicola Albiventer</i> | Black-Backed Water-Tyrant | A | AM | INS | 1,2,4,5,6,7 |
| <i>Arundinicola Leucocephala</i> | White-Headed Marsh Tyrant | A | | INS | 1,4,5,6,7,8,9 |
| <i>Gubernetes Yetapa</i> | Streamer-Tailed Tyrant | A, OP Ce, OP Ch | ICA | INS | 1,8,9 |
| <i>Alectrurus Risor</i> | Strange-Tailed Tyrant | OP Ce, OP Ch | AM | INS | 1 |
| <i>Cnemotriccus Fuscatus</i> | Fuscous Flycatcher | FO, OP Ce, OP Ch | AM | INS | 1,4,5,8,9 |
| <i>Hymenops Perspicillatus</i> | Spectacled Tyrant | OP Ce, OP Ch | AM | INS | 7 |
| <i>Satrapa Icterophrys</i> | Yellow-Browed Tyrant | OP Ce, OP Ch | AM | INS | 4,5,7 |
| <i>Xolmis Cinereus</i> | Gray Monjita | OP Ce, OP Ch | ICA | INS | 1,2,4,5,6,7,8,9 |
| <i>Xolmis Velatus</i> | White-Rumped Monjita | OP Ce, OP Ch | R | INS | 1,2,5,6,7,8,9 |
| <i>Xolmis Irupero</i> | White Monjita | OP Ce, OP Ch | R | INS | 1,2,4,5,6,7,8,9 |
| Vireonidae | | | | | |
| <i>Cyclarhis Gujanensis</i> | Rufous-Browed Peppershrike | FO, OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| <i>Vireo Chivi</i> | Chivi Vireo | OP Ce, OP Ch | AM | INS | 1,6,7,8 |
| Corvidae | | | | | |
| <i>Cyanocorax Cyanomelas</i> | Purplish Jay | FO, OP Ce, OP Ch | | ONI | 1,2,4,5,7,8,9 |
| <i>Cyanocorax Cristatellus</i> | Curl-Crested Jay | OP Ce | | ONI | 8,9 |
| <i>Cyanocorax Chrysops</i> | Plush-Crested Jay | FO | | ONI | 1,4,5,7,8,9 |
| Hirundinidae | | | | | |
| <i>Stelgidopteryx Ruficollis</i> | Southern Rough-Winged Swallow | A, FO | ICA | INS | 1,5,8 |
| <i>Progne Tapera</i> | Brown-Chested Martin | AA, OP Ce, OP Ch | ICA | INS | 1,2,3,4,5,6,7,8,9 |
| <i>Progne Chalybea</i> | Gray-Breasted Martin | AA, OP Ce, OP Ch | ICA | INS | 1,2,8,9 |
| <i>Tachycineta Albiventer</i> | White-Winged Swallow | A | | INS | 2,3,4,5 |
| <i>Tachycineta Leucorrhoa</i> | White-Rumped Swallow | OP Ce, OP Ch | ICA | INS | 1,7 |
| <i>Riparia Riparia</i> | Bank Swallow | OP Ce, OP Ch | S | | |
| <i>Hirundo Rustica</i> | Barn Swallow | OP Ce, OP Ch | S | INS | 1,7 |
| Troglodytidae | | | | | |
| <i>Troglodytes Musculus</i> | Southern House Wren | AA, OP Ce, OP Ch | | INS | 1,2,4,5,6,7,8,9 |
| <i>Campylorhynchus Turdinus</i> | Thrush-Like Wren | AA, FO, OP Ce, OP Ch | | INS | 1,2,3,4,5,6,7,8,9 |
| <i>Cantorchilus Guarayanus</i> | Fawn-Breasted Wren | FO | | INS | 1,4,5,7,8,9 |
| Donacobiidae | | | | | |
| <i>Donacobius Atricapilla</i> | Black-Capped Donacobius | A | | INS | 1,2,3 |
| Poliptilidae | | | | | |
| <i>Poliptila Dumicola</i> | Masked Gnatcatcher | OP Ce, OP Ch | | INS | 1,2,4,5,6,7,8,9 |
| Turdidae | | | | | |
| <i>Turdus Leucomelas</i> | Pale-Breasted Thrush | FO | S | ONI | 1,4 |
| <i>Turdus Rufiventris</i> | Rufous-Bellied Thrush | AA, FO, OP Ce, OP Ch | | ONI | 1,2,4,5,6,8,9 |
| <i>Turdus Amaurochalinus</i> | Creamy-Bellied Thrush | AA, FO, OP Ce, OP Ch | R | ONI | 1,2,4,5,6,8,9 |

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| Mimidae | | | | | |
| Mimus Saturninus | Chalk-Browed Mockingbird | AA, OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| Mimus Triurus | White-Banded Mockingbird | AA, OP Ce, OP Ch | AM | ONI | 1,2,7 |
| Motacillidae | | | | | |
| Anthus Lutescens | Yellowish Pipit | AA, OP Ce, OP Ch | R | INS | 1,7 |
| Passerellidae | | | | | |
| Zonotrichia Capensis | Rufous-Collared Sparrow | AA, OP Ce, OP Ch | | ONI | 1,2,8,9 |
| Ammodramus Humeralis | Grassland Sparrow | AA, OP Ce, OP Ch | | GRA | 7,8,9 |
| Arremon Flavivestris | Saffron-Billed Sparrow | FO | | GRA/INS | 1,5 |
| Parulidae | | | | | |
| Setophaga Pitiayumi | Tropical Parula | FO, OP Ce, OP Ch | | INS | 1,4,5,8,9 |
| Geothlypis Aequinoctialis | Masked Yellowthroat | OP Ce, OP Ch | | INS | 7 |
| Basileuterus Culicivorus | Golden-Crowned Warbler | FO | | INS | 1,4,5,8,9 |
| Myiothlypis Flaveola | Flavescent Warbler | FO | | INS | 1,4,5,8,9 |
| Icteridae | | | | | |
| Psarocolius Decumanus | Crested Oropendola | FO | | ONI | 1,4,5 |
| Procacicus Solitarius | Solitary Black Caciue | FO, OP Ce, OP Ch | | ONI | 1,2,6,7 |
| Cacicus Chrysopterus | Golden-Winged Caciue | FO, OP Ce, OP Ch | | ONI | 1,2,4,5,6,7,8,9 |
| Cacicus Haemorrhous | Red-Rumped Caciue | FO, OP Ce, OP Ch | | ONI | 1,8,9 |
| Icterus Pyrrhopterus | Variable Oriole | FO, OP Ce, OP Ch | | ONI | 1,2,4,5,6,7,8,9 |
| Icterus Croconotus | Orange-Backed Troupial | FO, OP Ce, OP Ch | | ONI | 1,2,3,4,5,7 |
| Gnorimopsar Chopi | Chopi Blackbird | AA, OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8 |
| Amblyramphus Holosericeus | Scarlet-Headed Blackbird | A | | ONI | 4,7 |
| Agelasticus Cyanopus | Unicolored Blackbird | A | R | ONI | 1,5,7,8,9 |
| Chrysomus Ruficapillus | Chestnut-Capped Blackbird | A | R | ONI | 1,2,5,7 |
| Pseudoleistes Guirahuro | Yellow-Rumped Marshbird | OP Ce | | ONI | 8,9 |
| Agelaioides Badius | Grayish Baywing | OP Ce, OP Ch | | ONI | 1,2,4,5,6,7,8,9 |
| Molothrus Rufoaxillaris | Screaming Cowbird | AA, OP Ce, OP Ch | | ONI | 1,2,4,5,7,8,9 |
| Molothrus Oryzivorus | Giant Cowbird | AA, FO, OP Ce, OP Ch | | ONI | 1,2,7,8 |
| Molothrus Bonariensis | Shiny Cowbird | AA, OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| Sturnella Superciliaris | White-Browed Meadowlark | AA, OP Ce, OP Ch | R | ONI | 7 |
| Thraupidae | | | | | |
| Paroaria Coronata | Red-Crested Cardinal | AA, FO, OP Ce, OP Ch | | GRA | 1,2,3,4,5,6,8,9 |
| Paroaria Capitata | Yellow-Billed Cardinal | AA, OP Ce, OP Ch | | GRA | 1,2,3,4,5,6,7,8,9 |
| Tangara Sayaca | Sayaca Tanager | AA, FO, OP Ce, OP Ch | | FRU | 1,2,3,4,5,6,7,8,9 |
| Tangara Palmarum | Palm Tanager | AA, FO, OP Ce, OP Ch | | FRU | 1,2,4,5 |
| Tangara Cayana | Burnished-Buff Tanager | FO, OP Ce, OP Ch | | FRU | 1,2 |
| Nemosia Pileata | Hooded Tanager | FO, OP Ce, OP Ch | | INS | 1,4,5 |
| Conirostrum Speciosum | Chestnut-Vented Conebill | FO, OP Ce, OP Ch | ICA | INS | 1,4,5,6,8,9 |

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|----------------------------------|-----------------------------|----------------------|-----|---------|-------------------|
| <i>Sicalis Flaveola</i> | Saffron Finch | OP Ce, OP Ch | | GRA | 1,2,3,4,5,6,7,8,9 |
| <i>Hemithraupis Guira</i> | Guira Tanager | FO, OP Ce, OP Ch | | INS | 8,9 |
| <i>Volatinia Jacarina</i> | Blue-Black Grassquit | AA, OP Ce, OP Ch | R | GRA | 1,4,5,6,7,8,9 |
| <i>Eucometis Penicillata</i> | Gray-Headed Tanager | FO | | INS/FRU | 1,4,5,8,9 |
| <i>Coryphospingus Cucullatus</i> | Red-Crested Finch | AA, FO, OP Ce, OP Ch | | GRA | 1,2,4,5,7,8,9 |
| <i>Tachyphonus Rufus</i> | White-Lined Tanager | FO, OP Ce, OP Ch | | FRU | 1,2,3,5,6,8,9 |
| <i>Ramphocelus Carbo</i> | Silver-Beaked Tanager | FO, OP Ce, OP Ch | | INS/FRU | 1,2,3,4,5,6,8,9 |
| <i>Tersina Viridis</i> | Swallow-Tanager | FO | ICA | INS/FRU | 8 |
| <i>Coereba Flaveola</i> | Bananaquit | AA, FO, OP Ce, OP Ch | | NEC/INS | 1,2,6 |
| <i>Sporophila Lineola</i> | Lined Seedeater | OP Ce, OP Ch | ICA | GRA | 1,2,6,7 |
| <i>Sporophila Collaris</i> | Rusty-Collared Seedeater | OP Ce, OP Ch | ICA | GRA | 1,2,4,5,6,7,8 |
| <i>Sporophila Caerulescens</i> | Double-Collared Seedeater | OP Ce, OP Ch | R | GRA | 1,2,6,7 |
| <i>Sporophila Leucoptera</i> | White-Bellied Seedeater | OP Ce, OP Ch | | GRA | 1,2,4,5,6,7 |
| <i>Sporophila Hypoxantha</i> | Tawny-Bellied Seedeater | OP Ce, OP Ch | R | GRA | 7 |
| <i>Sporophila Ruficollis</i> | Dark-Throated Seedeater | OP Ce, OP Ch | AM | GRA | 7 |
| <i>Sporophila Palustris</i> | Marsh Seedeater | OP Ce, OP Ch | AM | GRA | 7 |
| <i>Sporophila Angolensis</i> | Chestnut-Bellied Seed-Finch | FO, OP Ce, OP Ch | | GRA | 1,4,5,8,9 |
| <i>Emberizoides Herbicola</i> | Wedge-Tailed Grass-Finch | OP Ce, OP Ch | | INS | 8,9 |
| <i>Saltatricula Atricollis</i> | Black-Throated Saltator | OP Ce | | INS | 8,9 |
| <i>Saltatricula Multicolor</i> | Many-Colored Chaco Finch | OP Ch | | INS | 2 |
| <i>Saltator Coerulescens</i> | Grayish Saltator | OP Ce, OP Ch | | ONI | 1,2,3,4,5,6,7,8,9 |
| <i>Saltator Similis</i> | Green-Winged Saltator | FO | R | ONI | 1 |
| <i>Microspingus Melanoleucus</i> | Black-Capped Warbling-Finch | OP Ce, OP Ch | | INS | 1,2,4,5,6,7,8,9 |
| Cardinalidae | | | | | |
| <i>Piranga Flava</i> | Hepatic Tanager | OP Ce, OP Ch | AM | INS/FRU | 4 |
| <i>Cyanoloxia Brissonii</i> | Ultramarine Grosbeak | OP Ce, OP Ch | | ONI | 5 |
| Fringillidae | | | | | |
| <i>Spinus Magellanicus</i> | Hooded Siskin | FO, OP Ce, OP Ch | | GRA | 4,8 |
| <i>Euphonia Chlorotica</i> | Purple-Throated Euphonia | FO, OP Ce, OP Ch | | FRU | 1,2,4,5,7,8,9 |
| Passeridae | | | | | |
| <i>Passer Domesticus</i> | | AA | | ONI | 1,2,8,9 |

The birds of the Chaco exhibit very low avian endemism [7] and they present very close affinities with the surrounding avifauna [10,24-27]. However, the region of Porto Murtinho presents species of birds which are particular to the Chaco [23], with a close bio geographical connection with the nearby Cerrado and the Pantanal biomes. Considering the location of the Chaco and its limits to the west with the Andes, the Amazon in the north, and the Pampas and Patagonia in the south, there has been a high bio geographical interest in the region [20,23,28-30]. Open habitats favor insectivore species, and the Tyrannidae are more abundant. We found 35.6% of insectivore species in our

survey. They rely mostly on arthropod prey, complementing their diet with other items [15]. Besides, many Tyrannidae species are austral migrants. Among the omnivores, the combination of terrestrial and hydric habitats favor the offer of invertebrate preys, amphibians and fish, depending on the annual seasonality [31]. We found 32.6% of omnivore species. Our results show that the majority of the species occurrence was found in open areas (n= 130; 39.9%), and the other portion occurs in generalist habitats: forest, open areas and modified habitats (n= 87; 26.7%), only in forest (n= 44; 13.5%), and in aquatic areas (n= 65; 19.9%). Some birds depend upon the presence of well preserved open habitats,

including species of Furnariidae, Tyrannidae, Thraupidae, and Cardinalidae. Therefore, deforestation and conversion of natural vegetation, particularly open natural areas, is one of the major threats to be considered in conservation measures [3,4,8,28-30].

Some of our recorded species were only recently recorded for the Pantanal wetland, including: *Nothura boraquira*, *Aramides ypecaha*, *Pardirallus maculatus*, *Calidris himantopus*, *Dendrocolaptes platyrostris*, *Elaenia chilensis*, *E. parvirostris*, *Platyrinchus mystaceus*, *Hymenops perspicillatus*, *Pachyramphus validus*, *Xenopsaris albinucha*, *Pseudoleites guirahuro*, *Sporophila ruficollis*, *S. palustris* [10]. A considerable number of species migrate to the Pantanal wetland [32], and others are present in the Pantanal in Cerrado vegetation [26]. Species such as *Cyanocorax cristatellus* and *Saltatricula atricollis*, common in open areas associated with Cerrado vegetation, were found in this study in similar habitats, showing the transitional feature of the Porto Murтинho region. There are migrant species that occur in the region. The Tyrannidae Austral migrants, for example, arrive in general by the end of the dry season, fixing home ranges in the region throughout the wet season, coinciding with greater abundance of food [33,34]. Some of the species registered deserve special attention since they are officially listed as threatened under national and international guidelines [35,36], considering the alteration and loss of their natural habitats. When dealing with threatened species, the value of rarity is one trophy for the birders, which requires a fair conservation strategy in order to balance protection and visiting strategies [37]. On the other hand, the number of threatened species found in this study reinforces the need for a reliable conservation strategy. Natural habitats have been modified and the increasing deforestation has reached the study area [5]. There are no protected areas designated for the Porto Murтинho region to preserve the native Chaco natural habitats and their associated biodiversity. All activities in the region related to the exploitation of biodiversity resources have been unsustainable in recent years, for example the use of the red quebracho (*S. balansae*) to extract tannin, the leaves of erva mate (*Ilex paraguariensis*) for tea, as well as predatory fisheries. In addition to the intrinsic value of biodiversity, its conservation needs to consider a combination of multiple strategies. For example, biodiversity plays an important role to human well-being and health, providing basic products and ecosystem services. Thus, conservation is also related to the social and economic dimensions of development. But although this relationship, human land occupation has become the dominant force that negatively impacts the biological system. The avifauna of the Chaco expresses the fascination of the local people, who have generated stories and folklore associated with mystic birds, aggregating cultural heritage. The knowledge on birds can improve not only scientific support but ways to develop sustainable tourism in the region. The benefits of nature-based tourism to biodiversity conservation are often rarely to profitability of local environmentally-based rational use to achieve sustainability. The protection of biodiversity is essential in the fight to reduce local human poverty and to achieve sustainable development. The challenge is to pursue responsible travel to relatively undisturbed natural area, such as the Brazilian portion of Chaco, with the specific objective of studying, admiring, and enjoying the scenery

and its wildlife, as well as any existing cultural manifestations found in the region. However, in its broadest sense, nature-based tourism has to be sustainable in terms of its potential negative effects on the environment, for its successful conduct.

Conclusion

The present results contribute to knowledge of the great diversity of bird species in the region, which may be an attraction for sustainable tourism through birdwatching activities. This should be an incentive to protect the avifauna and their habitats, achieving conservation for the biodiversity of the region.

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Conflict of Interest

No conflict of interest was detected during the work carried out in the field or for its publication.

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