

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 800,000km², of which 9,000km² 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

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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, 700km wide in the east west direction and roughly 1,500km 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 970.3mm 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.

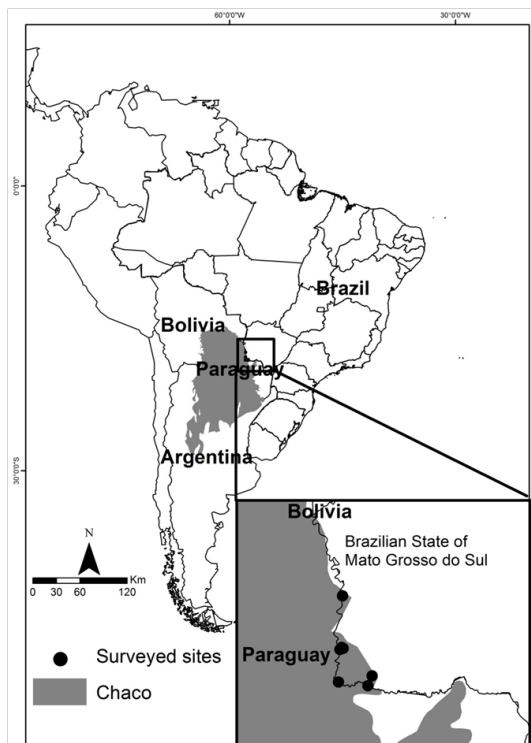


Figure 1 The Chaco in South America comprising the countries of Argentina, Bolivia, Paraguay and Brazil.

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 85km 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.

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 *Prosopis* 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

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

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 Murтинho	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	15-Oct	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, 15-Oct	21°41'59.33"S 57°51'47.38"W
Cerro Pora Cattle Ranch	4	Dec-15	22°01'44.0"S 57°31'22.0"W
Cangalha Cattle Ranch	4	Dec-15	22°08'21"S 57°34'50"W

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 quebrachoblanco*, *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 survey¹⁷ 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 Chaco¹¹ 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*.

The birds of the Chaco exhibit very low avian endemism⁷ 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}

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

Table Continued....

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
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 Cocoi</i>	Cocoi 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

Table Continued...

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
<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 Burrovianus</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

Table Continued....

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
Heliornithidae					
Heliornis Fulica	Sungrebe	A	ICA	ONI	1,4
Charadriiformes					
Charadriidae					
Vanellus Cayanus	Pied Lapwing	A	ICA	ONI	1,4,5,7
Vanellus Chilensis	Southern Lapwing	AA, OP Ce, OP Ch		ONI	1,2,3,4,5,6,7,8,9
Charadrius Collaris	Collared Plover	A	ICA	ONI	4,5
Recurvirostridae					
Himantopus Melanurus	White-Backed Stilt	A	R	ONI	1,5,6,7
Scolopacidae					
Gallinago Paraguaiae	South American Snipe	A	ICA	ONI	7
Bartramia Longicauda	Upland Sandpiper	OP Ce, OP Ch	S	ONI	7
Tringa Solitaria	Solitary Sandpiper	A	S	ONI	1,5,7,8
Tringa Melanoleuca	Greater Yellowlegs	A	S	ONI	7
Tringa Flavipes	Lesser Yellowlegs	A	S	ONI	1,7
Calidris Fuscicollis	White-Rumped Sandpiper	A	S	ONI	7
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					

Table Continued...

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
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					
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 Furcifer	Blue-Tufted Starthroat	FO		NEC	1,5
Trogoniformes					
Trogonidae					
Trogon Curucui	Blue-Crowned Trogon	FO		ONI	1,2,3,4,5,8,9
Coraciiformes					

Table Continued....

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
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					
Momotus Momota	Amazonian Motmot	FO		ONI	1,2,3,4,5,7,8
Galbuliformes					
Galbulidae					
Galbula Ruficauda	Rufous-Tailed Jacamar	FO		INS	
Bucconidae					
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
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

Table Continued....

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
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 Rufifigularis	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
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 Anumbi	Firewood-Gatherer	OP Ce, OP Ch		INS	5,7

Table Continued....

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
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
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

Table Continued....

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
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	Variiegated 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
Sublegatus Modestus	Southern Scrub-Flycatcher	OP Ce, OP Ch	AM	INS	1,4,5,8,9
Pyrocephalus Rubinus	Vermilion Flycatcher	OP Ce, OP Ch	AM	INS	1,2,4,5,7,8,9
Fluvicola Albiventer	Black-Backed Water-Tyrant	A	AM	INS	1,2,4,5,6,7
Arundinicola Leucocephala	White-Headed Marsh Tyrant	A		INS	1,4,5,6,7,8,9
Gubernetes Yetapa	Streamer-Tailed Tyrant	A, OP Ce, OP Ch	ICA	INS	1,8,9
Alectrurus Risora	Strange-Tailed Tyrant	OP Ce, OP Ch	AM	INS	1
Cnemotriccus Fuscatus	Fuscous Flycatcher	FO, OP Ce, OP Ch	AM	INS	1,4,5,8,9
Hymenops Perspicillatus	Spectacled Tyrant	OP Ce, OP Ch	AM	INS	7
Satrapa Icterophrys	Yellow-Browed Tyrant	OP Ce, OP Ch	AM	INS	4,5,7
Xolmis Cinereus	Gray Monjita	OP Ce, OP Ch	ICA	INS	1,2,4,5,6,7,8,9
Xolmis Velatus	White-Rumped Monjita	OP Ce, OP Ch	R	INS	1,2,5,6,7,8,9
Xolmis Irupero	White Monjita	OP Ce, OP Ch	R	INS	1,2,4,5,6,7,8,9
Vireonidae					
Cyclarhis Gujanensis	Rufous-Browed Peppershrike	FO, OP Ce, OP Ch		ONI	1,2,3,4,5,6,7,8,9
Vireo Chivi	Chivi Vireo	OP Ce, OP Ch	AM	INS	1,6,7,8
Corvidae					
Cyanocorax Cyanomelas	Purplish Jay	FO, OP Ce, OP Ch		ONI	1,2,4,5,7,8,9
Cyanocorax Cristatellus	Curl-Crested Jay	OP Ce		ONI	8,9
Cyanocorax Chrysops	Plush-Crested Jay	FO		ONI	1,4,5,7,8,9
Hirundinidae					
Stelgidopteryx Ruficollis	Southern Rough-Winged Swallow	A, FO	ICA	INS	1,5,8
Progne Tapera	Brown-Chested Martin	AA, OP Ce, OP Ch	ICA	INS	1,2,3,4,5,6,7,8,9
Progne Chalybea	Gray-Breasted Martin	AA, OP Ce, OP Ch	ICA	INS	1,2,8,9
Tachycineta Albiventer	White-Winged Swallow	A		INS	2,3,4,5

Table Continued....

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
Tachycineta Leucorrhoa	White-Rumped Swallow	OP Ce, OP Ch	ICA	INS	1,7
Riparia Riparia	Bank Swallow	OP Ce, OP Ch	S		
Hirundo Rustica	Barn Swallow	OP Ce, OP Ch	S	INS	1,7
Troglodytidae					
Troglodytes Musculus	Southern House Wren	AA, OP Ce, OP Ch		INS	1,2,4,5,6,7,8,9
Campylorhynchus Turdinus	Thrush-Like Wren	AA, FO, OP Ce, OP Ch		INS	1,2,3,4,5,6,7,8,9
Cantorchilus Guarayanus	Fawn-Breasted Wren	FO		INS	1,4,5,7,8,9
Donacobiidae					
Donacobius Aticapilla	Black-Capped Donacobius	A		INS	1,2,3
Poliophtilidae					
Poliophtila Dumicola	Masked Gnatcatcher	OP Ce, OP Ch		INS	1,2,4,5,6,7,8,9
Turdidae					
Turdus Leucomelas	Pale-Breasted Thrush	FO	S	ONI	1,4
Turdus Rufiventris	Rufous-Bellied Thrush	AA, FO, OP Ce, OP Ch		ONI	1,2,4,5,6,8,9
Turdus Amaurochalinus	Creamy-Bellied Thrush	AA, FO, OP Ce, OP Ch	R	ONI	1,2,4,5,6,8,9
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 Flavirostris	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 Cacique	FO, OP Ce, OP Ch		ONI	1,2,6,7
Cacicus Chrysopterus	Golden-Winged Cacique	FO, OP Ce, OP Ch		ONI	1,2,4,5,6,7,8,9
Cacicus Haemorrhous	Red-Rumped Cacique	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

Table Continued...

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
<i>Pseudoleistes Guirahuro</i>	Yellow-Rumped Marshbird	OP Ce		ONI	8,9
<i>Agelaioides Badius</i>	Grayish Baywing	OP Ce, OP Ch		ONI	1,2,4,5,6,7,8,9
<i>Molothrus Rufoaxillaris</i>	Screaming Cowbird	AA, OP Ce, OP Ch		ONI	1,2,4,5,7,8,9
<i>Molothrus Oryzivorus</i>	Giant Cowbird	AA, FO, OP Ce, OP Ch		ONI	1,2,7,8
<i>Molothrus Bonariensis</i>	Shiny Cowbird	AA, OP Ce, OP Ch		ONI	1,2,3,4,5,6,7,8,9
<i>Sturnella Superciliaris</i>	White-Browed Meadowlark	AA, OP Ce, OP Ch	R	ONI	7
Thraupidae					
<i>Paroaria Coronata</i>	Red-Crested Cardinal	AA, FO, OP Ce, OP Ch		GRA	1,2,3,4,5,6,8,9
<i>Paroaria Capitata</i>	Yellow-Billed Cardinal	AA, OP Ce, OP Ch		GRA	1,2,3,4,5,6,7,8,9
<i>Tangara Sayaca</i>	Sayaca Tanager	AA, FO, OP Ce, OP Ch		FRU	1,2,3,4,5,6,7,8,9
<i>Tangara Palmarum</i>	Palm Tanager	AA, FO, OP Ce, OP Ch		FRU	1,2,4,5
<i>Tangara Cayana</i>	Burnished-Buff Tanager	FO, OP Ce, OP Ch		FRU	1,2
<i>Nemosia Pileata</i>	Hooded Tanager	FO, OP Ce, OP Ch		INS	1,4,5
<i>Conirostrum Speciosum</i>	Chestnut-Vented Conebill	FO, OP Ce, OP Ch	ICA	INS	1,4,5,6,8,9
<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

Table Continued...

Taxon	English Name	Habitat	Status	Trophic guild	Surveyed Sites
Fringillidae					
Spinus Magellanicus	Hooded Siskin	FO, OP Ce, OP Ch		GRA	4,8
Euphonia Chlorotica	Purple-Throated Euphonia	FO, OP Ce, OP Ch		FRU	1,2,4,5,7,8,9
Passeridae					
Passer Domesticus		AA		ONI	1,2,8,9

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*, *Pachyrhamphus 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 Murtinho 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 Murtinho 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.³⁸

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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