

Article

Conservation Status and Challenges of the Atlantic Forest Birds of Paraguay

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Abstract: The Atlantic Forest, one of the most biodiverse biomes in the world, is also one of the most endangered. In Paraguay, its remnants are mostly fragmented and isolated. The Paraguay Biodiversity Corridor is an initiative that is being developed to generate and maintain connectivity of the main conservation areas. With the objective to analyze the bird richness and occurrence in each of the core areas of this corridor, we gathered published data, details of the management plans, and bird surveys recorded during 2015 and 2017 in these areas. In total, 557 bird species occur in the core areas of the Corridor, representing more than 80% of the birds of the country. San Rafael National Park and Mbaracayú Forest Nature Reserve are the richest areas, with 427 (70) and 408 (61) bird species (Atlantic forest endemics), respectively. These two areas also harbor more than 30 bird species of global conservation concern. Only 24% of the Corridor area is protected or sustainably managed, with only 10% under strict protection. The Corridor situated within this endangered biome encompasses some of the most important areas for bird conservation, but the situation of many of these areas is alarming as they are not protected or effectively managed to conserve their biodiversity. Restoration of connectivity, legal enforcement, and strengthening of authorities to combat deforestation on core areas, along with research focused on the impact contributed by human activities (selective logging, ecotoxicity exposure to agrochemicals) are key actions prioritized for the Upper Parana Atlantic forest (UPAF) Corridor.

Keywords: Atlantic forest; bird; Corridor; avifauna; richness; conservation

1. Introduction

The Atlantic forest of South America has been identified as one of the most important biodiversity hotspots of the planet. It is a complex of 15 terrestrial eco-regions of tropical and sub-tropical humid forests [1] with the highest concentration of plant and vertebrate endemism. With only 8% of its original extent remaining as a consequence of the degradation imposed by human activities, today, this ecoregion is considered one of the most endangered biomes [2,3]. Originally, the forest covered one tenth of the south American continent, extending from Río Grande do Norte and Ceará south to Río Grande do Sul in Brazil, Northeast of Argentina and east of Paraguay, with a total of 1,233,875 km² [3]. In Paraguay, the Upper Parana Atlantic forest (UPAF) eco-region encompasses more than 88,000 km². It was almost “intact” until 1940, its degradation being mainly due to selective

logging [4]. Seventy percent of the forest remained at the beginning of 1970s, but during the following 30 years it was reduced significantly to less than 25% [5]. Between 2003 to 2013, 6000 km² of forest were lost, with the deforestation rate of 1.8% per year of the remnant of the UPAF [6].

The UPAF region has high concentrations of endemic birds [7]. About 50% of its avifauna are rare (usually occurring in very low densities) [8,9] and more than 40% of its endemic species are facing extinction due to the rampant deforestation [10].

The UPAF is one of the key ecoregions focused on by different conservation entities and organizations: WWF-Brazil (World Wildlife Fund), WWF-Paraguay, Fundación Vida Silvestre of Argentina [11], World Bank, and ITAIPU Binational. In order to identify priorities for conservation actions, this study examines the occurrence of the avifauna inhabiting the main forest remnants of the UPAF in Paraguay. The scientific baseline data obtained from the study would provide an in-depth understanding of the current avifauna status for better conservation and management initiatives.

2. Materials and Methods

The study was conducted within the boundaries of the proposed corridor of UPAF in the eastern region of Paraguay, defined in the Biodiversity Vision for the UPAF [12]. The study area was focused in the part of the corridor that includes seven departments: Canindeyú, Alto Paraná, San Pedro, Caazapá, Caaguazú, Itapúa, and Guairá, with a total area of 12,000 km². Forest cover in the departments ranged from 3.6% (985 km²) in Guaira to 21% (5690 km²) in Canindeyú, in 2013 [6]. Occurrence data of birds were analyzed from 22 remnants of the Atlantic Forest, named in the rest of this article as “Core Areas”, as some of these are protected areas (reserves that counts with all the processes and are established as Protected Areas); partially protected (core area that is proposed as a Protected Area, but lacks some of the processes, such as legally defined or management plans, presence of park rangers); unprotected (core area that is not included or proposed as a Protected Area); and sustainable management area (core area with sustainable activities such as selective logging, shade-growing plantations developed in its forest).

2.1. Avifauna Surveys

Bird surveys were conducted in 19 core areas of the UPAF from November 2015 to September 2018 (Table 1; Figure 1) using standard methods for Rapid Ecological Assessment (REA): Diurnal and nocturnal records of birds in different habitats. Tape-recording and playbacks were used to help identify unrecognized voices or calls of birds during surveys. Efforts of surveys for each core area in terms of number of days are detailed at Table 1. We could not determine habitats and distances covered in each core area, as we recorded a bird list for each day, while other methods of censuses explained at Section 2.3 were used in order to study Atlantic forest bird communities.

Taxonomy and scientific nomenclature follow Rensen et al. [13]. The global conservation status of a species is based on BirdLife International [14]. Endemism definitions follow Guyra Paraguay [15], adding the Buff-bellied Puffbird (*Notharchus swainsoni*) and excluding the Red-ruffed Fruitcrow (*Pyroderus scutatus*) in the UPAF endemic list.

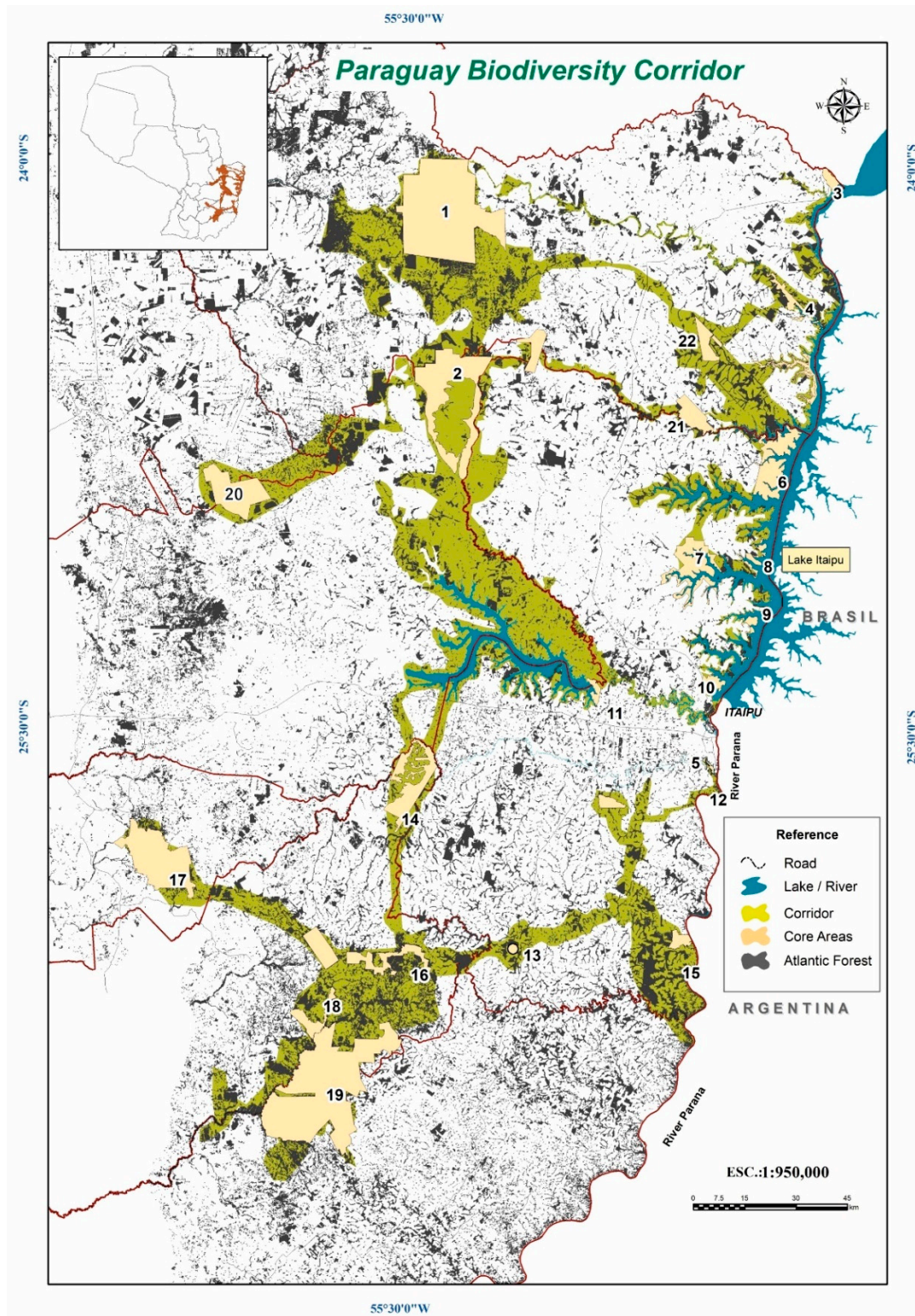


Figure 1. Studies areas of the Paraguay Biodiversity Corridor of the Upper Parana Atlantic Forest: (1) Mbaracayú Forest Nature Reserve; (2) Morombí Nature Reserve; (3) Mbaracayú Binational Nature Reserve; (4) Carapá Nature Reserve; (5) Maharashi Nature Reserve; (6) Limoy Nature Reserve; (7) Itabó Nature Reserve; (8) Yvyty Rókai Nature Reserve; (9) Pykyry Nature Reserve; (10) Tati Yupi Nature Reserve; (11) Yguazú Nature Reserve; (12) Moises Bertoni Scientific Monument; (13) Agropeco Farm; (14) Ypeti Nature Reserve; (15) Ñacunday National Park; (16) Caazapá National Park; (17) Ybytyruzú Management Reserve; (18) Tapyta Nature Reserve; (19) San Rafael National Park; (20) Carla María Farm; (21) Federico Farm; (22) Itabó Biological Reserve.

Table 1. Details of the main study sites surveyed and analyzed in the corridor of the UPAF of Paraguay.

Study Site	Area (km ²)	Status ¹	Habitats ²	Field Surveys (Month-Days of Fieldwork/Year)	2014–2018 Total Effort (Days)	Previous Studies or Reports
San Rafael National Park	748	pp	F, FE, S, MG, Aq, AA	Aug-2/2015, Mar-2, Apr-1/2016, Mar-2, Oct-4, Nov-2/2017, Jan-2/2018	17	[16–18]
Ybytyruzú Management Reserve	256	pp	F, FE, S, AA	Nov-1/2015	1	[19]
Tapyta Private Nature Reserve	44	pr, sm	F, E, S, MG, W, AA	Nov-3/2015, Oct-2, Nov-3, Dec-1/2016, Jul-5, Sept-2, Oct-4, Nov-5, Dec-4/2017	29	[20]
Mbaracayú Forest Nature Reserve	651	pr	F, E, S, Ce, We, Aq	Set-2/2014, Jun-2/2015, Mar-2/2016, May-4/2018	10	[21]
Ypetí Nature Reserve	136	pr, sm	F, E, S, W, AA	Feb-3, Set-4, Oct-2/2016, Jan-5, Feb-2, Mar-2, May-3/2017, Apr-2/2018	23	[22]
Caazapá National Park	133	pr	F, E, S	Jan-4/2014, Nov-1/2015	5	[23]
Carla María Farm	155	un	F, E, S, AA	Nov-3/2015	3	
Mbaracayú Binational Nature Reserve	15	pr	F, E, S, Aq	Jan-2/2016	2	[24]
Carapá Nature Reserve	37	pr	F, E, S, Aq	Set-1/2014, Jan-1/2016	2	[25]
Limoy Nature Reserve	136	pr	F, E, S, Aq, AA	Set-1/2014, Jan-2/2016	3	[26]
Itabó Nature Reserve	137	pr	F, E, S, Aq, AA	Jan-3/2018	3	[27]
Pikyry Nature Reserve	12	pr	F, E, S, Aq			[28]
Tati Yupi Nature Reserve	20	pr	F, E, S, Aq			[29]
Yvyty Rokai Nature Reserve	22	pr	F, E, S, Ce, Aq			[30]
Ñacunday National Park	20	pr	F, E, S, Aq	Jan-1/2016	1	[31]
Maharishi Nature Reserve	3	pr	F, E, S, Aq	Jan-1/2016	1	[32]
Moisés Bertoni Scientific Monument	2	pr	F, E, S, Aq	Nov-2/2015, Jan-2/2016	4	[33]
Morombí Nature Reserve	310	un	F, E, S, Ce, AA	Aug-3/2016	3	
Yguazu Nature Reserve	17	pr	F, E, S, Aq, AA	Feb-1/2016	1	[34]
Itabó Biological Reserve	44	sm	F, E, Aq, AA	Feb-2/2016	2	
Federico Farm	34	un	F, E, S, AA	Feb-1/2016	1	
Agropeco Farm	15	un	F, E, S, AA	Feb-4, Aug-4/2018	8	
Total area (km ²) and effort (days)	2949				119	

¹ Status: pr, protected, core area that counts with all the processes to work as a Protected Area; pp, partially protected, core area that is proposed as a Protected Area, but is still missing some of the processes (legal, management plans, presence of park rangers, etc); un, unprotected, core area that is not included or proposed as a Protected Area; sm, sustainable management, core area with sustainable activities such as selective logging, shade-growing plantations developed in its forest.² Habitats: F, forest; E, forest edge; S, scrub; MG, Mesopotamian grasslands; Ce, Cerrado; We, wetlands; Aq, water; AA, anthropogenic areas.

2.2. Historical Bird Records

We have compiled all previous studies, reports, or published materials at each study site in order to obtain a total of bird species recorded in each site (Table 1).

2.3. Bird Counts and Richness Estimators

We conducted 10-min unlimited-distance point counts [35] at available trails at 15 core areas (Table 2). On each trail, counts stations were located at least 200 m apart, and more than 100 m away from the forest edge. Point counts were conducted from 30 min before sunrise (in order to record nocturnal and crepuscular species) to 3 h after sunrise. We recorded each bird or group of birds detected aurally or visually. No counts were conducted on rainy or windy days, and all counts were made by the same observer (A.E.).

Due to difference in bird count efforts, we analyzed data clustering point counts in some areas as defined in Table 2. Species-accumulation curves and species richness estimators were computed using EstimateS, version 9.1.0 [36]. We used sample-based incidence data randomizations of the clustering point counts. In each randomization, sampled species were drawn randomly from the data set without replacement and added to the curve in a random order. We used 100 runs of randomized sampling order and extrapolated the rarefaction curves to a total of 500 samples.

Table 2. Designation of grouped core areas to analyze point count data in order to estimate richness of bird species at the Paraguay Biodiversity Corridor.

Group Name	Core Areas
Itaipu	Federico Farm, Itabo Biological Reserve, Mbaracayú Binational Nature Reserve, Carapa Nature Reserve and Limoy Nature Reserve
Agropeco	Agropeco Farm
Mbaracayu	Mbaracayú Forest Nature Reserve, Carla María Farm, Maharishi Nature Reserve, Yguazu Nature Reserve and Moisés Bertoni Scientific Monument
Kanguery	San Rafael National Park—center of the reserve (26°27' S, 55°47' W)
San Rafael	San Rafael National Park—south of the reserve (26°37' S, 55°40' W)
Tapyta	Tapyta Private Nature Reserve and Caazapá National Park
Ypeti	Ypeti Private Nature Reserve

3. Results

3.1. Birds of the Paraguay Biodiversity Corridor

3.1.1. Total Avifauna of Core Areas at the Paraguay Biodiversity Corridor

The avifauna of 22 Core Areas within the Paraguay Biodiversity Corridor have been evaluated in this study, through bird surveys (119 days of surveys) in 19 sites along with the analysis of the bird species lists through their management plans, literature, and studies done in each study site.

In total, 557 bird species have been recorded in the Paraguay Biodiversity Corridor, based on the bird species lists and studies analyzed. Their occurrences in the Core Areas are detailed in Appendix A. The areas with the highest number of species are: San Rafael National Park (427 species), Mbaracayú Forest Nature Reserve (408 species), Tapyta Private Nature Reserve (377 species), Ypeti Nature Reserve (350 species), Itabó Biological Reserve (341 species), and Itabó Nature Reserve (310 species; Table 3).

Table 3. Total number of species recorded at each core area of the Paraguay Biodiversity Corridor.

Core Areas of the UPAF Corridor	Total Species	Endemism ¹				Total End	IUCN ²				National Status ³			
		UPAF	Ce	Cha	Mes		NT	VU	EN	CR	Total	Thr	End	Total
San Rafael National Park	427	70	0	0	2	72	17	10	3	0	30	48	29	77
Ybytyruzu Management Reserve	259	54	0	0	1	55	8	4	3	0	15	32	11	43
Tapyta Private Nature Reserve	377	65	0	1	2	68	14	12	2	0	28	46	23	69
Mbaracayú Forest Nature Reserve	408	61	5	0	2	68	16	10	5	0	31	53	23	76
Ypeti Nature Reserve	350	58	0	0	0	58	10	2	2	0	14	38	9	47
Caazapá National Park	254	64	0	0	0	64	11	3	1	0	15	41	13	54
Carla María Farm	148	29	0	0	0	29	1	1	1	0	3	15	2	17
Mbaracayú Binational Nature Reserve	260	16	0	1	1	18	3	2	0	0	5	8	4	12
Carapá Nature Reserve	267	40	0	0	0	40	5	1	1	1	8	23	4	27
Limoy Nature Reserve	300	51	0	0	0	51	7	2	2	0	11	32	9	41
Itabó Nature Reserve	310	56	1	0	0	57	7	2	2	0	11	37	9	46
Pikyry Nature Reserve	199	27	0	0	0	27	1	0	0	0	1	8	1	9
Tati Yupi Nature Reserve	286	45	0	0	0	45	6	1	0	0	7	24	3	27
Yvyty Rokai Nature Reserve	185	26	0	0	0	26	1	0	1	0	2	6	2	8
Nacunday National Park	115	13	0	0	0	13	3	0	0	0	3	6	2	8
Maharishi Nature Reserve	276	51	0	0	0	51	8	1	0	0	9	32	5	37
Moisés Bertoni Scientific Monument	159	32	0	0	0	32	3	0	0	0	3	16	3	19
Morombi Nature Reserve	302	48	1	0	0	49	6	4	2	0	12	31	9	40
Yguazu Nature Reserve	160	19	0	0	0	19	2	1	0	0	3	6	2	8
Itabó Biological Reserve	341	66	0	0	0	66	13	4	2	1	20	44	20	64
Federico Farm	85	15	0	0	0	15	0	0	1	0	1	2	1	3
Agropeco Farm	179	42	0	0	0	42	2	0	0	0	2	22	2	24
Total species	557	78	5	2	2	87	27	16	5	2	50	59	50	109

¹ Endemism: Number of endemics of the Upper Paraná Atlantic Forest (UPAF), Cerrado (Ce) and Chaco (Cha), and Messopotamian Grasslands (Mes) at each core area. ² IUCN: Number of globally concern species, NT: Near Threatened species, VU: Vulnerable species, EN: Endangered species, CR: Critically Endangered species [14]; ³ National status: Number of nationally threatened (Thr) and endangered (End) species.

3.1.2. Bird Richness at the Paraguay Biodiversity Corridor

A total of 200 bird species were recorded during 318 10-min point counts surveyed in the core areas of the corridor. In average, 11.6 (range = 1–24) bird species were recorded during point counts, being higher at Agropeco (15.2 species), Kanguery (14.2), and Tapyta (14.2; Table 4).

Table 4. Total number of species recorded during 10-min point counts at grouped core areas of the Paraguay Biodiversity Corridor.

Core Area	N° Point Counts	Total Species	Mean (SD)	Min	Max
Itaipu	24	69	6.6 (2.6)	1	11
Agropeco	41	103	15.2 (3.9)	6	24
Mbaracayú	33	93	9.1 (3.5)	3	16
S-San Rafael	72	105	11.5 (4.7)	3	23
Kanguery	26	100	14.2 (3.7)	6	21
Tapyta	54	113	14.2 (3.7)	3	23
Ypeti	68	119	9.3 (3.9)	2	18

N°: number of point counts in each core area. Mean (SD): average number (standard deviation) of bird species recorded during 10-min point counts; Min/Max: range (minimum and maximum) number of bird species recorded during 10-min point counts.

Species accumulation curves for grouped core areas (see Section 2.3) of all bird species recorded during 318 10-point count stations showed that estimation of bird richness did not depend on sample efforts, as bird richness estimation for some areas were higher even with lower number of samples than others. Bird richness obtained through an extrapolation to 500 counts for each grouped core area, estimated for Kanguery (center of the reserve) 163.5 (95% C.I. = 111.4–215.5) bird species with a sample of only 26 10-min point counts, while at south of San Rafael it is estimated to be 122.4 (103.9–140.9) with a total of 72 10-min point counts (Figure 2).

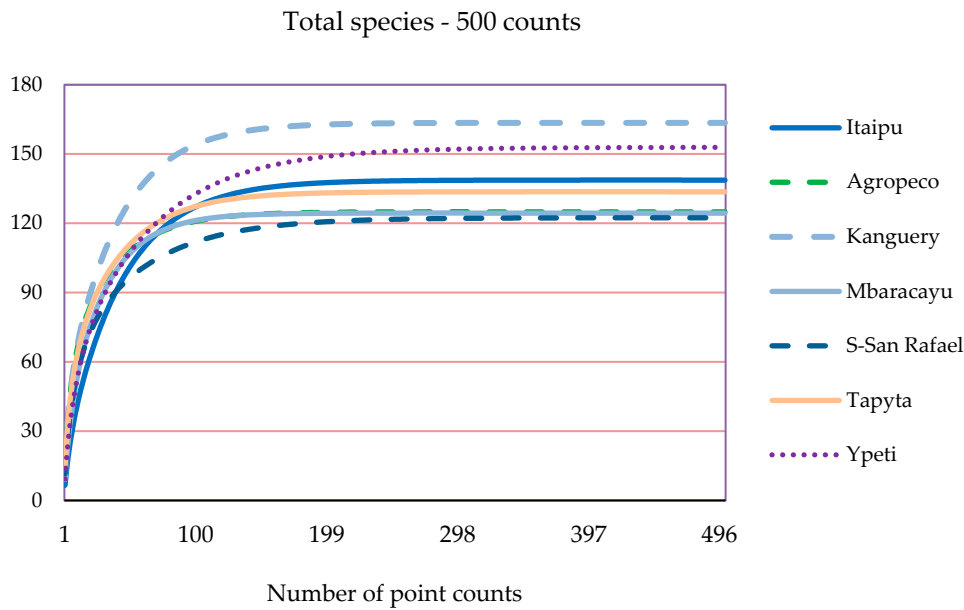


Figure 2. Bird species accumulation curves of grouped core areas of the Paraguay Biodiversity Corridor. Total number of counts for each core grouped areas is extrapolated to 500 samples.

3.1.3. Endemic Species at the Paraguay Biodiversity Corridor

Eighty-seven species out of the 557 registered in the Paraguay Biodiversity Corridor are endemic to one of the ecoregions that occur in the country.

The 78 endemic species of the UPAF are present within the Paraguay Biodiversity Corridor, which demonstrates the importance of the Protected Areas for the conservation of the biodiversity of this ecoregion. The core areas with the highest number of endemic species are: San Rafael National Park (70 species), Itabó Biological Reserve (66 species), Tapyta Private Nature Reserve (65 species), Caazapá National Park (64 species), and Mbaracayú Forest Nature Reserve (61 species; Table 3).

In the Corridor, five of the 11 Cerrado endemic species of the country, two of 17 Chaco endemics, and two Mesopotamian Grasslands endemic species have been recorded in the core areas.

3.1.4. Endemic Richness at the Paraguay Biodiversity Corridor

A total of 52 Atlantic forest endemic species were recorded during 318 10-min point counts surveyed in the core areas of the corridor. In average, 3.8 (range = 0–11) endemic species were recorded during point counts, being higher at Agropeco (5.3 species), Tapyta (4.8), and south of San Rafael (4.5; Table 5).

Table 5. Total number of Atlantic forest endemic species recorded during 10-min point counts at grouped core areas of the Paraguay Biodiversity Corridor.

Grouped Core Area	N° Point Counts	Total Endemics	Mean (SD)	Min	Max
Itaipu	24	18	1.3 (1.3)	0	5
Agropeco	41	29	5.3 (2.4)	1	11
Mbaracayu	33	26	2.6 (1.6)	0	8
S-San Rafael	72	34	4.5 (2.6)	0	10
Kanguery	26	28	4.2 (2.8)	0	9
Tapyta	54	32	4.8 (1.9)	1	9
Ypeti	68	37	2.5 (1.5)	0	8

N°: number of point counts in each grouped core area. Mean (SD): average number (standard deviation) of bird species recorded during 10-min point counts; Min/Max: range (minimum and maximum) number of bird species recorded during 10-min point counts.

Sample effort did affect species accumulation curves of Atlantic forest endemic bird species, showing higher richness with increase of sample efforts, except for Itaipu, in which the reduce number of point counts is not enough for a robust estimation. The two grouped core areas with highest number of point counts, Ypeti Private Nature Reserve (68 point counts), and south of San Rafael (72 point counts) yield higher endemic richness, with 55.4 (95% CI = 30.8–79.9) and 52.6 (95% CI = 21.4–83.7), respectively (Figure 3).

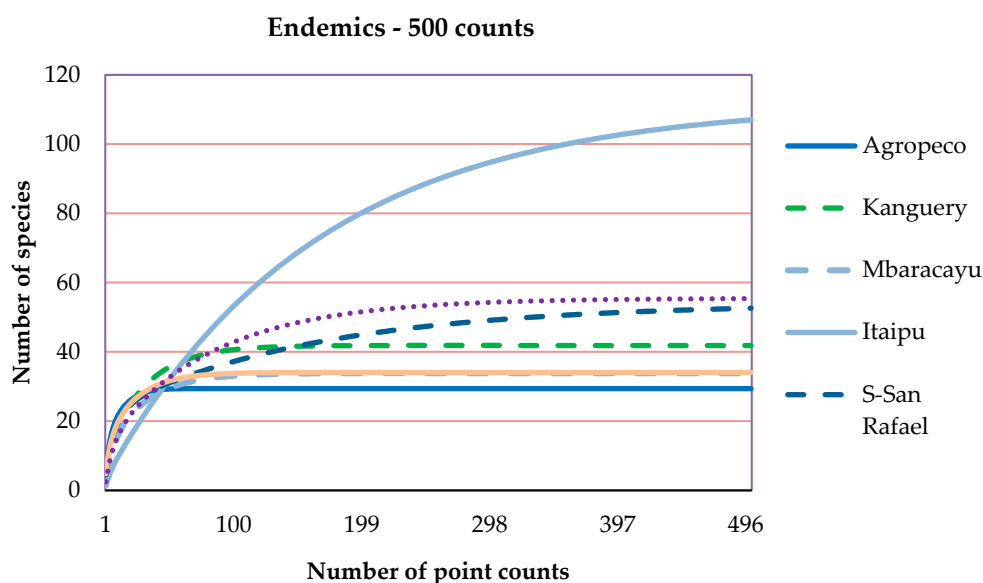


Figure 3. Atlantic forest endemic species accumulation curves of grouped core areas of the Paraguay Biodiversity Corridor. Total number of counts for each core grouped areas is extrapolated to 500 samples.

3.1.5. Global Concern Species

Fifty species out of the 557 registered at the Paraguay Biodiversity Corridor have global conservation issues, and 23 of them are globally threatened with extinction.

The Core Areas with greater number of species with global conservation issues are: Mbaracayú Forest Nature Reserve (31 species), San Rafael National Park (30 species), Tapyta Private Nature Reserve (28 species), Itabó Biological Reserve (20 species), Caazapá National Park (15 species), and Ybytyruzú Management Reserve (15 species; Table 3).

Forty-two percent (21 species) out of the 50 species with global conservation issues are endemic to the Upper Paraná Atlantic Forest. Twelve endemic species are Near Threatened with extinction, six are Vulnerable, two are Endangered and one is Critically Endangered (Table 6).

Among the Near Threatened species, the Mantled Hawk (*Pseudastur polionotus*) has only been recorded at the Carapá Nature Reserve; the Rusty-barred Owl (*Strix hylophila*) at three protected areas: San Rafael National Park, Maharishi Nature Reserve, and Itabó Biological Reserve; the White-browed Foliage-gleaner (*Anabacerthia amaurotis*) has also been recorded at only three protected areas: San Rafael National Park, Ypeti Nature Reserve, and Caazapá National Park.

Among the Vulnerable species, the Red-spectacled Amazon (*Amazona pretrei*) is only known from a historical record at Itabó Biological Reserve; the Buffy-fronted Seedeater (*Sporophila frontalis*) at the Ybytyruzú Management Reserve and the Tapyta Private Nature Reserve; and the Temminck's Seedeater (*Sporophila falcirostris*) at the Mbaracayú Forest Nature Reserve, Tapyta Private Nature Reserve, and Caazapá National Park.

The two Endangered species, the Black-fronted Piping-guan (*Pipile jacutinga*) and the Vinaceous-breasted Amazon (*Amazona vinacea*) have been recorded in 9 and 12 protected areas, respectively.

The Purple-winged Ground-dove (*Claravis geoffroyi*), a Critically Endangered species, has only been recorded at Itabó Biological Reserve.

Table 6. The UPAF endemic species with global conservation issues [14] and the number of core areas at the Paraguay Biodiversity Corridor with records of the species.

Common Name	Scientific Name	IUCN ¹	N° Core Areas
Solitary Tinamou	<i>Tinamus solitarius</i>	NT	15
Black-fronted Piping-guan	<i>Pipile jacutinga</i>	EN	9
Purple-winged Ground-dove	<i>Claravis geoffroyi</i>	CR	1
Mantled Hawk	<i>Pseudastur polionotus</i>	NT	1
Rusty-barred Owl	<i>Strix hylophila</i>	NT	3
Saffron Toucanet	<i>Pteroglossus bailloni</i>	NT	16
Helmeted Woodpecker	<i>Ceelus galeatus</i>	VU	13
White-browed Woodpecker	<i>Piculus aurulentus</i>	NT	9
Vinaceous-breasted Amazon	<i>Amazona vinacea</i>	EN	12
Red-spectacled Amazon	<i>Amazona pretrei</i>	VU	1
White-browed Foliage-gleaner	<i>Anabacerthia amaurotis</i>	NT	3
Canebrake Groundcreeper	<i>Clibanornis dendrocolaptoides</i>	NT	2
Southern Bristle-tyrant	<i>Phylloscartes eximius</i>	NT	14
Sao Paulo Tyrannulet	<i>Phylloscartes paulista</i>	NT	9
Bay-ringed Tyrannulet	<i>Phylloscartes sylviolus</i>	NT	8
Russet-winged Spadebill	<i>Platyrrinchus leucoryphus</i>	VU	4
Bare-throated Bellbird	<i>Procnias nudicollis</i>	VU	13
Creamy-bellied Gnatcatcher	<i>Poliophtila lactea</i>	NT	14
Green-throated Euphonia	<i>Euphonia chalybea</i>	NT	6
Temminck's Seedeater	<i>Sporophila falcirostris</i>	VU	3
Buffy-fronted Seedeater	<i>Sporophila frontalis</i>	VU	2

N°: number of core areas where the species occurs. ¹ IUCN: NT, species Near Threatened with extinction; VU, species Vulnerable to extinction; EN, species Endangered with extinction; CR, species Critically Endangered with extinction [14].

3.2. Birds with National Conservation Issues

A total of 120 bird species are included in lists of threatened and endangered species at a national level in Paraguay [37,38]. In the Paraguay Biodiversity Corridor, 91% (109) of these species have been recorded, of which 59 are threatened with extinction and 50 are endangered with extinction (Table 3).

The protected areas with the larger number of species with national conservation issues are: San Rafael National Park (77 species), Mbaracayú Forest Nature Reserve (76 species), Tapyta Private Nature Reserve (69 species), Itabó Biological Reserve (64 species), Caazapá National Park (54 species), and Ypeti Nature Reserve (47 species; Table 3).

Forty-one percent (45) of the species with national conservation issues are endemics of the UPAF. Excluding the 21 species with global conservation issues, among the remaining 24, the Tawny-browed Owl (*Pulsatrix koeniswaldiana*) has been registered only at the San Rafael National Park, the Maharishi Nature Reserve, the Itabó Biological Reserve, Morombí Nature Reserve and Agropeco; the Bertoni's Antbird (*Drymophila rubricollis*) has been registered at the San Rafael National Park, the Caazapá National Park and Agropeco; the Speckle-breasted Antpitta (*Hyllopezus nattereri*) has been registered at the San Rafael National Park, Mbaracayú Forest Nature Reserve, the Caazapá National Park and Agropeco; the Black-billed Scythebill (*Campylorhamphus falcularius*) has been registered at the San Rafael National Park, the Tapyta Private Nature Reserve, and the Itabó Natural Reserve; and the Black-throated Grosbeak (*Saltator fuliginosus*) only has been registered at two protected areas, the Tapyta Private Nature Reserve and the San Rafael National Park (Table 7).

Table 7. The UPAF endemic species with national conservation issues [37,38], and the number of core areas within the Paraguay Biodiversity Corridor with records of the species.

Common Name	Scientific Name	National Status	N° Protected Areas
Spot-winged Wood-quail	<i>Odontophorus capueira</i>	Threatened	16
Tawny-browed Owl	<i>Pulsatrix koeniswaldiana</i>	Endangered	5
Buff-bellied Puffbird	<i>Notharchus swainsoni</i>	Threatened	15
Spot-billed Toucanet	<i>Selenidera maculirostris</i>	Threatened	21
Robust Woodpecker	<i>Campephilus robustus</i>	Threatened	17
Bertoni's Antbird	<i>Drymophila rubricollis</i>	Endangered	3
Streak-capped Antwren	<i>Terenura maculata</i>	Threatened	13
Speckle-breasted Antpitta	<i>Hylopezus nattereri</i>	Endangered	4
Rufous-breasted Leaf-tosser	<i>Sclerurus scansor</i>	Threatened	7
Plain-winged Woodcreeper	<i>Dendrocincla turdine</i>	Threatened	14
Lesser Woodcreeper	<i>Xiphorhynchus fuscus</i>	Threatened	16
Black-billed Scythebill	<i>Campylorhynchus falcularius</i>	Endangered	3
Scalloped Woodcreeper	<i>Lepidocolaptes falcinellus</i>	Endangered	5
Sharp-billed Treehunter	<i>Heliobletus contaminates</i>	Threatened	10
Black-capped Foliage-gleaner	<i>Philydor atricapillus</i>	Threatened	10
Olive Spinetail	<i>Cranioleuca obsoleta</i>	Threatened	9
Greenish Tyrannulet	<i>Phyllomyias virescens</i>	Threatened	9
Drab-breasted Pygmy-Tyrant	<i>Hemitriccus diops</i>	Threatened	13
Greenish Schiffornis	<i>Schiffornis virescens</i>	Threatened	18
Rufous-crowned Greenlet	<i>Hylophilus poicilotis</i>	Threatened	14
Blackish-blue Seedeater	<i>Amaurospiza moesta</i>	Threatened	11
Uniform Finch	<i>Haplospiza unicolor</i>	Threatened	6
Black-throated Grosbeak	<i>Saltator fuliginosus</i>	Endangered	2
Green-headed Tanager	<i>Tangara seledon</i>	Threatened	11

N°: number of protected areas where the species occurs.

3.3. Migratory Species at the Paraguay Biodiversity Corridor

Of the 557 bird species registered at the Corridor, 457 are confirmed residents breeding in the country. The 17.4% (97) are migrant species with different seasonal movements, and three species have no definite occurrence status because of deficient data [15].

Nineteen species are nearctic migrants that breed in North America and migrate to the South of South America during the boreal winter. Forty-one species are northern austral migrants that breed in Paraguay and migrate to the North of South America in the austral fall and winter, when they are less abundant or absent.

Ten species are breeding southern austral migrants which breed in Paraguay but are more abundant in the austral winter with the arrival of more individuals from the south of South America.

Nineteen species are austral visitors, which pass by the country in the winter but do not breed here. Eight species are vagrant, with no clear pattern of occurrence in the country, being specially species with few records.

4. Discussion

4.1. Bird Richness at the Paraguay Biodiversity Corridor

The total richness of 557 bird species recorded at the Paraguay Biodiversity Corridor of the UPAF represents more than 80% of the birds known for the country [15]. The richness of this Corridor, with an area of 12,000 km², is higher than other ecoregions of globally concerned hotspots [2]. For example, most of the bird richness of the ecoregions of the tropical moist broadleaf forest biome of Mesoamerica ranges from 294 to 600 bird species, being the only one that surpasses the UPAF corridor, the Chocó/Darién moist forest. With a total of 600 bird species, the Chocó/Darién moist forest has an area of 10,294 km² and more than 50% is officially designated as protected areas [39]. Compared to other Atlantic Forest region, bird richness of the Paraguay Biodiversity Corridor is 17% higher than the Tibagi River Basin with an area of 24,530 km², in the Paraná State of Brazil, with only 476 bird species recorded [40].

The Tibagi area which is two times bigger than the Paraguay Biodiversity Corridor is also a part of the UPAF ecoregion. This shows the high richness in the study area.

As mentioned before, core areas represent only 24% of the total area of the UPAF Corridor and only 3.5% of the original cover of the UPAF in the country. Some protected areas are Sustainable Management Resources Reserves (239 km²), where 50% of the surface of the reserve are allowed to be managed for economic benefits, including agriculture, shade-grown plantations, or harvesting timber or non-timber products in the forest. While comparing the bird community in a shade-grown yerba mate plantation with the forest in one of the core areas, Itabó Biological Reserve, only 66% of the species of the forest were present in the plantation, being the understory, forest floor, and mid-story species more restricted to the forest; 40% of the species that were present in both habitats were two times more abundant at the forest, and five of the seven threatened species found in the forest were present at the plantation [41]. These results suggest that this sustainable activity does have lower impact in the forest bird community than traditional plantations and could be beneficial if used to rehabilitate some of the deforested areas, including areas where yerba mate is grown in the open [41]. The effects of selective logging on the bird community is still not evaluated at the UPAF in Paraguay, being one of the objectives of the censuses developed in this study. In the UPAF of Brazil, avian species richness and diversity were similar between a primary forest and logged forest; but species composition differed strongly, with understory and terrestrial insectivores as the most sensitive ecological groups [42].

Others core areas are partially protected (1004 km²; Table 1). At the time of this study, only 12 protected areas were under strict protection, with a total of 127,818 hectares (10% of UPAF Corridor). The private sector contributes to the main surface of protected areas, with a total of 69,994 hectares, of which is mostly the Mbaracayú Forest Nature Reserve (65,134 hectares). Similarly, ITAIPU Binacional also provides most of strictly protected areas, with 40,655 hectares.

Seven private nature reserves have developed sustainable production of different resources of the forest; for example, the Itabo Biological Reserve extracts palm heart and produces shade-grown yerba mate; the Pindó, shade-grown yerba mate; the Ypetí, selective logging. These areas total 98,965 hectares of the Corridor. The effects of these human activities on the biodiversity of the forest are still not well understood.

The San Rafael National Park and the Mbaracayú Forest Nature Reserve are the core areas that hold higher richness of birds, with 427 and 408 species, respectively. This richness is also similar or higher than other protected areas in the Atlantic Forest in Brazil and Argentina, some of them being more than 30 times bigger than these two core areas of the Paraguay Biodiversity Corridor. In Brazil, the Iguaçu National Park, an area of 1850 km², only has 335 species recorded [43,44] even though it is estimated that fewer than 400 species are found in the Park [43]. In the area of Saibadela of the Intervalles State Park (380 km²), in the southeast of Brazil, 234 species were recorded during an intensive study and 355 species were considered to occur at the area [45]. At the Sooretama Biological Reserve (240 km²) in the Espírito Santo State, 286 species were reported and at the Itatiaia National Park (300 km²) in the States of Rio de Janeiro and Minas Gerais, 251 species were found [46]. In Santa Catarina Island (425 km²) in the Santa Catarina State, 269 species were known to have occurred in its area [47]. San Rafael and Mbaracayú surpasses all these sites in terms of total species richness.

4.2. Recommendations for the Management of Paraguay Biodiversity Corridor

The state of fragmentation and deterioration of the core areas of the Corridor require urgent actions so that biodiversity and natural resources can be preserved for the long term. Here are some of the key recommendations:

- (a) **Connectivity:** Actions must be focused to restore connectivity between: The Mbaracayú Forest Nature Reserve with the Morombí Private Nature Reserve; the San Rafael National Park with the Caazapá National Park and the Tapyta Private Nature Reserve; the Ypeti Private Nature Reserve with the Caazapá National Park.

- (b) Legal enforcement: The San Rafael National Park is one of the areas with an ineffective protection, due to a lack of legal definition since its creation in 1992, as most of the area remains under private properties. More details about the situation of San Rafael have been detailed in 2007 [16], and it continues without any progress after 12 years.
- (c) Strengthening of authorities: Since 2004, a “Zero Deforestation” law have been applied to all the Oriental region of Paraguay. Regardless of the law, 6000 km² of the UPAF were deforested between 2003–2013 [6]. These illegal conversions of forest occur as there is a lack of control and punishment for these crimes. The authorities do not have the capacity nor an interest to work efficiently to impose this banning. An example that reflects the weakness of the authorities is that only 10 among 30 public Protected Areas managed by the state has an administration or a park ranger house, and there are only 64 park rangers employed to manage these areas, a number that is clearly insufficient for effective conservation purposes.
- (d) Research: The different types of pressure that effects the biodiversity of the UPAF are still not measured. Some of the main focus of research could be: Densities of endemic birds in the remnants of the UPAF; evaluating the impact of human activities such as selective logging on the bird communities of core areas (Agropeco, Ypeti and Tapyta Private Nature Reserve); and the impact of agriculture pesticides on the bird communities of remnants. Species accumulation curves showed that sample efforts for some of the grouped core areas (Kanguery, Itaipu) were insufficient to estimate species richness, especially when focusing on the Atlantic forest endemic. A higher sampling effort is required to improve comparisons of the bird richness of the UPAF core areas.

5. Conclusions

These results have demonstrated that the Paraguay Biodiversity Corridor contains a high bird species richness with a total of 557 species recorded at its core conservation areas. This richness surpasses sites with bigger areas in the ecoregion of neighboring countries. It has core conservation areas with high species richness, with the highest richness found in the San Rafael National Park (427 species), the Mbaracayú Forest Nature Reserve (408 species), the Tapyta Private Nature Reserve (377 species) and the Ypeti Nature Reserve (350 species). The Corridor also harbors 78 endemic bird species of the Atlantic Forest that occur in the country and 50 species of globally concerned conservation importance.

However, it is denoted that the main conservation core areas at the Corridor are fragmented and isolated, where the main landscape are cultivated lands and urban areas, covering over 50% of the surface. Likewise, only 24% of the Corridor area is included in a category of protected or sustainable management area, with only 10% under strict protection. The situation of the protected areas is alarming, considering that only 59% of the core conservation areas have a management plan, with protected areas like San Rafael not strictly protected, as it should be according to the category of protection designated by the government to this important bird area.

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Appendix A

Table A1. Bird species recorded at each core area of the Paraguay Biodiversity Corridor, Paraguay, with their global and national status, and occurrences.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
RHEAS (RHEIDAE)					
<i>Greater Rhea (Rhea americana)</i>		NT		R	1-4-8-9-18
TINAMOUS (TINAMIDAE)					
<i>Solitary Tinamou (Tinamus solitarius)</i>	ATL	NT	EN	R	1-2-3-4-5-6-10-11-13-14-15-16-17-20
<i>Brown Tinamou (Crypturellus obsoletus)</i>			THRE	R	1-2-3-4-5-6-7-9-10-11-13-14-15-16-17-18-20-22
<i>Undulated Tinamou (Crypturellus undulatus)</i>				R	1-3-4-15-16
<i>Small-billed Tinamou (Crypturellus parvirostris)</i>				R	1-2-3-4-5-6-8-9-10-11-13-14-15-16-19-20-21
<i>Tataupa Tinamou (Crypturellus tataupa)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Red-winged Tinamou (Rhynchotus rufescens)</i>				R	1-2-3-4-5-7-8-9-10-11-12-13-14-15-16-18-20
<i>Spotted Nothura (Nothura maculosa)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-22
SCREAMERS (ANHIMIDAE)					
<i>Horned Screamer (Anhima cornuta)</i>			EN	R	8
<i>Southern Screamer (Chauna torquata)</i>				R	1-4-8-19
DUCKS (ANATIDAE)					
<i>White-faced Whistling-Duck (Dendrocygna viduata)</i>				R	1-3-4-5-8-9-11-12-13-14-20
<i>Black-bellied Whistling-duck (Dendrocygna autumnalis)</i>				R	5
<i>Coscoroba Swan (Coscoroba coscoroba)</i>			EN	R	1
<i>Muscovy Duck (Cairina moschata)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-18-20
<i>Comb Duck (Sarkidiornis melanotos)</i>			EN	R	12
<i>Ringed Teal (Callonetta leucophrys)</i>				R	5
<i>Brazilian Teal (Amazonetta brasiliensis)</i>				R	1-2-3-4-5-7-8-9-10-11-12-13-14-16-18-19-20-21
<i>Rosy-billed Pochard (Netta peposaca)</i>				R	1-8-9
<i>Brazilian Merganser (Mergus octosetaceus)</i>		CR	EN	R	9

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Masked Duck (Nomonyx dominicus)</i>				R	1-3-4-5-8-9-12-13
GUANS (CRACIDAE)					
<i>Rusty-margined Guan (Penelope superciliaris)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-19-20
<i>Dusky-legged Guan (Penelope obscura)</i>			EN	R	1-19
<i>Black-fronted Piping-Guan (Pipile jacutinga)</i>	ATL	EN	EN	R	1-2-3-4-6-10-11-20
<i>Bare-faced Curassow (Crax fasciolata)</i>		VU	EN	R	1-3-4
<i>Spot-winged Wood-Quail (Odontophorus capueira)</i>	ATL		THRE	R	1-2-3-4-5-6-7-9-10-11-13-14-16-20-22
GREBES (PODICIPEDIDAE)					
<i>White-tufted Grebe (Rollandia rolland)</i>				R	1-16
<i>Least Grebe (Tachybaptus dominicus)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-18-20
<i>Pied-billed Grebe (Podilymbus podiceps)</i>				R	1-3-4-5-11-13-14-16
<i>Great Grebe (Podiceps major)</i>				R	8
PIGEONS (COLUMBIDAE)					
<i>Rock Pigeon (Columba livia)</i>				R	1-5-8-9-10-11-12-13-15-16-19-20
<i>Scaled Pigeon (Patagioenas speciosa)</i>			THRE	R	4-20
<i>Picazuro Pigeon (Patagioenas picazuro)</i>				AS	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Pale-vented Pigeon (Patagioenas cayennensis)</i>				R	1-2-3-4-5-6-8-9-10-11-12-16-17-18-20-21-22
<i>Ruddy Quail-Dove (Geotrygon montana)</i>			THRE	R	1-2-3-4-5-6-9-10-11-16-17-20-22
<i>Violaceous Quail-Dove (Geotrygon violacea)</i>			THRE	R	1-2-3-4-6-20
<i>White-tipped Dove (Leptotila verreauxi)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Gray-fronted Dove (Leptotila rufaxilla)</i>				R	1-2-3-4-5-6-7-9-10-11-12-13-15-16-17-18-20-21-22
<i>Eared Dove (Zenaida auriculata)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Plain-breasted Ground-Dove (Columbina minuta)</i>				R	1-4
<i>Ruddy Ground-Dove (Columbina talpacoti)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-18-19-20-21-22

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Scaled Dove (Columbina squammata)</i>				R	1-4-5-8-9-10-11-12-13-14-16-20-21
<i>Picui Ground-Dove (Columbina picui)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-19-20-21-22
<i>Blue Ground-Dove (Claravis pretiosa)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-16-19-20-22
<i>Purple-winged Ground-Dove (Claravis geoffroyi)</i>	ATL	CR	EN	R	20
CUCKOOS (CUCULIDAE)					
<i>Guira Cuckoo (Guira guira)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Greater Ani (Crotophaga major)</i>				AN	1-3-4-5-8-9-10-11-12-13-14-15-16-17-19-20
<i>Smooth-billed Ani (Crotophaga ani)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Striped Cuckoo (Tapera naevia)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-22
<i>Pheasant Cuckoo (Dromococcyx phasianellus)</i>				R	1-2-3-4-19-20
<i>Pavonine Cuckoo (Dromococcyx pavoninus)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-20-22
<i>Squirrel Cuckoo (Piaya cayana)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-22
<i>Dark-billed Cuckoo (Coccyzus melacoryphus)</i>				AN	1-3-4-6-7-8-9-10-11-12-13-14-16-19-20-22
<i>Yellow-billed Cuckoo (Coccyzus americanus)</i>				N	3-4-8-10-11-14-20
<i>Pearly-breasted Cuckoo (Coccyzus euleri)</i>				AN	1-4-8-10-20
POTOOS (NYCTIBIIDAE)					
<i>Long-tailed Potoo (Nyctibius aethereus)</i>			EN	R	1-3-4-5-11-20
<i>Common Potoo (Nyctibius griseus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-20-22
NIGHTJARS (CAPRIMULGIDAE)					
<i>Nacunda Nighthawk (Chordeiles nacunda)</i>				AS	1-3-4-5-7-8-9-10-11-12-13-14-15-16-19-20
<i>Lesser Nighthawk (Chordeiles acutipennis)</i>				V	4
<i>Common Nighthawk (Chordeiles minor)</i>				N	1-2-3-4-5-9-10-11-12-13-16-19-20
<i>Short-tailed Nighthawk (Lurocalis semitorquatus)</i>				AN	1-3-4-5-6-7-8-9-10-11-12-13-14-16-17-20-21-22
<i>Band-winged Nightjar (Systellura longirostris)</i>				AV	10

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Common Pauraque (Nyctidromus albigollis)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>White-winged Nightjar (Eleothreptus candicans)</i>	CER	EN	EN	R	4
<i>Sickle-winged Nightjar (Eleothreptus anomalus)</i>		NT	EN	R	1-3
<i>Little Nightjar (Setopagis parvula)</i>				R	1-4-5-8-10-11-12-13-14-16-20
<i>Spot-tailed Nightjar (Hydrosalis maculicaudus)</i>			THRE	R	4
<i>Scissor-tailed Nightjar (Hydrosalis torquata)</i>				R	1-2-3-4-6-8-9-10-11-12-13-14-20-22
<i>Ocellated Poorwill (Nyctiphrynus ocellatus)</i>				R	1-3-4-5-6-10-18-20-22
<i>Silky-tailed Nightjar (Antrostomus sericocaudatus)</i>				R	1-3-4-6-9-10-11-13-14-16-20
<i>Rufous Nightjar (Antrostomus rufus)</i>				R	1-2-3-4-5-11-18
SWIFTS (APODIDAE)					
<i>Sooty Swift (Cypseloides fumigatus)</i>				AN	1-2-3-4-16-20
<i>Great Dusky Swift (Cypseloides senex)</i>				R	4-8-9-10-11-12-13-14-15-16-20
<i>White-collared Swift (Streptoprocne zonaris)</i>				R	2-4-6-8-13-16-20
<i>Biscutate Swift (Streptoprocne biscutata)</i>				V	4
<i>Gray-rumped Swift (Chaetura cinereiventris)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-20
<i>Sick's Swift (Chaetura meridionalis)</i>				AN	1-2-3-4-5-6-7-9-10-11-12-13-16-17-20-22
HUMMINGBIRDS (TROCHILIDAE)					
<i>Black Jacobin (Florisuga fusca)</i>	ATL			R	6-16-19-22
<i>Planalto Hermit (Phaethornis pretrei)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-19-20
<i>Scale-throated Hermit (Phaethornis eurynome)</i>	ATL			R	1-2-3-4-5-6-8-9-10-11-12-13-16-17-19-20-22
<i>White-vented Violetear (Colibri serrirostris)</i>				V	4
<i>White-tailed Goldenthrout (Polytmus guainumbi)</i>				R	1-3-4-5-8-10
<i>Black-throated Mango (Anthracothorax nigricollis)</i>				R	1-2-3-4-5-8-9-10-11-12-13-14-16-17-19-20
<i>Blue-tufted Starthroat (Heliomaster furcifer)</i>				R	1-2-3-4-8-10-11-22

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Amethyst Woodstar (Calliphlox amethystina)</i>				R	1-3
<i>Glittering-bellied Emerald (Chlorostilbon lucidus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-22
<i>Violet-crowned Plovercrest (Stephanoxis loddigesii)</i>	ATL			R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-20-21-22
<i>Fork-tailed Woodnymph (Thalurania furcata)</i>				R	1-2-3-6-19-20-21-22
<i>Violet-capped Woodnymph (Thalurania glaucopis)</i>	ATL			R	1-2-3-4-5-6-9-10-11-12-13-16-17-19-20-21
<i>Swallow-tailed Hummingbird (Eupetomena macroura)</i>				R	9-16
<i>Versicolored Emerald (Chrysuronia versicolor)</i>				R	1-3-4-5-6-9-10-11-12-13-14-16-19-20-21-22
<i>White-throated Hummingbird (Leucochloris albicollis)</i>	ATL			R	1-3-5-6-13-16-19
<i>Rufous-throated Sapphire (Hylocharis sapphirina)</i>				R	2-3-4-6-19-20
<i>Gilded Hummingbird (Hylocharis chrysura)</i>				R	1-2-3-4-5-7-8-9-10-11-12-13-15-16-17-18-19-20-21
LIMPKIN (ARAMIDAE)					
<i>Limpkin (Aramus guarauna)</i>				R	1-3-4-5-6-8-9-10-11-13-19-20
RAILS (RALLIDAE)					
<i>Purple Gallinule (Porphyrio martinica)</i>				AN	1-3-5-6-9-10-11-12-13-14-19-20
<i>Azure Gallinule (Porphyrio flavirostris)</i>				AN	3-4-8
<i>Russet-crowned Crake (Anurolimnas viridis)</i>				R	4
<i>Rufous-sided Crake (Laterallus melanophaius)</i>				R	1-3-5-8-9-16-18
<i>Red-and-white Crake (Laterallus leucopyrrhus)</i>				R	1-8
<i>Rufous-faced Crake (Laterallus xenopterus)</i>		VU	THRE	R	3-4
<i>Ocellated Crake (Micropygia schomburgkii)</i>				R	4
<i>Ash-throated Crake (Mustelirallus albicollis)</i>				R	1-2-3-4-5-8-9-10-11-12-13-14-16-18-20
<i>Paint-billed Crake (Mustelirallus erythropis)</i>				AN	4
<i>Spotted Rail (Pardirallus maculatus)</i>				AN	1-4-5-8
<i>Blackish Rail (Pardirallus nigricans)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-20

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Plumbeous Rail (Pardirallus sanguinolentus)</i>				R	1-3-13-20
<i>Giant Wood-Rail (Aramides ypecaha)</i>				R	1-3-4-5-15-19
<i>Gray-cowled Wood-Rail (Aramides cajaneus)</i>				R	1-2-3-4-5-8-9-10-11-15-20
<i>Slaty-breasted Wood-Rail (Aramides saracura)</i>	ATL			R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-19-20-22
<i>Spot-flanked Gallinule (Porphyriops melanops)</i>				R	4-5
<i>Yellow-breasted Crake (Porzana flaviventer)</i>				R	9-10
<i>Common Gallinule (Gallinula galeata)</i>				R	1-2-3-4-5-8-9-10-11-12-13-14-16-18-20
<i>Red-fronted Coot (Fulica rufifrons)</i>				R	13
FINFOOTS (HELIORNITHIDAE)					
<i>Sungrebe (Heliornis fulica)</i>				R	1-4-5-8-9-10-11-13-19
PLOVERS (CHARADRIIDAE)					
<i>American Golden-Plover (Pluvialis dominica)</i>				N	1-3-5
<i>Southern Lapwing (Vanellus chilensis)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-22
<i>Collared Plover (Charadrius collaris)</i>				R	8-12
AVOCETS AND STILTS (RECURVIROSTRIDAE)					
<i>Black-necked Stilt (Himantopus mexicanus)</i>				R	1-3-5-12-18-19
SANDPIPERS (SCOLOPACIDAE)					
<i>Upland Sandpiper (Bartramia longicauda)</i>				N	1-3-4-5-10-11-12-14-20
<i>White-rumped Sandpiper (Calidris fuscicollis)</i>				N	5-10-11-12-13
<i>Pectoral Sandpiper (Calidris melanotos)</i>				N	5
<i>Giant Snipe (Gallinago undulata)</i>				R	1-2-3-4-13-18
<i>South American Snipe (Gallinago paraguaiae)</i>				R	1-4-5-8
<i>Wilson's Phalarope (Phalaropus tricolor)</i>				N	4

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Solitary Sandpiper (Tringa solitaria)</i>				N	1-2-3-4-5-8-9-10-11-12-13-14-20
<i>Greater Yellowlegs (Tringa melanoleuca)</i>				N	5
<i>Lesser Yellowlegs (Tringa flavipes)</i>				N	4-5-10-11-12-13-20
JACANAS (JACANIDAE)					
<i>Wattled Jacana (Jacana jacana)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-18-19-20
PAINTED-SNIPE (ROSTRATULIDAE)					
<i>South American Painted-snipe (Nycticryphes semicollaris)</i>				R	1-19
SKIMMERS (RYNCHOPIDAE)					
<i>Black Skimmer (Rynchops niger)</i>				R	1-8-10-16
GULLS (LARIDAE)					
<i>Yellow-billed Tern (Sternula superciliaris)</i>				R	4-8-11-12-13-14-16
<i>Large-billed Tern (Phaetusa simplex)</i>				R	7-8-10-11-12-13-14-16
STORKS (CICONIIDAE)					
<i>Maguari Stork (Ciconia maguari)</i>				R	1-4-5-10-11-12-13
<i>Jabiru (Jabiru mycteria)</i>				R	1-4
<i>Wood Stork (Mycteria americana)</i>				R	1-3-4-8-10-13
ANHINGAS (ANHINGIDAE)					
<i>Anhinga (Anhinga anhinga)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-18-19-20
CORMORANTS (PHALACROCORACIDAE)					
<i>Neotropic Cormorant (Phalacrocorax brasilianus)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-17-19-20
HERONS (ARDEIDAE)					
<i>Rufescent Tiger-Heron (Tigrisoma lineatum)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-18-20
<i>Boat-billed Heron (Cochlearius cochlearius)</i>				R	1-4-5-10-13-16

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Pinnated Bittern (Botaurus pinnatus)</i>				R	8
<i>Least Bittern (Ixobrychus exilis)</i>				R	1-8-16
<i>Stripe-backed Bittern (Ixobrychus involucris)</i>				R	13-16
<i>Black-crowned Night-Heron (Nycticorax nycticorax)</i>				R	1-2-3-4-5-8-9-10-11-13-14-16-17-19-20
<i>Striated Heron (Butorides striata)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-19-20
<i>Cattle Egret (Bubulcus ibis)</i>				R	1-2-3-4-5-7-8-9-10-11-12-13-14-15-17-18-19-20
<i>Cocoi Heron (Ardea cocoi)</i>				R	1-2-3-5-8-9-10-11-12-13-14-16-18-19-20
<i>Great Egret (Ardea alba)</i>				R	1-2-3-4-5-8-9-10-11-12-13-14-15-16-18-19-20
<i>Whistling Heron (Syrigma sibilatrix)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-18-19-20
<i>Snowy Egret (Egretta thula)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-19-20
IBISES (THRESKIORNITHIDAE)					
<i>White-faced Ibis (Plegadis chihi)</i>				R	1-20
<i>Green Ibis (Mesembrinibis cayennensis)</i>				R	1-4-5-8-10-11-16-20
<i>Bare-faced Ibis (Phimosus infuscatus)</i>				R	1-2-3-4-5-8
<i>Buff-necked Ibis (Theristicus caudatus)</i>				R	3-4-5
<i>Roseate Spoonbill (Platalea ajaja)</i>				R	1-8
NEW WORLD VULTURES (CATHARTIDAE)					
<i>King Vulture (Sarcoramphus papa)</i>			EN	R	1-2-3-4-5-6-9-10-11-16-20
<i>Black Vulture (Coragyps atratus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Turkey Vulture (Cathartes aura)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-18-19-20-22
<i>Lesser Yellow-headed Vulture (Cathartes burrovianus)</i>				R	1-3-4-5-8-15-18-20
OSPREY (PANDIONIDAE)					
<i>Osprey (Pandion haliaetus)</i>				N	1-8-9-10-11-12-13-14-16

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
HAWKS (ACCIPITRIDAE)					
<i>White-tailed Kite (Elanus leucurus)</i>				R	1-3-4-5-8-9-10-11-12-13-14-15-16-20
<i>Pearl Kite (Gampsonyx swainsonii)</i>				R	4
<i>Hook-billed Kite (Chondrohierax uncinatus)</i>				R	4
<i>Gray-headed Kite (Leptodon cayanensis)</i>				R	1-2-3-4-5-6-7-9-10-11-16-20
<i>Swallow-tailed Kite (Elanoides forficatus)</i>				AN, N	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-20
<i>Crested Eagle (Morphnus guianensis)</i>		NT	EN	R	1
<i>Harpy Eagle (Harpia harpyja)</i>		NT	EN	R	4-10-20
<i>Black Hawk-Eagle (Spizaetus tyrannus)</i>			EN	R	1-20
<i>Black-and-white Hawk-Eagle (Spizaetus melanoleucus)</i>				R	1-4-9-10-16-20
<i>Ornate Hawk-Eagle (Spizaetus ornatus)</i>		NT	THRE	R	1-4-6-16-20
<i>Black-collared Hawk (Busearellus nigricollis)</i>				R	8-9-13
<i>Snail Kite (Rostrhamus sociabilis)</i>				AS	1-3-4-5-6-8-9-10-11-12-13-14-15-16-20
<i>Rufous-thighed Kite (Harpagus diodon)</i>				AN	1-2-3-4-6-11-16-20-22
<i>Plumbeous Kite (Ictinia plumbea)</i>				AN	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-20-22
<i>Cinereous Harrier (Circus cinereus)</i>				R	1
<i>Long-winged Harrier (Circus buffoni)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-18
<i>Gray-bellied Hawk (Accipiter poliogaster)</i>		NT	EN	R	2-3-5-10-11-15-16-20
<i>Tiny Hawk (Accipiter superciliosus)</i>			THRE	R	4-5-11-13-15-16
<i>Sharp-shinned Hawk (Accipiter striatus)</i>				R	1-3-4-5-6-15-20
<i>Bicolored Hawk (Accipiter bicolor)</i>				R	1-2-4-6-11-15-20
<i>Crane Hawk (Geranospiza caerulescens)</i>				R	1-20
<i>Savanna Hawk (Buteogallus meridionalis)</i>				R	1-3-4-5-8-10-13-15-18-19-21-22
<i>Great Black Hawk (Buteogallus urubitinga)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Crowned Eagle (Buteogallus coronatus)</i>		EN	THRE	R	2-4-5
<i>Roadside Hawk (Rupornis magnirostris)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-22
<i>Harris's Hawk (Parabuteo unicinctus)</i>				R	5
<i>White-rumped Hawk (Parabuteo leucorrhous)</i>				R	1-2
<i>White-tailed Hawk (Geranoaetus albicaudatus)</i>				R	1-2-3-4-5-8-20-22
<i>Black-chested Buzzard-Eagle (Geranoaetus melanoleucus)</i>				R	2-8-11-13
<i>Mantled Hawk (Pseudastur polionotus)</i>	ATL	NT	EN	R	9
<i>Gray-lined Hawk (Buteo nitidus)</i>				R	20
<i>Short-tailed Hawk (Buteo brachyurus)</i>				R	1-5-6
<i>Swainson's Hawk (Buteo swainsoni)</i>				N	5-13-16-20-21
<i>Zone-tailed Hawk (Buteo albonotatus)</i>				R	4-11
BARN OWLS (TYTONIDAE)					
<i>Barn Owl (Tyto alba)</i>				R	1-3-4-5-7-8-9-10-11-12-13-14-16-20-22
OWLS (STRIGIDAE)					
<i>Tropical Screech-Owl (Megascops choliba)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-20-22
<i>Black-capped Screech-Owl (Megascops atricapilla)</i>	ATL			R	1-2-3-4-5-7-9-10-11-14-16-20-22
<i>Spectacled Owl (Pulsatrix perspicillata)</i>				R	20
<i>Tawny-browed Owl (Pulsatrix koeniswaldiana)</i>	ATL		EN	R	1-16-20-22
<i>Great Horned Owl (Bubo virginianus)</i>				R	10-11-16
<i>Rusty-barred Owl (Strix hylophila)</i>	ATL	NT	THRE	R	1-16-20
<i>Mottled Owl (Ciccaba virgata)</i>				R	1-2-3-4-6-10-13-20
<i>Black-banded Owl (Ciccaba huhula)</i>			THRE	R	1-3-4-6-10-16-20
<i>Ferruginous Pygmy-Owl (Glaucidium brasilianum)</i>				R	1-2-3-4-5-8-9-10-11-12-13-14-15-16-18-20-21-22
<i>Burrowing Owl (Athene cunicularia)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Buff-fronted Owl (Aegolius harrisi)</i>				R	1-9
<i>Striped Owl (Asio clamator)</i>				R	4-8-10-11
<i>Short-eared Owl (Asio flammeus)</i>				R	1-13
TROGONS (TROGONIDAE)					
<i>Surucua Trogon (Trogon surrucura)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Black-throated Trogon (Trogon rufus)</i>				R	1-2-3-4-5-6-8-9-10-11-13-14-17-18-19-20-22
MOTMOTS (MOMOTIDAE)					
<i>Rufous-capped Motmot (Baryphthengus ruficapillus)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22
<i>Amazonian Motmot (Momotus momota)</i>				R	20
KINGFISHERS (ALCEDINIDAE)					
<i>Ringed Kingfisher (Megaceryle torquata)</i>				R	1-2-3-4-5-8-9-10-11-12-13-14-16-17-19-20
<i>Amazon Kingfisher (Chloroceryle amazona)</i>				R	1-3-4-5-8-9-10-11-12-13-14-16-17-19-20-21
<i>American Pygmy Kingfisher (Chloroceryle aenea)</i>				R	1-4
<i>Green Kingfisher (Chloroceryle americana)</i>				R	1-2-3-4-5-8-9-10-11-12-13-14-16-17-19-20
<i>Green-and-rufous Kingfisher (Chloroceryle inda)</i>				R	1-4
PUFFBIRDS (BUCCONIDAE)					
<i>Buff-bellied Puffbird (Notharchus swainsoni)</i>	ATL		THRE	R	1-2-3-4-5-6-8-9-10-11-12-13-16-20
<i>White-eared Puffbird (Nystalus chacuru)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-18-19-20-21-22
<i>Rusty-breasted Nunlet (Nonnula rubecula)</i>				R	1-2-3-4-5-6-9-10-11-13-16-20
TOUCANS (RAMPHASTIDAE)					
<i>Toco Toucan (Ramphastos toco)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-19-20
<i>Red-breasted Toucan (Ramphastos dicolorus)</i>	ATL			R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-18-20
<i>Spot-billed Toucanet (Selenidera maculirostris)</i>	ATL		THRE	R	1-2-3-4-5-6-7-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Saffron Toucanet (Pteroglossus bailloni)</i>	ATL	NT	THRE	R	1-2-3-4-5-6-8-9-10-11-12-13-16-19-20

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Chestnut-eared Aracari (Pteroglossus castanotis)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-21-22
WOODPECKERS (PICIDAE)					
<i>White-barred Piculet (Picumnus cirratus)</i>				R	1-2-4-5-6-7-15-19-20
<i>Ochre-collared Piculet (Picumnus temminckii)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-18-20-21-22
<i>White-wedged Piculet (Picumnus albosquamatus)</i>			EN	R	8
<i>White Woodpecker (Melanerpes candidus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-19-20-22
<i>Yellow-fronted Woodpecker (Melanerpes flavifrons)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-18-20-21-22
<i>White-spotted Woodpecker (Veniliornis spilogaster)</i>	ATL			R	1-2-3-4-5-6-9-10-11-12-13-15-16-17-18-20-22
<i>Little Woodpecker (Veniliornis passerinus)</i>				R	8
<i>Robust Woodpecker (Campephilus robustus)</i>	ATL		THRE	R	1-2-3-4-5-6-7-9-10-11-12-13-14-16-20-22
<i>Crimson-crested Woodpecker (Campephilus melanoleucos)</i>				R	5
<i>Lineated Woodpecker (Dryocopus lineatus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-18-20-22
<i>Helmeted Woodpecker (Celeus galeatus)</i>	ATL	VU	THRE	R	1-2-3-4-5-6-9-10-11-16-19-20
<i>Blond-crested Woodpecker (Celeus flavescens)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-16-17-20-21-22
<i>Golden-green Woodpecker (Piculus chrysochloros)</i>				R	9-10-16
<i>White-browed Woodpecker (Piculus aurulentus)</i>	ATL	NT	THRE	R	1-2-4-6-9-11-20-22
<i>Green-barred Woodpecker (Colaptes melanochloros)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-18-20
<i>Campo Flicker (Colaptes campestris)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-18-19-20-22
SERIEMAS (CARIAMIDAE)					
<i>Red-legged Seriema (Cariama cristata)</i>				R	1-3-4-18
FALCONS (FALCONIDAE)					
<i>Laughing Falcon (Herpetotheres cachinnans)</i>				R	1-3-4-5-7-8-9-11-19
<i>Barred Forest-Falcon (Micrastur ruficollis)</i>				R	1-2-3-4-5-6-9-10-11-14-16-18-20-21-22
<i>Collared Forest-Falcon (Micrastur semitorquatus)</i>				R	1-3-4-5-6-7-9-10-11-13-14-16-20-22

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Southern Caracara (Caracara plancus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-18-19-20-21-22
<i>Yellow-headed Caracara (Milvago chimachima)</i>				R	1-2-3-4-5-7-8-9-10-11-12-13-14-15-16-17-18-19-20
<i>Chimango Caracara (Milvago chimango)</i>				R	1-2-3-4-5-7-15-19-20
<i>American Kestrel (Falco sparverius)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21
<i>Bat Falcon (Falco ruficularis)</i>				R	1-2-3-4-5-6-8-9-10-11-13-14-16-18-19-20-21
<i>Orange-breasted Falcon (Falco deiroleucus)</i>		NT		R	3
<i>Aplomado Falcon (Falco femoralis)</i>				R	1-3-4-5-8-9-13-18-20-22
<i>Peregrine Falcon (Falco peregrinus)</i>				N, AV	1-5-6-7-10-11-16-20
PARROTS (PSITTACIDAE)					
<i>Monk Parakeet (Myiopsitta monachus)</i>				R	1-2-3-5-6-15-17-19-20-21-22
<i>Yellow-chevroned Parakeet (Brotogeris chiriri)</i>				R	1-2-3-4-5-6-8-9-11-12-13-14-16-18-19-20-21
<i>Pileated Parrot (Pionopsitta pileata)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-20-21-22
<i>Scaly-headed Parrot (Pionus maximiliani)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-19-20-21-22
<i>Vinaceous-breasted Parrot (Amazona vinacea)</i>	ATL	EN	EN	R	1-2-4-5-7-9-10-11-14-20-21
<i>Red-spectacled Parrot (Amazona pretrei)</i>	ATL	VU	EN	V	20
<i>Turquoise-fronted Parrot (Amazona aestiva)</i>				R	2-4-5-8-9-10-11-12-13-14-15-16-18-20
<i>Blue-winged Parrotlet (Forpus xanthopterygius)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-19-20
<i>Maroon-bellied Parakeet (Pyrrhura frontalis)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Hyacinth Macaw (Anodorhynchus hyacinthinus)</i>		VU	EN	R	4
<i>Peach-fronted Parakeet (Eupsittula aurea)</i>				R	4-19
<i>Nanday Parakeet (Aratinga nenday)</i>				R	2-11-12-13
<i>Blue-winged Macaw (Primolius maracana)</i>		NT	EN	R	1-3-4-20
<i>Blue-and-yellow Macaw (Ara ararauna)</i>			EN	R	4
<i>Red-and-green Macaw (Ara chloropterus)</i>			EN	R	4-10-17-20

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>White-eyed Parakeet (Psittacara leucophthalmus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-21-22
ANTBIRDS (THAMNOPHILIDAE)					
<i>Spot-backed Antshrike (Hypoedaleus guttatus)</i>	ATL			R	1-2-3-4-5-6-7-10-11-13-15-16-17-18-20-21-22
<i>Large-tailed Antshrike (Mackenziaena leachii)</i>	ATL			R	1-2-3-5-6-16-20-22
<i>Tufted Antshrike (Mackenziaena severa)</i>	ATL			R	1-2-3-4-5-6-7-9-10-11-12-13-14-16-18-19-20-22
<i>Great Antshrike (Taraba major)</i>				R	2-8-9-15-19
<i>Barred Antshrike (Thamnophilus doliatus)</i>				R	1-3-4-8-9-19-20
<i>Rufous-capped Antshrike (Thamnophilus ruficapillus)</i>				R	1-3-13-17-20
<i>Rufous-winged Antshrike (Thamnophilus torquatus)</i>			EN	R	4
<i>Variable Antshrike (Thamnophilus caerulescens)</i>				R	1-2-3-4-5-6-7-9-10-11-12-13-14-15-16-17-18-20-22
<i>Plain Anttoireo (Dysithamnus mentalis)</i>				R	1-2-3-4-5-6-7-9-10-11-12-13-14-15-16-17-19-20-22
<i>Black-capped Antwren (Herpsilochmus atricapillus)</i>				R	1-2-3-4-5-6-21
<i>Rufous-winged Antwren (Herpsilochmus rufimarginatus)</i>				R	1-2-3-4-5-6-7-9-10-11-16-17-18-20-21-22
<i>Rusty-backed Antwren (Formicivora rufa)</i>				R	4-8-18-19
<i>Bertoni's Antbird (Drymophila rubricollis)</i>	ATL		EN	R	1-6-20
<i>Dusky-tailed Antbird (Drymophila malura)</i>	ATL			R	1-2-3-4-5-6-10-11-13-16-20-22
<i>Streak-capped Antwren (Terenura maculata)</i>	ATL		THRE	R	1-2-3-4-5-6-7-9-10-11-20-22
<i>White-shouldered Fire-eye (Pyriglena leucoptera)</i>	ATL			R	1-2-3-4-5-6-7-9-10-11-12-13-14-15-16-17-18-20-21-22
CRESCENTCHESTS (MELANOPAREIIDAE)					
<i>Collared Crescentchest (Melanopareia torquata)</i>	CER		THRE	R	4
GNATEATERS (CONOPOPHAGIDAE)					
<i>Rufous Gnateater (Conopophaga lineata)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-16-17-18-20-22
ANTPITTAS (GRALLARIIDAE)					

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Variiegated Antpitta (Grallaria varia)</i>			THRE	R	1-2-3-4-5-6-7-10-16-17-20
<i>Speckle-breasted Antpitta (Hylopezus nattereri)</i>	ATL		EN	R	1-4-6-22
ANTTHRUSHES (FORMICARIIDAE)					
<i>Short-tailed Antthrush (Chamaeza campanisona)</i>			THRE	R	1-2-3-4-5-6-7-8-9-10-11-13-15-16-17-19-20-22
OVENBIRDS (FURNARIIDAE)					
<i>Rufous-breasted Leaf-tosser (Sclerurus scansor)</i>	ATL		THRE	R	1-2-3-4-6-17-20
<i>Olivaceous Woodcreeper (Sittasomus griseicapillus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Plain-winged Woodcreeper (Dendrocincla turdina)</i>	ATL		THRE	R	1-2-3-4-5-6-10-11-13-16-17-18-20-21
<i>Planalto Woodcreeper (Dendrocolaptes platyrostris)</i>				R	1-2-3-4-5-6-7-9-10-11-13-15-16-17-18-19-20-21-22
<i>White-throated Woodcreeper (Xiphocolaptes albicollis)</i>				R	1-2-3-4-5-6-9-10-11-13-16-17-20-21-22
<i>Lesser Woodcreeper (Xiphorhynchus fuscus)</i>	ATL		THRE	R	1-2-3-4-5-6-9-10-11-13-15-16-17-20-22
<i>Red-billed Scythebill (Campylorhamphus trochilirostris)</i>				R	8
<i>Black-billed Scythebill (Campylorhamphus falcularius)</i>	ATL		EN	R	1-3-11
<i>Narrow-billed Woodcreeper (Lepidocolaptes angustirostris)</i>				R	1-4-5-8-15-16-19
<i>Scalloped Woodcreeper (Lepidocolaptes falcinellus)</i>	ATL		EN	R	1-2-3-6-20
<i>Plain Xenops (Xenops minutus)</i>			THRE	R	1-3-4-5-6-10-11-13-16-20
<i>Streaked Xenops (Xenops rutilans)</i>				R	1-3-4-5-6-9-10-11-12-13-16-17-20
<i>Rufous Hornero (Furnarius rufus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Sharp-tailed Streamcreeper (Lochmias nematura)</i>			THRE	R	1-2-3-4-5-6-11-13-16-17-20-22
<i>Sharp-billed Treehunter (Heliobletus contaminatus)</i>	ATL		THRE	R	1-3-4-5-6-10-11-13-16-20
<i>Black-capped Foliage-gleaner (Philydor atricapillus)</i>	ATL		THRE	R	1-3-4-5-6-9-10-17-20-22
<i>Buff-fronted Foliage-gleaner (Philydor rufum)</i>				R	1-3-4-5-6-9-10-11-12-13-16-17-20
<i>White-browed Foliage-gleaner (Anabacerthia amaurotis)</i>	ATL	NT	EN	R	1-5-6
<i>Ochre-breasted Foliage-gleaner (Anabacerthia lichtensteini)</i>	ATL			R	1-2-3-4-5-6-7-9-10-11-12-13-14-16-17-18-19-20-21-22

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Buff-browed Foliage-gleaner (Syndactyla rufosuperciliata)</i>				R	1-2-3-4-5-6-10-11-16-20-21-22
<i>Canebrake Groundcreeper (Clibanornis dendrocolaptoides)</i>	ATL	NT	EN	R	5-6
<i>White-eyed Foliage-gleaner (Automolus leucophthalmus)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22
<i>Rufous-fronted Thornbird (Phacellodomus rufifrons)</i>				R	19
<i>Greater Thornbird (Phacellodomus ruber)</i>				R	3-5-8-19
<i>Olive Spinetail (Cranioleuca obsoleta)</i>	ATL		THRE	R	1-3-5-6-10-11-18-20-22
<i>Bay-capped Wren-spinetail (Spartonoica maluroides)</i>		NT		AV	1
<i>Yellow-chinned Spinetail (Certhiaxis cinnamomeus)</i>				R	1-4-5-8-9-10-11-12-13-14-16-19-20
<i>Chotoy Spinetail (Schoeniophylax phryganophilus)</i>				R	1
<i>Gray-bellied Spinetail (Synallaxis cinerascens)</i>			THRE	R	1-2-3-4-5-6-7-9-10-11-12-13-16-18-19-20-22
<i>Rufous-capped Spinetail (Synallaxis ruficapilla)</i>	ATL			R	1-2-3-4-5-6-7-9-10-11-12-13-16-17-19-20-22
<i>Spix's Spinetail (Synallaxis spixi)</i>				R	1-2-3-4-5-6-13-16-20-22
<i>Pale-breasted Spinetail (Synallaxis albescens)</i>				R	1-3-4-13
<i>Sooty-fronted Spinetail (Synallaxis frontalis)</i>				R	1-3-5-7-8-10-11-18-20
TYRANT FLYCATCHERS (TYRANNIDAE)					
<i>Rough-legged Tyrannulet (Phyllomyias burmeisteri)</i>			THRE	R	1-2-3-4-5-6-11
<i>Greenish Tyrannulet (Phyllomyias virescens)</i>	ATL		THRE	R	1-2-3-4-6-11-13-20
<i>Planalto Tyrannulet (Phyllomyias fasciatus)</i>				R	11-16
<i>Gray Elaenia (Myiopagis caniceps)</i>				R	1-2-3-4-5-6-7-9-10-11-13-16-17-19-20-22
<i>Greenish Elaenia (Myiopagis viridicata)</i>				AN	1-3-4-5-6-8-9-10-11-13-15-16-17-20-22
<i>Yellow-bellied Elaenia (Elaenia flavogaster)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-18-19-20
<i>Large Elaenia (Elaenia spectabilis)</i>				AN	1-2-3-4-5-7-8-10-13-17-19-22
<i>White-crested Elaenia (Elaenia albiceps)</i>				AV	1-2-3-4-6-11-13-20
<i>Small-billed Elaenia (Elaenia parvirostris)</i>				AN	1-3-4-5-6-8-11-13

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
Olivaceous Elaenia (<i>Elaenia mesoleuca</i>)				R	1-6-11
Lesser Elaenia (<i>Elaenia chiriquensis</i>)				AN	3-4-18
Small-headed Elaenia (<i>Elaenia sordida</i>)				R	1-2-3-4-5-9-10
Southern Beardless-Tyrannulet (<i>Camptostoma obsoletum</i>)				R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-20
Suiriri Flycatcher (<i>Suiriri suiriri</i>)				R	1-15-19
Sooty Tyrannulet (<i>Serpophaga nigricans</i>)				R	5-8-10-13
White-crested Tyrannulet (<i>Serpophaga subcristata</i>)				AS	1-3-4-6-8-9-10-11-15-16-19-20
Straneck's Tyrannulet (<i>Serpophaga griseicapilla</i>)				AV	1-4
Mouse-colored Tyrannulet (<i>Phaeomyias murina</i>)				AN	1-3-4-6-10-11-17
Yellow Tyrannulet (<i>Capsiempis flaveola</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-21-22
Bearded Tachuri (<i>Polystictus pectoralis</i>)		NT		AV	1-3-4-13
Crested Doradito (<i>Pseudocolopteryx sclateri</i>)				R	5
Dinelli's Doradito (<i>Pseudocolopteryx dinelliana</i>)	CHA	NT		AV	8
Warbling Doradito (<i>Pseudocolopteryx flaviventris</i>)				AV	11
Southern Antpipit (<i>Corythopis delalandi</i>)				R	1-2-3-4-5-6-7-9-10-11-13-14-15-16-17-20
Tawny-crowned Pygmy-Tyrant (<i>Euscarthmus meloryphus</i>)				R	1-2-3-4-6-8-9-10-11-12-13-14-16-20-21
Southern Bristle-Tyrant (<i>Phylloscartes eximius</i>)	ATL	NT	THRE	R	1-2-3-4-5-6-7-10-11-13-16-20-22
Mottle-cheeked Tyrannulet (<i>Phylloscartes ventralis</i>)			THRE	R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-20
São Paulo Tyrannulet (<i>Phylloscartes paulista</i>)	ATL	NT	EN	R	1-2-3-4-5-6-16-19-20
Bay-ringed Tyrannulet (<i>Phylloscartes sylviolus</i>)	ATL	NT	THRE	R	1-3-4-5-6-16-17-20
Gray-hooded Flycatcher (<i>Mionectes rufiventris</i>)	ATL			R	1-2-3-4-5-6-10-11-13-16-20
Sepia-capped Flycatcher (<i>Leptopogon amaurocephalus</i>)				R	1-2-3-4-5-6-9-10-11-12-13-14-16-17-20-21-22
Plain Tyrannulet (<i>Inezia inornata</i>)				AN	4-19
Sharp-tailed Tyrant (<i>Culicivora caudacuta</i>)		VU	THRE	R	1-3-4

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
Eared Pygmy-Tyrant (<i>Myiornis auricularis</i>)	ATL			R	1-2-3-4-5-6-7-9-10-11-13-14-16-17-18-20-22
Drab-breasted Pygmy-Tyrant (<i>Hemitriccus diops</i>)	ATL		THRE	R	1-3-4-5-6-7-9-10-11-16-20-22
Pearly-vented Tody-Tyrant (<i>Hemitriccus margaritaceiventer</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-18-19-20-22
Ochre-faced Tody-Flycatcher (<i>Poecilatriccus plumbeiceps</i>)				R	1-2-3-4-5-6-7-9-10-11-16-17-20-22
Common Tody-Flycatcher (<i>Todirostrum cinereum</i>)				R	5-8
Yellow-olive Flycatcher (<i>Tolmomyias sulphurescens</i>)				R	1-2-3-4-5-6-10-11-13-19-20-22
White-throated Spadebill (<i>Platyrinchus mystaceus</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-16-17-18-20-22
Russet-winged Spadebill (<i>Platyrinchus leucoryphus</i>)	ATL	VU	EN	R	1-3-4-6
Bran-colored Flycatcher (<i>Myiophobus fasciatus</i>)				AN	1-2-3-4-5-6-8-9-10-11-13-16-17-20
Euler's Flycatcher (<i>Lathrotriccus euleri</i>)				AN	1-2-3-4-5-6-8-9-10-11-16-17-18-19-20-22
Fuscous Flycatcher (<i>Cnemotriccus fuscatus</i>)				AN	1-2-3-4-5-7-9-10-11-13-16-17-18-20-22
Tropical Pewee (<i>Contopus cinereus</i>)				R	1-3-4-5-6-9-10-11-13-20
Vermilion Flycatcher (<i>Pyrocephalus rubinus</i>)				AS	1-3-4-5-8-9-10-11-12-13-14-16-20
Crested Black-Tyrant (<i>Knipolegus lophotes</i>)				?	4
Blue-billed Black-Tyrant (<i>Knipolegus cyanirostris</i>)				AV	1-2-4-10-11-13-20
Spectacled Tyrant (<i>Hymenops perspicillatus</i>)				AS	1-3-8-13
Yellow-browed Tyrant (<i>Satrapa icterophrys</i>)				R	1-3-4-5-6-8-9-10-13-20
Gray Monjita (<i>Xolmis cinereus</i>)				R	1-3-4-5-13-18-20
White-rumped Monjita (<i>Xolmis velatus</i>)				R	18
White Monjita (<i>Xolmis irupero</i>)				R	19
Streamer-tailed Tyrant (<i>Gubernetes yetapa</i>)				R	1-3-4-5-7-8-9-10-11-12-13-14-16-18-19-20
Shear-tailed Gray-Tyrant (<i>Muscipipra vetula</i>)	ATL			AV	4-9-11
Black-backed Water-Tyrant (<i>Fluvicola albiventer</i>)				R	3-8-10-11-13
White-headed Marsh-Tyrant (<i>Arundinicola leucocephala</i>)				R	3-5-8-9-10-11-13-14-20

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
Cock-tailed Tyrant (<i>Alectrurus tricolor</i>)		VU	EN	R	1-3
Strange-tailed Tyrant (<i>Alectrurus risora</i>)		VU	EN	R	1
Long-tailed Tyrant (<i>Colonia colonus</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-19-20
Cattle Tyrant (<i>Machetornis rixosa</i>)				R	1-2-3-4-5-8-9-10-11-12-13-14-15-16-17-18-19-20-22
Piratic Flycatcher (<i>Legatus leucophaeus</i>)				AN	1-3-4-5-6-13-16-20-22
Social Flycatcher (<i>Myiozetetes similis</i>)				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-18-19-20-21-22
Great Kiskadee (<i>Pitangus sulphuratus</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
Three-striped Flycatcher (<i>Conopias trivirgatus</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-20
Streaked Flycatcher (<i>Myiodynastes maculatus</i>)				AN	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-21-22
Boat-billed Flycatcher (<i>Megarynchus pitangua</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
Variegated Flycatcher (<i>Empidonomus varius</i>)				AN	1-3-4-5-6-8-10-11-13-16-19-20-21-22
Crowned Slaty-Flycatcher (<i>Empidonomus aurantioatrocristatus</i>)				AN	4-19-20
Tropical Kingbird (<i>Tyrannus melancholicus</i>)				AN	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-21-22
Fork-tailed Flycatcher (<i>Tyrannus savana</i>)				AN	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-20-22
Eastern Kingbird (<i>Tyrannus tyrannus</i>)				N	1-5
Sibilant Silystes (<i>Silystes sibilator</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22
Rufous Casiornis (<i>Casiornis rufus</i>)				R	1-2-3-4-5-8-9-10-11-16-20
Swainson's Flycatcher (<i>Myiarchus swainsoni</i>)				AN	1-3-4-5-6-8-13-17-19-20-22
Short-crested Flycatcher (<i>Myiarchus ferox</i>)				R	1-2-3-4-8-9-10-11-12-13-14-16-18-19-20-22
Brown-crested Flycatcher (<i>Myiarchus tyrannulus</i>)				R	1-2-3-4-5-7-15-20-22
Large-headed Flatbill (<i>Ramphotrigon megacephalum</i>)			EN	R	1-2-3-4-6-17-20
Rufous-tailed Attila (<i>Attila phoenicurus</i>)				V	1
SHARPBILL (OXYRUNCIDAE)					
Sharpbill (<i>Oxyruncus cristatus</i>)			THRE	R	1-2-3-4-5-6-11-18-20-22

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
COTINGAS (COTINGIDAE)					
<i>White-tipped Plantcutter (Phytotoma rutila)</i>				AV	5
<i>Swallow-tailed Cotinga (Phibalura flavirostris)</i>		NT	EN	AV	10-11-13
<i>Red-ruffed Fruitcrow (Pyroderus scutatus)</i>			THRE	R	1-2-3-4-5-6-9-10-11-13-16-20-22
<i>Bare-throated Bellbird (Procnias nudicollis)</i>	ATL	VU	EN	R	1-2-3-4-5-7-8-10-11-13-20
MANAKINS (PIPRIDAE)					
<i>Helmeted Manakin (Antilophia galeata)</i>	CER			R	4
<i>Swallow-tailed Manakin (Chiroxiphia caudata)</i>	ATL			R	1-2-3-4-5-6-7-9-10-11-12-13-14-15-16-17-20-22
<i>White-bearded Manakin (Manacus manacus)</i>			THRE	R	3-4-9-10-11-12-13-16-20
<i>Band-tailed Manakin (Pipra fasciicauda)</i>				R	1-2-3-4-5-6-9-10-11-12-13-16-17-20
TITYRAS (TITYRIDAE)					
<i>Black-crowned Tityra (Tityra inquisitor)</i>				R	1-2-3-4-5-6-9-10-11-12-13-14-16-17-18-20-22
<i>Black-tailed Tityra (Tityra cayana)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-19-20-21-22
<i>Masked Tityra (Tityra semifasciata)</i>			THRE	R	1-3-4-7-9-20
<i>Greenish Schiffornis (Schiffornis virescens)</i>	ATL		THRE	R	1-2-3-4-5-6-7-9-10-11-12-13-14-16-17-18-20-22
<i>White-naped Xenopsaris (Xenopsaris albinucha)</i>				R	4
<i>Green-backed Becard (Pachyramphus viridis)</i>				R	1-3-4-5-6-8-10-11-13-20
<i>Chestnut-crowned Becard (Pachyramphus castaneus)</i>				R	1-2-5-6-9-10-11-16-20-22
<i>White-winged Becard (Pachyramphus polychopterus)</i>				AN	1-3-4-5-6-7-8-18-20-22
<i>Crested Becard (Pachyramphus validus)</i>				R	1-3-4-7-8-9-20-21
<i>Wing-barred Piprites (Piprites chloris)</i>			THRE	R	1-2-3-4-5-6-7-9-10-11-16-18-20-22
VIREOS (VIREONIDAE)					
<i>Rufous-browed Peppershrike (Cyclarhis gujanensis)</i>				R	1-2-3-4-5-6-7-8-9-10-11-15-16-17-18-19-20-22
<i>Rufous-crowned Greenlet (Hylophilus poicilotis)</i>	ATL		THRE	R	1-2-3-4-5-6-7-11-13-16-17-20-22

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Red-eyed Vireo (Vireo olivaceus)</i>				AN	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-20-22
JAYS (CORVIDAE)					
<i>Purplish Jay (Cyanocorax cyanomelas)</i>				R	1-2-3-4-5-8-9-10-11-12-13-14-16-18-20
<i>Curl-crested Jay (Cyanocorax cristatellus)</i>	CER		THRE	R	4-11
<i>Plush-crested Jay (Cyanocorax chrysops)</i>				R	1-2-3-4-5-6-7-8-9-10-12-13-14-15-16-17-18-19-20-21-22
SWALLOWS (HIRUNDINIDAE)					
<i>Blue-and-white Swallow (Pygochelidon cyanoleuca)</i>				AS	1-2-4-8-9-10-11-12-13-16-20
<i>Black-collared Swallow (Pygochelidon melanoleuca)</i>			THRE	R	8
<i>Tawny-headed Swallow (Alopochelidon fucata)</i>				R	1-3-4-5-11-13-18-20
<i>Southern Rough-winged Swallow (Stelgidopteryx ruficollis)</i>				AN	1-2-3-4-5-6-8-9-10-11-16-17-20-22
<i>Brown-chested Martin (Progne tapera)</i>				AN	1-2-3-4-5-7-8-11-13-15-16-18-20
<i>Purple Martin (Progne subis)</i>				N	7-8
<i>Gray-breasted Martin (Progne chalybea)</i>				AN	1-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21
<i>White-winged Swallow (Tachycineta albiventer)</i>				R	8-9-10-11-12-13-14-16-17-20
<i>White-rumped Swallow (Tachycineta leucorrhoa)</i>				AS	1-2-3-4-5-7-8-9-10-11-13-18-20
<i>Chilean Swallow (Tachycineta leucopyga)</i>				?	1-8-19
<i>Bank Swallow (Riparia riparia)</i>				N	1-3-4-5-20
<i>Barn Swallow (Hirundo rustica)</i>				N	1-3-4-5-6-8-10-16-20
<i>Cliff Swallow (Petrochelidon pyrrhonota)</i>				N	1-3-4-5-17-20-22
WRENS (TROGLODYTIDAE)					
<i>House Wren (Troglodytes aedon)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Sedge Wren (Cistothorus platensis)</i>				R	1-5
<i>Thrush-like Wren (Campylorhynchus turdinus)</i>				R	1-2-3-4-5-8-9-22
<i>Buff-breasted Wren (Cantorchilus leucotis)</i>			EN	R	8

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
GNATCATCHERS (POLIOPTILIDAE)					
<i>Creamy-bellied Gnatcatcher (Polioptila lactea)</i>	ATL	NT	THRE	R	1-2-3-4-5-6-9-10-11-13-15-17-20
DONACOBIOUS (DONACOBIIDAE)					
<i>Black-capped Donacobius (Donacobius atricapilla)</i>				R	1-3-4-5-8-9-14-20
THRUSHES (TURDIDAE)					
<i>Yellow-legged Thrush (Turdus flavipes)</i>				R	10
<i>Pale-breasted Thrush (Turdus leucomelas)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-21-22
<i>Rufous-bellied Thrush (Turdus rufiventris)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-22
<i>Creamy-bellied Thrush (Turdus amaurochalinus)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-18-20-22
<i>Slaty-thrush (Turdus nigriceps)</i>	ATL			AV	1-3-4-5-11-13-14-16-17-20
<i>White-necked Thrush (Turdus albicollis)</i>				R	1-2-3-4-5-6-8-9-10-11-13-16-17-20-22
MOCKINGBIRDS (MIMIDAE)					
<i>Chalk-browed Mockingbird (Mimus saturninus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-18-19-20-21-22
<i>White-banded Mockingbird (Mimus triurus)</i>				AV	1-2
OLD WORLD SPARROWS (PASSERIDAE)					
<i>House Sparrow (Passer domesticus)</i>				R	1-2-3-4-5-7-8-9-10-11-12-13-15-18-19-20-22
PIPITS AND WAGTAILS (MOTACILLIDAE)					
<i>Yellowish Pipit (Anthus lutescens)</i>				R	1-3-5-7-8-9-10-11-12-13-14-16-17-22
<i>Pampas Pipit (Anthus chacoensis)</i>				AV	2
<i>Correndera Pipit (Anthus correndera)</i>				AV	1
<i>Ochre-breasted Pipit (Anthus nattereri)</i>		VU	EN	R	1-3
<i>Hellmayr's Pipit (Anthus hellmayri)</i>			THRE	R	3
FINCHES (FRINGILLIDAE)					
<i>Hooded Siskin (Spinus megellanicus)</i>				R	1-2-3-5

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Purple-throated Euphonia (Euphonia chlorotica)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Violaceous Euphonia (Euphonia violacea)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-15-16-17-20
<i>Green-throated Euphonia (Euphonia chalybea)</i>	ATL	NT	EN	R	1-2-3-4-6-20
<i>Golden-rumped Euphonia (Euphonia cyanocephala)</i>			THRE	R	1-4-5-6
<i>Chestnut-bellied Euphonia (Euphonia pectoralis)</i>	ATL			R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-22
<i>Blue-naped Chlorophonia (Chlorophonia cyanea)</i>				R	1-2-3-4-5-6-7-9-11-12-13-17-20-22
SPARROWS (PASSERELLIDAE)					
<i>Grassland Sparrow (Ammodramus humeralis)</i>				R	1-2-3-4-5-7-8-9-10-11-12-13-14-17-18-19-20-22
<i>Saffron-billed Sparrow (Arremon flavirostris)</i>				R	1-3-4-5-6-7-8-9-10-11-12-13-14-16-20
<i>Rufous-collared Sparrow (Zonotrichia capensis)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-18-19-20
BLACKBIRDS (ICTERIDAE)					
<i>Bobolink (Dolichonyx oryzivorus)</i>				N	4
<i>White-browed Meadowlark (Leistes superciliaris)</i>				R	1-3-4-5-7-8-9-10-11-12-13-14-15-16-17-18-20-21-22
<i>Solitary Black Cacique (Cacicus solitarius)</i>				R	1-3
<i>Golden-winged Cacique (Cacicus chrysopterus)</i>				R	1-3-4-6-22
<i>Red-rumped Cacique (Cacicus haemorrhous)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Variable Oriole (Icterus pyrrhopterus)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Screaming Cowbird (Molothrus rufoaxillaris)</i>				R	1-2-3-4-5-6-9-10-11-18-20
<i>Giant Cowbird (Molothrus oryzivorus)</i>				R	1-4-6-9-10-11-12-13-16-17-20
<i>Shiny Cowbird (Molothrus bonariensis)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-19-20-22
<i>Scarlet-headed Blackbird (Amblyramphus holosericeus)</i>				R	1-3-5
<i>Chopi Blackbird (Gnorimopsar chopi)</i>				R	1-2-3-4-5-7-8-9-10-11-13-15-17-18-20-22
<i>Grayish Baywing (Agelaioides badius)</i>				R	3-15
<i>Unicolored Blackbird (Agelasticus cyanopus)</i>				R	1-3-4-5

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Yellow-winged Blackbird (Agelasticus thilius)</i>				AV	8
<i>Chestnut-capped Blackbird (Chrysomus ruficapillus)</i>				R	1-4-5-8-9-11
<i>Saffron-cowled Blackbird (Xanthopsar flavus)</i>		VU	EN	R	1-3-20
<i>Yellow-rumped Marshbird (Pseudoleistes guirahuro)</i>				R	1-3-4-5-7-8-18-19
WOOD WARBLERS (PARULIDAE)					
<i>Masked Yellowthroat (Geothlypis aequinoctialis)</i>				R	1-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-20
<i>Tropical Parula (Setophaga pitiayumi)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Flavescent Warbler (Myiothlypis flaveola)</i>				R	3-4
<i>White-browed Warbler (Myiothlypis leucoblephara)</i>	ATL			R	1-2-3-4-5-6-7-9-10-11-12-13-14-16-19-20-22
<i>Riverbank Warbler (Myiothlypis rivularis)</i>				R	1-3-4-5-6-9-10-11-13-20
<i>Golden-crowned Warbler (Basileuterus culicivorus)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
CARDINAL GROSBEAKS (CARDINALIDAE)					
<i>Hepatic Tanager (Piranga flava)</i>				AS	20
<i>Red-crowned Ant-Tanager (Habia rubica)</i>			THRE	R	1-2-3-4-5-6-7-8-10-11-13-16-17-18-19-20-22
<i>Blackish-blue Seedeater (Amaurospiza moesta)</i>	ATL		THRE	R	1-3-4-5-6-10-11-13-16-20-22
<i>Glaucous-blue Grosbeak (Cyanoloxia glaucocaerulea)</i>				AV	1-3-5-6-8-10-11-20
<i>Ultramarine Grosbeak (Cyanoloxia brissonii)</i>				R	1-2-3-6-9-10-11-13-16-17-22
TANAGERS (THRAUPIDAE)					
<i>Hooded Tanager (Nemosia pileata)</i>				R	1-2-3-4-5-6-8-11-18
<i>Guira Tanager (Hemithraupis guira)</i>				R	1-2-3-4-5-6-7-9-10-11-12-13-14-15-16-17-18-20-22
<i>Chestnut-vented Conebill (Conirostrum speciosum)</i>				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-18-20-22
<i>Saffron Finch (Sicalis flaveola)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22
<i>Grassland Yellow-Finch (Sicalis luteola)</i>				AV	1-4-5-8-9-21-22
<i>Uniform Finch (Haplospiza unicolor)</i>	ATL		THRE	R	1-3-5-10-11-20

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
Blue-black Grassquit (<i>Volatinia jacarina</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-19-20-21-22
Ruby-crowned Tanager (<i>Tachyphonus coronatus</i>)	ATL			R	1-2-3-4-5-6-7-9-10-11-12-13-14-15-16-17-19-20-22
White-lined Tanager (<i>Tachyphonus rufus</i>)				R	1-5
Black-goggled Tanager (<i>Trichothraupis melanops</i>)				R	1-2-3-4-5-6-7-9-10-11-12-13-14-15-16-17-20-22
Red-crested Finch (<i>Coryphospingus cucullatus</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-22
Silver-beaked Tanager (<i>Ramphocelus carbo</i>)				R	4-8-9
Swallow Tanager (<i>Tersina viridis</i>)				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-20-21-22
Blue Dacnis (<i>Dacnis cayana</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-18-19-20-22
Lined Seedeater (<i>Sporophila lineola</i>)				AN	1-4-5-8
White-bellied Seedeater (<i>Sporophila leucoptera</i>)				R	5
Cooper Seedeater (<i>Sporophila bouvireuil</i>)				AN	1-4-13-20
Pearly-bellied Seedeater (<i>Sporophila pileata</i>)				AN	3
Tawny-bellied Seedeater (<i>Sporophila hypoxantha</i>)				R	1-3-4
Dark-throated Seedeater (<i>Sporophila ruficollis</i>)		NT		AN	3-4-5
Marsh Seedeater (<i>Sporophila palustris</i>)	PAM	EN	EN	AN	1-3-4
Rufous-rumped Seedeater (<i>Sporophila hypochroma</i>)		NT	EN	AN	3-4
Chestnut Seedeater (<i>Sporophila cinnamomea</i>)	PAM	VU	THRE	AN	1-2-3-4-8
Chesnut-bellied Seed-Finch (<i>Sporophila angolensis</i>)				R	1-2-3-4-5-10-11-13-16-20
Double-collared Seedeater (<i>Sporophila caeruleascens</i>)				R	1-2-3-4-5-6-8-9-10-11-12-13-14-16-20-22
Temminck's Seedeater (<i>Sporophila falcirostris</i>)	ATL	VU	EN	R	3-4-6
Buffy-fronted Seedeater (<i>Sporophila frontalis</i>)	ATL	VU	EN	R	2-3
Plumbeous Seedeater (<i>Sporophila plumbea</i>)				R	1-3-4-11-13
Rusty-collared Seedeater (<i>Sporophila collaris</i>)				R	3-5-7-8-19
Black-throated Saltator (<i>Saltatricula atricollis</i>)	CER			R	4

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
Grayish Saltator (<i>Saltator coerulescens</i>)				R	1-2-3-5-6-8-19
Green-winged Saltator (<i>Saltator similis</i>)				R	1-2-3-4-5-6-7-9-10-11-13-14-16-20-22
Black-throated Grosbeak (<i>Saltator fuliginosus</i>)	ATL		EN	R	1-3
Black-masked Finch (<i>Coryphaspiza melanotis</i>)		VU	EN	R	4
Great Pampa-Finch (<i>Embernagra platensis</i>)				R	1-3-5-8-13-18
Wedge-tailed Grass-Finch (<i>Emberizoides herbicola</i>)				R	1-3-4-5-13-18
Lesser Grass-Finch (<i>Emberizoides ypiranganus</i>)				R	1-3-4-5
Black-capped Warbling-Finch (<i>Poospiza melanoleuca</i>)	CHA			R	3
Orange-headed Tanager (<i>Thlypopsis sordida</i>)				R	1-2-3-5-6
Chestnut-headed Tanager (<i>Thlypopsis pyrrhocoma</i>)	ATL			R	1-2-3-4-5-6-10-11-13-16-20-22
Gray-throated Warbling-Finch (<i>Microspingus cabanisi</i>)				?	6
Long-tailed Reed-Finch (<i>Donacospiza albifrons</i>)				R	1-3-5-8
Bananaquit (<i>Coereba flaveola</i>)				R	3-4-5-10-11-13-14-16
Sooty Grassquit (<i>Asemospiza fuliginosa</i>)			THRE	R	1-3-4-16
White-banded Tanager (<i>Neothraupis fasciata</i>)		NT	THRE	R	4
Red-crested Cardinal (<i>Paroaria coronata</i>)				R	1-2-15-19-20
Yellow-billed Cardinal (<i>Paroaria capitata</i>)				R	8-15
Diademed Tanager (<i>Stephanophorus diadematus</i>)			THRE	R	1-6
Black-faced Tanager (<i>Schistochlamys melanops</i>)				V	8
Cinnamon Tanager (<i>Schistochlamys ruficapillus</i>)				V	4
Magpie Tanager (<i>Cissopis leverianus</i>)				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16-17-19-20-21-22
Fawn-breasted Tanager (<i>Pipraeidea melanonota</i>)				R	1-2-3-4-5-6-8-9-10-11-12-13-16-17-20

Table A1. Cont.

English Name (Scientific Name)	Endem	IUCN	SEAM	Ocurr.	Conservation Areas
<i>Blue-and-yellow Tanager (Pipraeidea bonariensis)</i>				AS	1-16
<i>Chestnut-backed Tanager (Stilpnia preciosa)</i>				AV	2/3/2013
<i>Burnished-buff Tanager (Stilpnia cayana)</i>			THRE	R	1-3-4-5-8-9-10-11-20
<i>Green-headed Tanager (Tangara seledon)</i>	ATL		THRE	R	1-2-3-4-5-6-10-11-17-20
<i>Sayaca Tanager (Thraupis sayaca)</i>				R	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-19-20-22
<i>Palm Tanager (Thraupis palmarum)</i>				V	8

Endem (Endemism): ATL, Atlantic forest; CER: Cerrado; CHA: Chaco; PAM: Pampas. IUCN, Globally concerned species: NT, Near Threatened species; VU, Vulnerable species; EN, Endangered species; CR, Critically Endangered species [33]. SEAM, National conservation status: THRE, Threatened species; EN, Endangered species. Ocurr, Occurrence in Paraguay: R, Resident; AS, Breeding southern austral migrants; AV, Austral visitors; N, Neartic migrants; V, Vagrants; AN, Northern Austral Migrant; ?, no defined occurrence status. Conservation Areas: 1. San Rafael National Park; 2. Ybytyruzu Management Reserve; 3. Tapyta Private Nature Reserve; 4. Mbaracayú Forest Nature Reserve; 5. Ypeti Nature Reserve; 6. Caazapá National Park; 7. Carla María Farm; 8. Mbaracayú Binational Nature Reserve; 9. Carapá Nature Reserve; 10. Limoy Nature Reserve; 11. Itabó Nature Reserve; 12. Pikyry Nature Reserve; 13. Tati Yupi Nature Reserve; 14. Yvyty Rokai Nature Reserve; 15. Ñacunday National Park; 16. Maharishi Nature Reserve; 17. Moisés Bertoni Scientific Monument; 18. Morombí Nature Reserve; 19. Yguazu Nature Reserve; 20. Itabó Biological Reserve; 21. Federico Farm; 22. Agropeco.

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