Notes on breeding birds from the Guyana highlands with new records from a recent inventory of Mount Ayanganna

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Received 11 October 2015; final revision accepted 28 April 2016
Cotinga 38 (2016): 64–78

A continuación se presentan los resultados de un nuevo estudio de la avifauna del Monte Ayanganna, que incluye cuatro nuevas especies en Guyana. Estos resultados se combinaron con los de investigaciones anteriores sobre el monte Roraima y la montaña Kopinang para esclarecer los patrones y época de reproducción en los tepuyes guyaneses. Los tepuyes de Guyana no están lo suficientemente estudiados ornitológicamente; nuestras investigaciones han sido las primeras en documentar la avifauna de estos tepuyes. En cada ubicación fueron estudiados los mismos rangos altitudinales, con alguna variación en el mes y posición. Patrones climáticos altamente variables influyen en gran medida en la vegetación de los tepuyes. Durante nuestro estudio hallamos hábitats únicos, desde bosque alto a matorrales de tepuyes, y con precipitaciones oscilando desde relativamente seco a extremadamente húmedo. En un intento de discernir patrones en los ritmos de reproducción se compararon los datos sobre las condiciones de reproducción en estas tres investigaciones. Como era de esperar, los patrones estacionales resultaron difícil de determinar salvo en unas pocas excepciones.

The unique tabletop mountains of the pantepui region of the Guianan Shield have been the focus of scientific study, folklore, legend and casual curiosity for almost two centuries. Boundary explorations in the 1800s along the borders of Venezuela, Guyana and Brazil led to numerous scientific discoveries and increased awareness of the tepui flora and fauna. While many of these early surveys originated in the former British Guiana, most focused on Mount Roraima, the higher elevations being accessible from Venezuela. Some of the early explorers, such as Henry Whitely, Robert & Richard Schomburgk, Frederick V. McConnell, John J. Quelch, George H. Tate, Thomas D. Carter, William H. Phelps Jr. and Sr., and others, contributed a wealth of knowledge and many publications on the flora and fauna of the pantepui region and Mount Roraima in particular[13].

Guyana's tepuis received less attention, with some never having been ornithologically explored, due to difficulties in accessing the road-less interior. Those early explorers that did make attempts, such as Henry Whitely, had only primitive maps resulting in uncertainties surrounding specimen provenance. Moreover, the limited specimen material that was obtained during the 19th and early 20th centuries have a paucity of data compared to data-rich material from the past 20 years.

The status and distribution of the Guyana tepui avifauna remain poorly known. Expeditions during the last two decades have provided baseline inventories of the Potaro Plateau, Iwokrama Mountains, north slope of Mount Roraima, and Kopinang Mountain[1–3,14,17]. Mount Ayanganna has been inventoried by botanists, mycologists and herpetologists, but never by ornithologists[8,10,11]. Here, we present results from a recent avian survey of Mount Ayanganna and supplement these data with unpublished information from our Mount Roraima and Kopinang Mountain surveys. Because of inaccessibility, anthropogenic influence has been minimal at all three sites. We present complete species lists with relative abundance, elevations and breeding data for all three tepuis.

Site description and Methods

Study area and methods for the Mount Roraima and Kopinang Mountain inventories have been described previously[2,14]. These surveys were conducted on the north-east slope of Mount Roraima at 600–1,500 m in March–April 2001 and Kopinang Mountain, at the southern end of the Wokomung massif, at 700–1,400 m in July 2004. CMM participated in all three surveys, while MBR & BJO participated in two of the three. The Mount Ayanganna survey was the only trip with a botanist, AR, as part of the team. The number of field days, observers and mist-netting effort for each expedition were similar, although no field camps were established above 850 m on Kopinang.

On Mount Ayanganna, we used an established trail that began at a mining airstrip at 700 m (05°18'10"N 59°50'16"W) and followed the Potaro River through a small village before ascending the north-east slope of the mountain[10]. The mining airstrip has been used infrequently and there are no permanent inhabitants, although miners have established camps adjacent to the Potaro River. Prior to our expedition, guides from the nearest Patamona Amerindian communities (c.60 km to the south) were contacted to clear the airstrip and a reconnaissance trip was made by CMM on 2–8

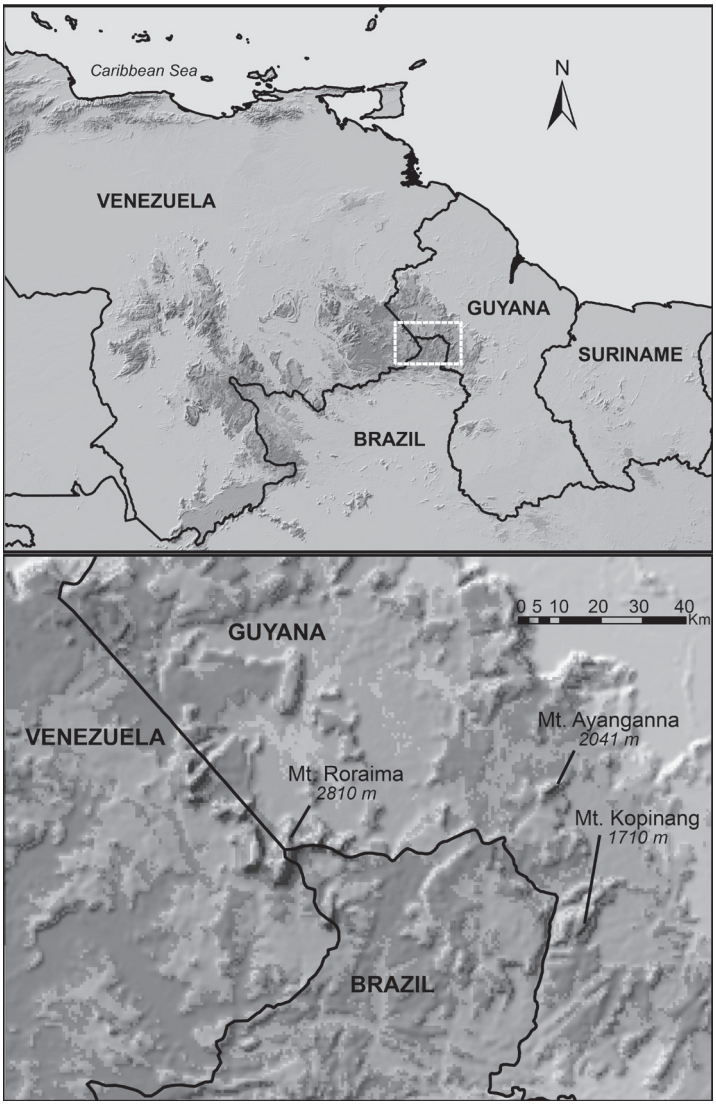

Figure 1. Map of the Pantepui region and our three study sites in Guyana.

February 2014. During this time, arrangements were made for 27 porters from the Patamona communities to meet the main expedition party at the airstrip on 8–10 March 2014. Avifaunal surveys were made by part of the team during the initial two days while waiting for the arrival of additional members and supplies. After making an ascent of the north-east slope, we established our first field camp at 1,375 m (05°22'34"N 59°58'21"W) on 14–22 March, followed by a mid-elevation camp on 23 March–2 April at 1,075 m (05°20'17"N 59°56'45"W) and the airstrip area on 4–8 April. At each camp, surveys were conducted along existing trails using binoculars, ground-based mist-nets (15–25, 12 m in length), shotguns and digital audio-recorders. Due to heavy rain (often persisting until after 08h00), especially at the uppermost camp, there was considerable variation in mist-net and observational effort. On Mount Ayanganna, mist-nets were generally opened from dawn to dusk, with most observer data collected during morning and late afternoon walks when information concerning habitat, behaviour, breeding activity and feeding patterns were noted. Representative series of specimens were preserved as study skins, skeletons and whole birds in fluid, along with frozen tissue samples. Specimens are deposited in the Smithsonian National Museum of Natural History, Washington DC (USNM), the University of Kansas Biodiversity Institute, Lawrence (KU), and Centre for the Study of Biological Diversity at the University of Guyana, Georgetown (CSBD).

Audio-recordings made by MBR are archived and available online at the Macaulay Library (ML), Cornell Laboratory of Ornithology.

Mount Ayanganna (summit: 05°23'10"N 59°59'26"W, 2,020 m) is the easternmost tepui above 2,000 m (Fig. 1). Habitat here is typical of other tall tepuis in the Pakaraima Mountains. *Terra firme* tropical forests in the rolling foothills quickly give way to montane vegetation and cloud forests on the higher, wetter sandstone escarpments leading to the summit, while the summit itself harbours a distinct 'high-tepui' flora[10]. The lower slopes and uplands are marked by higher diversity but lower endemism compared to the plant communities of the summits[4]. These lower forests are dominated by plant families such as Fabaceae, Sapotaceae, Clusiaceae and Lecythidaceae; Melastomataceae and Rubiaceae comprise a major component of the understorey[8,10,13]. Beginning at c.1,000 m the canopy becomes lower in stature and epiphytic plants more prevalent. *Clusia*, *Protium* and *Inga* are more frequent, and large stands of *Euterpe* (spiny palms) and *Rapataea* dominate on wetter ground. Above 1,300 m the vegetation is more typical of a true cloud forest, i.e. short, gnarled trees with coriaceous leaves and a high concentration of vascular and nonvascular epiphytes. *Bonnetia*, *Podocarpus*, *Weinmannia*, *Schefflera* and *Cyrilla* increase in frequency with elevation in the forested areas, while *Stenopadus*, *Byrsonima*, Cyperaceae, *Drosera* and Lycopodiaceae are common in open and boggy places. The plant families Melastomataceae and Rubiaceae are common throughout. These cloud forests eventually give way to what is known as 'tepui scrub' at c.1,500 m—a nearly impenetrable tangle of small trees and woody shrubs <2 m tall growing in an accumulated peat layer interspersed by herbaceous meadows[2]. While there is significant plant diversity in this region, during our expedition the forests were relatively devoid of fruiting individuals at all elevations, particularly among canopy and emergent taxa. This could reflect the relatively dry conditions that preceded the expedition. The most common fruiting plants were shrubby and herbaceous species in the families Melastomataceae (*Miconia*) and Rubiaceae (*Psychotria*), which produce berries of 1–3 cm.

To quantify breeding condition on the three tepuis, birds were categorised into primary trophic groups: frugivores, nectarivores, gleaning insectivores and aerial / sallying insectivores. Using specimen data and relying on extensive specimen preparation experience, we assessed gonadal development and age-related characteristics such as bursa of Fabricius and skull pneumatisation to assign a breeding score to each specimen. Males with greatly enlarged testes or seminal vesicles were considered to be breeding. Incomplete regression of gonads in tropical birds is well documented[5,19]. Therefore, relative body mass in relation to testes size was considered when using testes size as a breeding indicator. Females with collapsed follicles, enlarged and convoluted oviducts, brood patches or shelled / unshelled eggs in the oviduct were considered to be breeding, as were recently fledged young. Immatures with bursa of Fabricius and partially pneumatised skulls were not considered to be breeding as they can retain these characters for several months[6]. For example, more than half of Slate-crowned Antpitta *Grallaricula nana* specimens had bursas and partially pneumatised skulls in various states of advancement, but none of the adults had enlarged gonads. We converted breeding data to continuous numerical values, which permitted us to rate breeding status from non-breeding to breeding while also accounting for intermediate cases. These values were averaged, analysed and are discussed in Results. It should be emphasised that our surveys only covered a short timeframe and that some species were represented by only 1–2 specimens; therefore, our assessment of breeding should be considered incomplete. We used behavioural observations (e.g. persistent singing and / or individuals carrying nesting material) to supplement specimen data as an indication of breeding.

Results and Discussion

The Mount Ayanganna inventory documented four new species for Guyana: Tepui Tinamou *Crypturellus ptaritepui*, Band-tailed Pigeon *Patagioenas fasciata*, Striped Woodhaunter *Automolus subulatus* and Golden-rumped Euphonia *Euphonia cyanocephala* (see below). Species encountered at lower elevations (c.700–900m) were typical of lowland and foothill avifaunas elsewhere in Guyana, although several species characteristic of those zones were rare or absent. At these elevations, Tyrannidae (16 species), Thraupidae (15 species) and Furnariidae (15 species) were the most diverse families. Above approximately 1,000 m, characteristic tepui flora and avifauna were more prevalent. Tyrannidae (eight species), Trochilidae, Thamnophilidae and Thraupidae (seven species each) were the most diverse families. Roraiman Barbtail *Roraimia adusta* and White-throated Foliage-gleaner *Syndactyla roraimae* were the most common insectivores on the vertical, moss-laden substrates that comprised most of the forest structure above 1,000 m. Among species that we documented at 900–1,075 m, 28% were pantepui endemic taxa. Above 1,300 m diversity was low among all families, but the rate of tepui endemism for bird taxa was exceptionally high at 70%. Nearctic migrants were limited to a few American Redstarts *Setophaga ruticilla* and a single Barn Swallow *Hirundo rustica*.

Table 1. Bird list for our field sites on Mount Roraima, Mount Ayanganna, and Kopinang Mountain.

X = single sighting; S = scarce (occasionally in small numbers); U = uncommon (<5 individuals/day, but not encountered daily, even in prime habitat); F = fairly common/regular (5–20 individuals/day); C = common (>20 individuals/day); * = documented breeding; o = visual or audio documentation; s = specimen obtained

Common name	**Family/genus**	**Species**	**Ayanganna** 8 March–2 April 2014				**Roraima** 19 March–12 April 2001				**Kopinang** 12–27 July 2004			
			Abundance	Breeding	Documentation	Elevational range (m)	Aundance	Breeding	Documentation	Elevational range (m)	Aundance	Breeding	Documentation	Elevational range (m)
Tinamous	**TINAMIDAE**													
Great Tinamou	*Tinamus*	*major*	F	*	s	700–1,100	U		o	700–800	F		o	
Little Tinamou	*Crypturellus*	*soui*									U		o	
Tepui Tinamou	*Crypturellus*	*ptaritepui*	X		s	1,500								
Variegated Tinamou	*Crypturellus*	*variegatus*	U		o	700–1,075					U		o	700–1,200
Curassows, guans	**CRACIDAE**													
Variable Chachalaca	*Ortalis*	*motmot*	S		o	700–750					F		s	850
Marail Guan	*Penelope*	*marail*	U	*	s	700–750					U		o	1,400
Blue-throated Piping Guan	*Pipile*	*cumanensis*					X		o	700				
Black Curassow	*Crax*	*alector*	U		o	700–1,075	U		o	700–800	U		o	700–1,100
Wood quails	**ODONTOPHORIDAE**													
Marbled Wood Quail	*Odontophorus*	*gujanensis*	U		s	700–950	X	*	o	700	U		o	1,300–1,400
Herons	**ARDEDIDAE**													
Rufescent Tiger Heron	*Tigrisoma*	*lineatum*	X	f		750								
Ibises	**THRESKIORNITHIDAE**													
Green Ibis	*Mesembrinibis*	*cayennensis*	U		o	700–750								
Vultures	**CATHARTIDAE**													
Turkey Vulture	*Cathartes*	*aura*									U		o	
Greater Yellow-headed Vulture	*Cathartes*	*melambrotus*	U		o	700–1,100					S		o	
King Vulture	*Sarcoramphus*	*papa*	S		o	700–750					S		o	
Eagles, hawks	**ACCIPITRIDAE**													
White-tailed Kite	*Elanus*	*leucurus*	X		o	700								
Grey-headed Kite	*Leptopodon*	*cayanensis*									S		s	
Swallow-tailed Kite	*Elanoides*	*forficatus*	U		o	700–825	S		o	700–1,400	U		o	
Crested Eagle	*Morphnus*	*guianensis*	X		o	700								
Harpy Eagle	*Harpia*	*harpyja*	X		o	700					U		o	
Black Hawk-Eagle	*Spizaetus*	*tyrannus*					X		o	1,300				
Black-and-white Hawk-Eagle	*Spizaetus*	*melanoleucus*	X		o	700					S		o	
Double-toothed Kite	*Harpagus*	*bidentatus*									U		s	
Plumbeous Kite	*Ictinea*	*plumbea*	S		o	700–750								
Grey-bellied Goshawk	*Accipiter*	*poliogaster*									S		o	
Sharp-shinned Hawk	*Accipiter*	*striatus*					S		o	1,300				
Great Black Hawk	*Buteogallus*	*urubitinga*									S		o	
Solitary Eagle	*Buteogallus*	*solitarius*									X		o	
White-tailed Hawk	*Geranoaetus*	*albicaudatus*									U		s	
White Hawk	*Leucopternis*	*albicollis*	S		o	850–1,000								
Short-tailed Hawk	*Buteo*	*brachyura*	S	*	o	700								
Roadside Hawk	*Buteo*	*magnirostris*	U		o	700–750	X		o	1,300	U		s	
Trumpeters	**PSOPHIIDAE**													
Grey-winged Trumpeter	*Psophia*	*crepitans*	S		o	700–750					U		o	1,000
Rails	**RALLIDAE**													
Grey-necked Wood Rail	*Aramides*	cajanea	S		o	700–750								

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Russet-crowned Crake	*Anurolimnas*	*viridis*									S		o	850
Ash-throated Crake	*Mustelirallus*	*albicollis*									U		o	850
Sandpipers	**SCOLOPACIDAE**													
Spotted Sandpiper	*Actitis*	*macularius*	X		o	700								
South American Snipe	*Gallinago*	*paraguaiae*									F	*	s	850
Pigeons, doves	**COLUMBIDAE**													
Plumbeous Pigeon	*Patagioenas*	*plumbea*	U		o	700–800					U		o	
Ruddy Pigeon	*Patagioenas*	*subvinacea*	F		o	700–1,000					U		o	1,400
Band-tailed Pigeon	*Patagioenas*	*fasciata*	X	*	s	1,500								
Grey-fronted Dove	*Leptotila*	*rufaxilla*	S		o	700–900					U		o	
Ruddy Quail-Dove	*Geotrygon*	*montana*	S		o	850–900					U		s	
Cuckoos	**CUCULIDAE**													
Squirrel Cuckoo	*Piaya*	*cayana*	U		o	700–750	S		o	800, 1,300	U	*	s	
Black-bellied Cuckoo	*Piaya*	*melanogaster*	S		o	700	X		s	800				
Smooth-billed Ani	*Crotophaga*	*ani*									U		o	
Striped Cuckoo	*Tapera*	*naevia*	X		o	700								
Rufous-winged Ground Cuckoo	*Neomorphus*	*rufipennis*									X		s	1,400
Owls	**STRIGIDAE**													
Vermiculated Screech Owl	*Megascops*	*guatemalae*	U	*	o	700–1,075	U		o	800–1,400	S		o	850–1,200
Spectacled Owl	*Pulsatrix*	*perspicillata*					X		o	1,300				
Ferruginous Pygmy Owl	*Glaucidium*	*brasilianum*					U		o	1,300–1,400				
Buff-fronted Owl	*Aegolius*	*harrisii*					S		o	1,300–1450				
Nightjars, nighthawks	**CAPRIMULGIDAE**													
Roraiman Nightjar	*Setopagis*	*whitelyi*									S		s	850
nightjar sp.			X			700								
Potoos	**NYCTIBIIDAE**													
Common Potoo	*Nyctibius*	*griseus*	S		o	700–750					U		o	850
Oilbirds	**STEATORNITHIDAE**													
Oilbird	*Steatornis*	*caripensis*					X		o	1,300	S		o	1,200
Swifts	**APODIDAE**													
White-chinned Swift	*Cypseloides*	*cryptus*									S		s	
Tepui Swift	*Streptoprogne*	*phelpsi*	F		s	700–750	F		o	700–1,400	F		o	
White-collared Swift	*Streptoprogne*	*zonaris*			o	700–750	F		o	700–1,400	C		o	
Band-rumped Swift	*Chaetura*	*spinicaudus*	C		o	700–750								
Grey-rumped Swift	*Chaetura*	*cinereiventris*	F	*	s	700–750					F		s	
Short-tailed Swift	*Chaetura*	*brachyura*	U		o	700–750								
White-tipped Swift	*Aeronautes*	*montivagus*					U		o	1,500	S		o	
Fork-tailed Palm Swift	*Tachornis*	*squamata*	X		o	700–750								
Hummingbirds	**TROCHILIDAE**													
Crimson Topaz	*Topaza*	*pella*	S		o	700								
Long-tailed Hermit	*Phaethornis*	*superciliosus*	U		s	700–1,075	S		s	700–1,300	C		s	
Straight-billed Hermit	*Phaethornis*	*bourcieri*	C		s	700–1,500	F		s	700–1,400	C		s	950
Reddish Hermit	*Phaethornis*	*ruber*	S		o	700					U		o	
Pale-tailed Barbthroat	*Threnetes*	*leucurus*	U		o	700								
Blue-fronted Lancebill	*Doryfera*	*johannae*	U		s	900–1,100	U		s	700–1,450	F		s	
Grey-breasted Sabrewing	*Campylopterus*	*largipennis*	S		s	700	S		o	700–800	U	*	s	

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Rufous-breasted Sabrewing	*Campylopterus*	*hyperythrus*	F		s	1,000–1,650	F	*	s	800–1,450				
White-necked Jacobin	*Florisuga*	*mellivora*	F		o	700	S		o	700–800	S		s	
Brown Violetear	*Colibri*	*delphinae*	S		o	850–950	U		o	800–1,450				
Sparkling Violetear	*Colibri*	*coruscans*					X		o	1,500				
Black-eared Fairy	*Heliothryx*	*auritus*									S		o	
Peacock Coquette	*Lophornis*	*pavoninus*					U		o	1,300–1,500				
Fork-tailed Woodnymph	*Thalurania*	*furcata*	U		s	700–1,500	F		s	700–1,450	C		s	
Velvet-browed Brilliant	*Heliodoxa*	*xanthogonys*	F		s	900–1,500	F		s	700–1,450				
Green-bellied Hummingbird	*Amazilia*	*viridigaster*									U		o	
Trogons	**TROGONIDAE**													
Black-tailed Trogon	*Trogon*	*melanurus*									S		s	
Green-backed Trogon	*Trogon*	*viridis*									U		o	700–1,000
Guianan Trogon	*Trogon*	*violaceus*	F			700					U		s	
Collared Trogon	*Trogon*	*collaris*	U			700								
Masked Trogon	*Trogon*	*personatus*	S		s	850–1,500	U		s	700–1,400	U		s	>1,000
Black-throated Trogon	*Trogon*	*rufus*									U		o	
Kingfishers	**ALCEDINIDAE**													
Ringed Kingfisher	*Megaceryle*	*torquata*	U		o	700								
Amazon Kingfisher	*Chloroceryle*	*amazona*	X		o	700								
Green Kingfisher	*Chloroceryle*	*americana*	S		o	700								
Green-and-rufous Kingfisher	*Chloroceryle*	*inda*	S		o	700								
Jacamars	**GALBULIDAE**													
Yellow-billed Jacamar	*Galbula*	*albirostris*	S		o	700					S		o	
Rufous-tailed Jacamar	*Galbula*	*ruficauda*	X		o	700								
Paradise Jacamar	*Galbula*	*dea*					S		o	1,200–1,300	S		o	
Great Jacamar	*Jacamerops*	*aureus*									S		o	
Puffbirds	**BUCCONIDAE**													
Pied Puffbird	*Notharcus*	*tectus*									S		o	
Collared Puffbird	*Bucco*	*capensis*	S		o	800–1,100	X		o	800				
Swallow-wing	*Chelidoptera*	*tenebrosa*	X		o	700					S		s	
Black Nunbird	*Monasa*	*atra*	S		o	700								
New World barbets	**CAPITONIDAE**													
Black-spotted Barbet	*Capito*	*niger*	S		o	700–950					S		o	1,400
Toucans	**RAMPHASTIDAE**													
Tepui Toucanet	*Aulacorhynchus*	*whitelianus*	U	*	s	850–1,075	U		s	1,100–1,400	U		o	1,000–1,400
Guianan Toucanet	*Selenidera*	*piperivora*									U		s	800–1,100
White-throated Toucan	*Ramphastos*	*tucanus*	U		o	700–850					F		s	
Channel-billed Toucan	*Ramphastos*	*vitellinus*	S		o	700–800					F		s	
Woodpeckers	**PICIDAE**													
Red-rumped Woodpecker	*Veniliornis*	*kirkii*	X		o	850	U		s	1,200–1,400				
Golden-collared Woodpecker	*Veniliornis*	*cassinii*	S	*	s	700–1,100					S		o	
Golden-olive Woodpecker	*Piculus*	*rubignosus*	U	*	s	700–1,400	U		s	700–1,300	U		s	700–1,400
Chestnut Woodpecker	*Celeus*	*elegans*	S		o	700					U		o	
Waved Woodpecker	*Celeus*	*undatus*	U		o	700					U		s	700–1,100
Red-necked Woodpecker	*Campephilus*	*rubricollis*	S		o	700–1,075	S		o	700–800	F		s	700–1,100
Crimson-crested Woodpecker	*Campephilus*	*melanoleucos*	X		o									

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Lineated Woodpecker	*Dryocopus*	*lineatus*	S		o	700								
Golden-spangled Piculet	*Picumnus*	*exilis*	S		s	700 –1,400					S		o	
Falcons, caracaras	**FALCONIDAE**													
Lined Forest Falcon	*Micrastur*	*gilvicollis*	S		o	700–750	X		o	1,300	S		s	700–900
Barred Forest Falcon	*Micrastur*	*ruficollis*	S		o	700	X		o	1,300				
Red-throated Caracara	*Ibycter*	*americanus*	U		o	700–1,075	S		o	700–1,300	U		o	
Yellow-headed Caracara	*Milvago*	*chimachima*					X		o		S		o	
Bat Falcon	*Falco*	*rufigularis*	X		o	700					S		s	
Orange-breasted Falcon	*Falco*	*deiroleucus*					X		o	1,300				
Parrots	**PSITTACIDAE**													
Sapphire-rumped Parrotlet	*Touit*	*purpuratus*	S		o	1,075								
Lilac-tailed Parrotlet	*Touit*	*batavica*									U		o	
Scarlet-shouldered Parrotlet	*Touit*	*huetii*									U		o	
Fiery-shouldered Parakeet	*Pyrrhura*	*egregia*	F		o	700–1,100	F		s	700–1,400	C		s	700–1,400
Red-and-green Macaw	*Ara*	*chloropterus*	U		o	700–900					C		o	
Scarlet Macaw	*Ara*	*macao*									S		o	
Tepui Parrolet	*Nannopsittaca*	*panychlora*	U		o	1,300–1,600	F		s	700–1,400	C		o	700–1,400
Golden-winged Parakeet	*Brotogeris*	*chrysopterus*											s	700–800
Black-headed Parrot	*Pionites*	*melanocephala*	S		o	700–825					F		s	
Caica Parrot	*Pionopsitta*	*caica*					S		o	700–800				
Blue-headed Parrot	*Pionus*	*menstruus*	F		o	700–900					U		o	
Dusky Parrot	*Pionus*	*fuscus*	S		o	700					U		o	
Orange-winged Parrot	*Amazona*	*amazonica*	U			700								
Blue-cheeked Parrot	*Amazona*	*dufresniana*	F		o	700–1,100					F		o	
Red-fan Parrot	*Deroptypus*	*accipitrinus*	S		o	700	U		o	700–800				
Antbirds	**THAMNOPHILIDAE**													
Fasciated Antshrike	*Cymbilaimus*	*lineatus*	U		o	700								
Mouse-coloured Antshrike	*Thamnophilus*	*murinus*	F		o	700–950	X		o	700	F		s	1,000 (?)
Streak-backed Antshrike	*Thamnophilus*	*insignis*	F		s	1,300–1,650	U		s	1,300–1,500				
Plain Antvireo	*Dysithamnus*	*mentalis*									F	*	s	1,000–1,400
Dusky-throated Antshrike	*Thamnomanes*	*ardesiacus*	U		o	700–850					F	*	s	700–1,100
Brown-bellied Antwren	*Epinecrophylla*	*gutturalis*	U		s	700–850					U		s	
White-flanked Antwren	*Myrmotherula*	*axillaris*	S		o	700	U		o	700–800				
Pygmy Antwren	*Myrmotherula*	*brachyura*	U		s	700					U		o	
Long-winged Antwren	*Myrmotherula*	*longipennis*	F	*	o	700–850	X		o	800	F	*	s	700–1,000
Plain-winged Antwren	*Myrmotherula*	*behni*	S		s	850–1,000					F		s	1,400
Grey Antwren	*Myrmotherula*	*menetriesii*	X		o	700–900					S	*	s	
Spot-tailed Antwren	*Herpsilochmus*	*sticturus*	F		o	700–850					U		o	
Todd's Antwren	*Herpsilochmus*	*stictocephalus*	F		o	700–850								
Roraima Antwren	*Herpsilochmus*	*roraimae*	F		s	700–1,000	U		s	600–1,450	F		s	700–1,400
Ash-winged Antwren	*Terenura*	*spodioptila*	S		o	700					S		o	700–900 (?)
Grey Antbird	*Cercomacra*	*cinerascens*	F		s	700–900								
Guianan Warbling Antbird	*Hypocnemis*	*cantator*	F		s	700–1,100	U		s	600–1,400	F		s	700–1,400
Spot-winged Antbird	*Schistocichla*	*leucostigma*									U		o	
Roraiman Antbird	*Schistocichla*	*saturata*	U		s	1,000–1,500	F		s	700–1,400	S		s	1,000–1,400
Scale-backed Antbird	*Willisornis*	*poecilinota*	F	*	s	700	X		s	800	F	*	s	700–1,400

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Wing-banded Antbird	*Myrmornis*	*torquata*	X		s	700					U		s	
Rufous-throated Antbird	*Gymnopithys*	*rufigula*	F	*	s	700–1,100					U	*	s	
White-plumed Antbird	*Pithys*	*albifrons*	F	*	s	700–1,100	S		s	700–1,300	F	*	s	700–1,400
Antpittas	**GRALLARIIDAE**													
Scaled Antpitta	*Grallaria*	*guatimalensis*	S		o	950–1,100	F		s	800–1,400				
Spotted Antpitta	*Hylopezus*	*macularius*									S		o	
Brown-breasted Antpitta	*Myrmothera*	*simplex*	F	*	s	900–1,500	F	*	s	700–1,400	U		o	1,300–1,400
Thrush-like Antpitta	*Myrmothera*	*campanisona*	S		s	700–800								
Slate-crowned Antpitta	*Grallaricula*	*nana*	X		s	1,400	U		s	1,300–1,400				
Ground antbirds	**FORMICARIIDAE**													
Rufous-capped Antthrush	*Formicarius*	*colma*	S		o	700								
Black-faced Antthrush	*Formicarius*	*analis*	S		o	700								
Short-tailed Antthrush	*Chamaeza*	*campanisona*	U	*	s	850–1,100					U		s	1,400
Ovenbirds	**FURNARIIDAE**													
Short-billed Leafscraper	*Sclerurus*	*rufigularis*	S	*	s	700					U		s	850–1,000
Plain-brown Woodcreeper	*Dendrocincla*	*fuliginosa*	S			700	X		o	700–800	U		s	
White-chinned Woodcreeper	*Dendrocincla*	*merula*									S		s	
Olivaceous Woodcreeper	*Sittasomus*	*griseicapillus*					U	*	s	700–900	U		o	1,000–1,400
Wedge-billed Woodcreeper	*Glyphorynchus*	*spirurus*	F		s	700–1,100					C	*	s	700–1,400
Barred Woodcreeper	*Dendrocolaptes*	*certhia*	F		o	700	S		s	700–1,300	U	*	s	
Black-banded Woodcreeper	*Dendrocolaptes*	*picumnus*	S		s	700								
Red-billed Woodcreeper	*Hylexetastes*	*perrotii*	X		o	700								
Strong-billed Woodcreeper	*Xiphocolaptes*	*promeropirhynchus*					U	*	s	700–800				
Chestnut-rumped Woodcreeper	*Xiphorhynchus*	*pardalotus*	F	*	s	700–1,100	F	*	s	700–1,300	F	*	s	700–1,400
Curve-billed Scythebill	*Campylorhamphus*	*procurvoides*	X		o	700								
Pale-breasted Spinetail	*Synallaxis*	*albescens*	X		o	700					F	*	s	
Ruddy Spinetail	*Synallaxis*	*rutilans*									U		o	1,300–1,400
Tepui Spinetail	*Cranioleuca*	*demissa*	U		s	950–1,600	F	*	s	1,100–1,400	U		o	1,400
Roraiman Barbtail	*Roraimia*	*adusta*	F	*	s	950–1,600	F	*	s	700–1,450				
White-throated Foliage-gleaner	*Syndactyla*	*roraimae*	F	*	s	850–1,600	F	*	s	800–1,400	X		s	1,400
Buff-throated Foliage-gleaner	*Automolus*	*ochrolaemus*	F		o	700					F		s	700–900
Olive-backed Foliage-gleaner	*Automolus*	*infuscatus*									F		s	700–1,000
Striped Woodhaunter	*Automolus*	*subulatus*	S		o	700								
Rufous-rumped Foliage-gleaner	*Philydor*	*erythrocercum*	X		o	700					U		o	
Plain Xenops	*Xenops*	*minutus*	U		s	700–900	S		s	700–800	F		s	700–1,400
Slender-billed Xenops	*Xenops*	*tenuirostris*					X		s	1,200				
Sharp-tailed Streamcreeper	*Lochmias*	*nematura*	S		s	1,300–1,600					S		s	1,400
Tyrant flycatchers	**TYRANNIDAE**													
Yellow-crowned Tyrannulet	*Tyrannulus*	*elatus*	U		o	700					S		o	
Yellow-bellied Elaenia	*Elaenia*	*flavogaster*	U		o	700					F		o	
Sierran Elaenia	*Elaenia*	*pallatangae*					F	*	s	1,200–1,500	S		s	1,400
Plain-crested Elaenia	*Elaenia*	*cristata*									U		o	
White-lored Tryannulet	*Ornithion*	*inerme*	X		s						U		o	
Southern Beardless Tyrannulet	*Camptostoma*	*obsoletum*									U		o	
Mcconnell's Flycatcher	*Mionectes*	*macconnelli*	C	*	s	700–1,500	F	*	s	650–1,300	F	*	s	700–1,400
Sepia-capped Flycatcher	*Leptopogon*	*amaurocephalus*									S		o	850

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Black-fronted Tyrannulet	*Phylloscartes*	*nigrifrons*	X		s	1,400	F	*	s	800–1,400				
Chapman's Tyrannulet	*Phylloscartes*	*chapmani*	F	*	s	900–1,550	F	*	s	900–1,500	F	*	s	1,400 (not lower)
Ringed Antpipit	*Corythopis*	*torquatus*									U	*	s	700–950
Slender-footed Tyrannulet	*Zimmerius*	*gracilipes*	F		o	700–1075	F	*	s	1,100–1,400	U		o	1,400 (not lower)
Short-tailed Pygmy Tyrant	*Myiornis*	*ecaudatus*									U		o	
Helmeted Pygmy Tyrant	*Lophotriccus*	*galeatus*	F	*	s	700–850					U		s	
Double-banded Pygmy Tyrant	*Lophotriccus*	*vitiosus*	S		o	700					U		s	
Ruddy Tody-Flycatcher	*Poecilotriccus*	*russatus*	U		s	1,550–1,600	U	*	s	1,200–1,450				
Yellow-margined Flycatcher	*Tolmomyias*	*assimilis*	F		o	700–850					U	*	s	700–1,000
Grey-crowned Flycatcher	*Tolmomyias*	*sulphurescens*									S		o	
White-throated Spadebill	*Platyrinchus*	*mystaceus*					S	*	s	700–1,300				
Golden-crowned Spadebill	*Platyrinchus*	*coronatus*	U		o	700	U	*	s	700–800	F	*	s	
Cinnamon-crested Spadebill	*Platyrinchus*	*saturatus*	X		s	700								
Royal Flycatcher	*Onychorhynchus*	*coronatus*									U		s	
Roraima Flycatcher	*Myiophobus*	*roraimae*	F		s	850–1,500	U		s	800–1,400				
Sulphur-rumped Flycatcher	*Myiobius*	*barbatus*	U		s	700–900					F	*	s	up to 1,400 m
Ruddy-tailed Flycatcher	*Terenotriccus*	*erythrurus*	U		s	700								
Cinnamon Manakin-Tyrant	*Neopipo*	*cinnamomea*	X		s	1,075	U	*	o	800	U		o	1,100
Euler's Flycatcher	*Lathrotriccus*	*euleri*									U		s	
Cliff Flycatcher	*Hirundinea*	*ferruginea*					U		o					
Smoke-coloured Pewee	*Contopus*	*fumigatus*	U		s	950–1,100	U	*	s	1,200–1,400				
Tropical Pewee	*Contopus*	*cinereus*									U		s	
Rufous-tailed Tyrant	*Knipolegus*	*poecilurus*					S		o	1,300–1,400				
Greyish Mourner	*Rhytipterna*	*simplex*	X		o	1,075					U		o	
Rusty-margined Flycatcher	*Myiozetetes*	*cayannensis*	U		o	700								
Yellow-throated Flycatcher	*Conopias*	*parva*	F		s	700–825					U		o	
Variegated Flycatcher	*Empidonomus*	*varius*									U		o	
Tropical Kingbird	*Tyrannus*	*melancholicus*									C		o	
Fork-tailed Flycatcher	*Tyrannus*	*savana*									U		o	
Dusky-capped Flycatcher	*Myiarchus*	*tuberculifer*	S		s	700–900								
Swainson's Flycatcher	*Myiarchus*	*swainsoni*									F	*	s	
Short-crested Flycatcher	*Myiarchus*	*ferox*									U	*	s	
Rusty-margined Flycatcher	*Myiozetetes*	*cayannensis*	U		o	700								
Tropical Kingbird	*Tyrannus*	*melancholicus*	S		o	700								
Bright-rumped Attila	*Attila*	*spadiceus*	S		o	700–1,075					U		s	
Sharpbill	**OXYRUNCIDAE**													
Sharpbill	*Oxyruncus*	*cristatus*									U		s	850–1,400
Cotingas	**COTINGIDAE**													
Red-banded Fruiteater	*Pipreola*	*whitelyi*	U	*	s	950–1,500	F	*	s	1,200–1,400				1,000–1,400
Pompadour Cotinga	*Xipholena*	*punicea*	X		o	700					U		o	1,000–1,400
White Bellbird	*Procnias*	*albus*	F		o	800–1,075	F	*	o	800–1,300	F		s	850–1,400
Guianan Cock-of-the-rock	*Rupicola*	*rupicola*	F	*	s	700–1,100	S		s	800–1,300	S		o	
Capuchinbird	*Perissocephalus*	*tricolor*					U		o	800	U		o	up to 1,000
Purple-breasted Cotinga	*Cotinga*	*cotinga*									X		s	
Screaming Piha	*Lipaugus*	*vociferans*	S		o	700					U		o	700–1,000

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Rose-collared Piha	*Lipaugus*	*streptophorus*	S		s	900–1,500	S		s	1,100–1,300				
Manakins	**PIPRIDAE**													
White-throated Manakin	*Corapipo*	*gutturalis*	X	*	s	700					C		s	700–1,400
Olive Manakin	*Xenopipo*	*uniformis*	X		s	1,400	S		s	800–1,300				
Golden-headed Manakin	*Pipra*	*erythrocephala*	S		s	700–1,000					C		s	700–1,400
Orange-bellied Manakin	*Lepidothrix*	*suavissima*	C	*	s	700–1100	F	*	s	700–1,300	C	*	s	700–1,400
Scarlet-horned Manakin	*Ceratopipra*	*cornuta*					S		s	800–1,300	C		s	850–1,400
Tityras	**TITYRIDAE**													
Black-tailed Tityra	*Tityra*	*cayana*									U		o	750–850
Thrush-like Mourner	*Schiffornis*	*turdinus*	F	*	s	700–1,075	U		s	700–800	U		o	700–1,000
Dusky Purpletuft	*Iodopleura*	*fusca*									X		s	850
Black-capped Becard	*Pachyramphus*	*marginatus*									U		o	900
Piprites	**INCERTAE CEDIS**													
Wing-barred Piprites	*Piprites*	*chloris*	S		o	700–850	S		o	800–1,300	U		o	700–900
Vireos	**VIREONIDAE**													
Rufous-browed Peppershrike	*Cyclarhis*	*gujanensis*					U		s	700–1,300	U		s	
Tepui Greenlet	*Hylophilus*	*sclateri*	S		o	825–950	U		s	700–1,300	F		s	700–1,400
Buff-cheeked Greenlet	*Hylophilus*	*muscicapinus*	F		o	700–850					F		s	700–1,000
Tawny-crowned Greenlet	*Hylophilus*	*ochraceiceps*									U		s	
Slaty-capped Shrike-Vireo	*Vireolanius*	*leucotis*	F		o	700–850					U		o	
Jays	**CORVIDAE**													
Cayenne Jay	*Cyanocorax*	*cayanus*	U		s	700	S		o	700	F		s	
Swallows	**HIRUNDINIDAE**													
Blue-and-white Swallow	*Notiochelidon*	*cyanoleuca*					F		o	1,300–1,400				
White-banded Swallow	*Atticora*	*fasciata*	S		o	700								
Barn Swallow	*Hirundo*	*rustica*	X		o	700								
Wrens	**TROGLODYTIDAE**													
Wing-banded Wren	*Microcerculus*	*bambla*	U		o	700					S		o	850
Flutist Wren	*Microcerculus*	*ustulatus*	U		s	900–1,500	F		s	800–1,300	U		s	1,250–1,400
Tepui Wren	*Troglodytes*	*rufulus*					U		s	1,400–1,500				
Coraya Wren	*Pheugopedius*	*coraya*	F		s	700–1,500	F		s	800–1,500	F		s	
White-breasted Wood Wren	*Henicorhina*	*leucosticta*	F	*	s	700–850					F		s	
Musician Wren	*Cyphorhinus*	*arada*	S		o	700–850	X		o	800	U		s	850–1,400
Gnatcatchers	**POLIOPTILIDAE**													
Long-billed Gnatwren	*Ramphocaenus*	*melanurus*	U		o	700–950					U		o	900
Thrushes	**TURDIDAE**													
Rufous-brown Solitaire	*Cichlopsis*	*leucogenys*	U	*	s	1,000–1,100	U	*	s	800–1,300	S		s	850–1,400
Yellow-legged Thrush	*Turdus*	*flavipes*	F	*	s	825–950	S		o	1,000	U		s	1,400
Black-hooded Thrush	*Turdus*	*olivater*	U	*	s	900–1,500	F	*	s	800–1,400	F		s	1,400
White-necked Thrush	*Turdus*	*albicollis*	F	*	s	700–900	U		s	700–800	U	*	s	
Pipits	**MOTACILLIDAE**													
Yellowish Pipit	*Anthus*	*lutescens*									U		s	850
Tanagers	**THRAUPIDAE**													
Black-faced Tanager	*Schistochlamys*	*melanopis*									U		o	
Fulvous-crested Tanager	*Tachyphonus*	*surinamus*	U	*	s	700–1,100	U	*	s	700–800	F	*	s	
Flame-crested Tanager	*Tachyphonus*	*cristatus*									U	*	s	700–1,000

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Red-shouldered Tanager	*Tachyphonus*	*phoenicius*									U		s	
Fulvous Shrike-Tanager	*Lanio*	*fulvus*	U		o	700–850					F		o	700–1,000
Silver-beaked Tanager	*Ramphocelus*	*carbo*	C		o	700								
Blue-grey Tanager	*Thraupis*	*episcopus*	U		o	700					U		o	
Palm Tanager	*Thraupis*	*palmarum*									F		o	
Burnished-buff Tanager	*Tangara*	*cayana*									F		s	850
Paradise Tanager	*Tangara*	*chilensis*	U		o	700					F		o	below 850
Yellow-bellied Tanager	*Tangara*	*xanthogastra*	X			900–1,000	F	*	s	1,200–1,400	U		s	1,000–1,400
Black-headed Tanager	*Tangara*	*cyanoptera*	S	*	s	950–1,500	F	*	s	1,200–1,400	U		o	1,400
Bay-headed Tanager	*Tangara*	*gyrola*	S		o	700	U	*	s	800–1,300	F		s	850–1,400
Speckled Tanager	*Tangara*	*guttata*					S	*	s					
Spotted Tanager	*Tangara*	*punctata*	S	*	s	900–1,000					U		s	
Opal-rumped Tanager	*Tangara*	*velia*	S		o	900–1,000					S		o	
Blue Dacnis	*Dacnis*	*cayana*	S		o	700	S		o	1,300	U		s	850
Black-faced Dacnis	*Dacnis*	*lineata*									S		s	850
Greater Flowerpiercer	*Diglossa*	*major*	U		s	1,400–1,650	F		o	1,200–1,500				
Purple Honeycreeper	*Cyanerpes*	*caeruleus*	F	*	s	700–1,075	U	*	s	800–1,300	F		s	
Red-legged Honeycreeper	*Cyanerpes*	*cyaneus*	F		o	700–950	F		o	700–800	C	*	s	
Short-billed Honeycreeper	*Cyanerpes*	*nitidus*	S		o	700								
Green Honeycreeper	*Chlorophanes*	*spiza*	F		o	700					C	*	s	
Yellow-backed Tanager	*Hemithraupis*	*flavicollis*									U		s	1,000
Blue-black Grassquit	*Volatinia*	*jacarina*									F		o	
Yellow-bellied Seedeater	*Sporophila*	*nigricollis*	F	*	o	700					F		s	
Chestnut-bellied Seed Finch	*Sporophila*	*angolensis*	S		o	700	X		s	1,300	U		o	
Bananaquit	*Coereba*	*flaveola*	U		o	700–950, 1,400	U	*	s		U	*	s	
Sparrows	**EMBERIZIDAE**													
Rufous-collared Sparrow	*Zonotrichia*	*capensis*									U	*	s	
Grassland Sparrow	*Ammodramus*	*humeralis*									F	*	s	
Tepui Brush Finch	*Atlapetes*	*personatus*	F		s	1,300–1,650	U	*	s	1,300–1,400				
Pectoral Sparrow	*Arremon*	*taciturnus*	F	*	s	700					S		s	
	INCERTAE CEDIS													
Olive-backed Tanager	*Mitrospingus*	*oleagineus*	F		s	875–1,500	F		s	800–1,400	F		s	1,000–1,400
Slate-coloured Grosbeak	*Saltator*	*grossus*	U		s	700–950					U		s	800
Buff-throated Saltator	*Saltator*	*maximus*	U		s	700					U		s	
Cardinal, grosbeaks	**CARDINALIDAE**													
White-winged Tanager	*Piranga*	*leucoptera*					S		s	1,300				
Yellow-green Grosbeak	*Caryothraustes*	*canadensis*	U		o	700–1,075	U		o	700–800	F		s	
Red-and-black Grosbeak	*Periporphyrus*	*erythromelas*									S		s	900–1,100
Blue-black Grosbeak	*Cyanocompsa*	*cyanoides*	S	*	s	700–1,100					U	*	s	
Rose-breasted Chat	*Granatellus*	*pelzelni*	S		o	700								
Warblers	**PARULIDAE**													
American Redstart	*Setophaga*	*ruticilla*	U		o	700–1,075	S		o	800				
Tropical Parula	*Setophaga*	*pitiayumi*					U		s	800–1,300	U		s	
Slate-throated Redstart	*Myioborus*	*miniatus*	S		s	850–1,000	U	*	s	700–1,300	U		s	1,200–1,400
Tepui Redstart	*Myioborus*	*castaneocapillus*	F		s	950–1,500	U		s	700–1,400				

Common name	Family/genus	Species	Ayanganna 8 March–2 April 2014				Roraima 19 March–12 April 2001				Kopinang 12–27 July 2004			
			Abundance	Breeding	Documentation	Elevational range (m)	Aundance	Breeding	Documentation	Elevational range (m)	Aundance	Breeding	Documentation	Elevational range (m)
Two-banded Warbler	*Myiothlypis*	*bivittata*	U		s	850–1,100	S		s	800–1,300	F		o	1,000–1,400
Riverbank Warbler	*Myiothlypis*	*rivularis*	S		o	700					S		o	850
Blackbirds	**ICTERIDAE**													
Golden-tufted Grackle	*Macroagelaius*	*imthurni*	F		s	950–1,500	F		s	800–1,400	C		s	850–1,000
Red-rumped Cacique	*Cacicus*	*haemorrhous*	F	*	s	700								
Green Oropendola	*Psarocolius*	*viridis*	C		o	700					F		o	
Crested Oropendola	*Psarocolius*	*decumanus*	S		o	700								
Eastern Meadowlark	*Sturnella*	*magna*									F		o	
Finches/euphonias	**FRINGILLIDAE**													
Plumbeous Euphonia	*Euphonia*	*plumbea*									S		s	
Purple-throated Euphonia	*Euphonia*	*chlorotica*									U		s	
White-vented Euphonia	*Euphonia*	*minuta*									U		o	
Golden-bellied Euphonia	*Euphonia*	*chrysopasta*					X		o	800				
Orange-bellied Euphonia	*Euphonia*	*xanthogaster*	U		s	700–1,100	U	*	s	800–1,400				
Golden-rumped Euphonia	*Euphonia*	*cyanocephala*	X		o	950								
Blue-naped Euphonia	*Chlorophonia*	*cyanea*	X		o	950								

On any one tepui, bird species composition at a given elevation can vary. Some wide-ranging tepui specialists like Fiery-shouldered Parakeet *Pyrrhura egregia* are observed as low as 400 m in the foothills around the tepuis. Other species, with more specific habitat requirements, are restricted in elevation. In general, on the three tepuis covered here, we found a mix of lowland and highland species at 700–1,000 m, with a significant change in vegetation and bird species composition to a more exclusive highland avifauna above 1,000 m.

On Kopinang, despite reaching the same elevations as our other surveys, we did not encounter wet, moss-laden, tepui scrub forest, yet we did find many of the endemic tepui species. Notably absent were *Roraimia adusta*, Red-banded Fruiteater *Pipreola whitelyi* and *Grallaricula nana*, all usually restricted to tepui scrub forest. However, we did record in abundance species that were rare or absent on the other tepuis such as Scarlet-horned Manakin *Pipra cornuta* and Plain Antvireo *Dysithamnus mentalis*. We also encountered Sierran Elaenia *Elaenia pallatangae*, which was mysteriously absent from Mount Ayanganna. Expedition reports from the north slope of the Wokomung massif indicate that habitat there is similar to that on Mount Ayanganna, and probably holds these missing species[10].

Despite differences in size, weather and habitat, virtually the full suite of the endemic eastern tepui avifauna was recorded on each of the three tepuis. We suspect that some species not recorded on all three, e.g., *Crypturellus ptaritepui*, will be documented with additional effort, especially at other seasons. The results of the three inventories were compiled and are presented here with relative abundance, elevational range when determinable and breeding phenology (Table 1). For taxonomy and nomenclature we follow SACC[16].

Breeding seasons within the pantepui are poorly understood with no comprehensive studies at any single locality. Many tropical birds in regions with well-defined wet and dry seasons breed at a particular time of year, although there are many exceptions[21]. The unique weather patterns associated with the intertropical convergence zone (ITCZ) in the tepui region led us to investigate if there are patterns of breeding to be discerned in the avifauna of the tepui highlands. The ITCZ brings trade winds and moisture from the north during the typical wet seasons, and slopes of mountains that face the trade winds tend to have higher precipitation than leeward sides[4]. Climatic data are scarce to non-existent for the Guianan tepuis, although, based on our and the experience of other researchers, the dry and wet seasons typical of the lowlands do not appear to apply at higher elevations[10]. We chose to conduct our expeditions to Mount Ayanganna and Mount Roraima during the typical dry period in March–April. However, Mount Ayanganna was, in our experience, one of the wettest areas we have surveyed and we believe that a meteorological station sited at upper elevations on the north-east face would establish this area as

one of the wettest places on earth. Precipitation also influenced our efforts on Mount Roraima, although our southern approach to Kopinang in July, within the typical wet season, yet away from the ITCZ influences was drier than the other tepui surveys.

Mount Roraima and Mount Ayanganna possess similar wet forest structure, and showed some similarity in breeding phenology. Frugivores, in particular, were in peak breeding condition, with *Pipreola whitelyi*, McConnell's Flycatcher *Mionectes macconnelli roraimae*, Rufous-brown Solitaire *Cichlopsis leucogenys*, and highland representatives of *Turdus* and *Tangara* all showing high percentages of individuals breeding. These species were either absent or not breeding on Kopinang. Nevertheless, even within this foraging guild breeding phenology varied. For example, at Mount Ayanganna during mid March, no White-throated Thrushes *Turdus albicollis* were singing, but when we returned below 800 m in early April, multiple males were persistently singing and gonad data confirmed breeding. This was in contrast to all of the other thrushes that were in an advanced stage of breeding when we arrived in mid March at higher elevations. In addition, other Pantepui endemic insectivores like Brown-breasted Antpitta *Myrmothera simplex*, *Roraimia adusta* and *Syndactyla roraimae* showed the same seasonal patterns of breeding on Mount Roraima and Mount Ayanganna, whereas nectarivores displayed very little breeding activity during any of our expeditions. On Mount Ayanganna, *Roraimia adusta*, a species restricted to wet, mossy higher elevation forest, was breeding, whereas most other species in that habitat and elevation were not. In fact, tepui scrub forest often appeared completely devoid of birds, with fewer than ten individuals seen or heard during a typical morning survey. We believe this environment may be too extreme to sustain larger populations of resident species and some seasonal migration may occur as evidenced by the presence of Slaty Finch *Haplospiza rustica* in 1998[2]. It is also worth noting that, for several species, there were a small number of individuals breeding, which were not representative of the overall population. For example, Orange-bellied Manakin *Lepidothrix suavissima* was breeding during all three expeditions, but only 17% of the total individuals collected were adults in breeding condition.

In >20 years of combined experience in Guyana, we have found breeding patterns difficult to ascertain. In the tepuis many groups show signs of opportunistic breeding, with only a small proportion of species / individuals actively breeding. Our breeding values suggest that some foraging guilds possess unpredictable breeding patterns, especially insectivores. There was evidence of seasonality in breeding by frugivorous birds on Mount Roraima and Mount Ayanganna, possibly indicating ephemeral abundance of fruit early in the year. Also, the presence of such a high proportion of non-breeding nectarivores suggests a breeding season that falls outside our range of coverage, probably coinciding with major blooming events. Our work provides baseline data for the breeding avifauna of Guianan tepuis, but additional surveys are required at different times of year to fully understand avian breeding phenology in this region.

Species accounts

Tepui Tinamou *Crypturellus ptaritepui*

A single, non-vocalising bird was collected (USNM 650391) on 20 March 2014 by CMM on a steep slope within stunted, moss-laden forest at 1,400 m on Ayanganna. No tinamous were heard at this camp, so we presume the species was not breeding during our survey. The specimen was preserved whole in fluid, thus sex was not determined. This represents the first Guyana record for this range-restricted species; it is known from only four tepuis in easternmost Venezuela, c.200 km west of Mount Ayanganna[7].

Band-tailed Pigeon *Patagioenas fasciata*

During March 2014, this pigeon was recorded in small numbers, max. 2 heard per day, at 1,075–1,375 m on Mount Ayanganna. A male in breeding condition, testes 12 × 7 mm, was taken in the crown of a fruiting tree by TJD on 16 March 2014. The specimen (USNM 650546) and audio-recordings (ML 193327, 195696) represent the species' first documentation in Guyana. It was listed as hypothetical for the country, based on a specimen record on the Venezuelan side of Mount Roraima[20]. Undoubtedly, this species occurs on the Guyana side of Mount Roraima and other Guianan tepuis, but it was not otherwise encountered during our surveys.

Striped Woodhaunter *Automolus subulatus*

Recorded at two sites along trails through dense understorey in primary forest at 700 m near Mount Ayanganna airstrip. Audio-recordings on 10 March and 5 April (ML 195615, 193249) represent the first documentation in Guyana, although the species was known from nearby south-eastern Bolívar, Venezuela[7].

Cinnamon Manakin-Tyrant *Neopipo cinnamomea*

On 30 March 2014, a single individual (USNM 650434) was mist-netted at the surprisingly high elevation of 1,075 m on Mount Ayanganna. Primarily known from elevations below 300–400 m in Guyana and Venezuela, however, the species has been recorded up to 1,000 m in eastern Ecuador, at

800 m on our Kopinang expedition, and up to 700 m in eastern Peru[7,12,18].

Yellow-legged Thrush *Turdus flavipes*

Because this thrush was persistently singing from dawn to late morning (ML 193237–239, 195673, 195678, 195670, 195689, 195696, 195659–660) it was conspicuous in the canopy and subcanopy of tall primary forest at 825–1,075 m on Mount Ayanganna. As many as eight males were heard along c.2 km of trail in a single morning. This was in marked contrast to our surveys of Mount Roraima and Kopinang, where only a few individuals were recorded and were not singing consistently. We continue to be perplexed by the status of *T. flavipes* and Pale-eyed Thrush *T. leucops* in Guyana. We have not encountered the latter during any of our Guyana tepui surveys, yet the two have been recorded sympatrically on eastern Venezuelan tepuis[7]. Apparently, the only Guyana records of *T. leucops* are specimens taken by Henry Whitely in the Merume Mountains[20].

Golden-rumped Euphonia *Euphonia cyanocephala*

A male and female were photographed on 23 March 2014, foraging in a mistletoe clump in the canopy at 950 m on Mount Ayanganna by MBR & TJD. The addition of this euphonia to the Guyana list is long overdue as it is known from several Venezuelan tepuis, including Roraima[7], and from Surinam and French Guiana[9,15].

Acknowledgements

We offer sincere thanks to Holt Thrasher and David B. Ford for co-sponsoring the Mount Ayanganna expedition and for their companionship in the field. We thank the Guyana EPA for permission to conduct research under permit no. 0305514 BR005. In-country assistance was provided by Margaret & Malcolm Chan-a-sue and the Pierre family. Our primary Patamona guides on Mount Ayanganna were Christopher Andrew, Francino Edmond, Peter Joseph, Luciano Edmund and Rodney Daniel. Gary Sway served as an expert guide and companion. We greatly appreciate the assistance of Elford Liverpool and Kaslyn Holder at the Centre for the Study of Biological Diversity at the University of Guyana. The Guyana Wildlife Division provided assistance with export permits. Mark Adams confirmed identifications of specimens at the Natural History Museum, Tring. The abstract was translated by Smithsonian Language Services volunteers. Comments from reviewers, David Ascanio and Johan Ingels, greatly improved the manuscript. Partial funding for the Ayanganna survey was provided by John L. Clark and Michael J. Braun. This is no. 212 in the Smithsonian's Biological Diversity of the Guiana Shield publication series.

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