An avifaunal survey and conservation assessment of Serranía Sadiri, Madidi National Park, Bolivia

Martin Berg and A. Bennett Hennessey

Received 16 May 2018; final revision accepted 28 April 2019
Cotinga 41 (2019): 57–71
published online 21 June 2019

Durante tres meses de trabajo de campo entre noviembre de 2010 y febrero de 2011, se examinó la avifauna de la serranía Sadiri, departamento La Paz, noroeste de Bolivia. El área alberga bosque seco enano, bosque primario perenne de piedemonte y bosque de llanura tropical, en los yungas bajos del área de endemismo de aves entre Bolivia y Perú. Salvo algunos bosques secos alterados en la parte este de la cresta, el área está en gran parte sin explotar y se encuentra dentro del Parque Nacional Madidi. El estudio cubrió un área de 30 km^2, con un rango de elevación de 400–1.200 m, pero destacó la zona piedemonte por encima de los 800 m. Presentamos una lista de 274 especies de aves registradas en el área, incluyendo notas de abundancia relativa, rango de altitud, migración y evidencia. Se proporcionan recuentos para especies con registros significativos, incluyendo el primer registro del Vencejo Barbiblanco *Cypseloides cryptus* y el tercer registro del Vencejo Pechiblanco *C. lemosi* o Vencejo Negro *C. niger* en Bolivia. El área protege poblaciones de dos especies vulnerables y tres especies casi amenazadas globalmente, como también cuatro especies de rango restringido. Biogeográficamente, la avifauna de la zona piedemonte incluye un número de especies de crestas periféricas del norte de Bolivia y del sur de Perú, mientras que la zona más baja de la cresta alberga una mezcla de especies características del bosque de llanura tropical. La combinación de alta biodiversidad de aves en un área pequeña y la presencia de poblaciones aparentemente sanas de algunas especies de rango restringido, amenazadas y casi amenazadas le dan a la serranía Sadiri una alta prioridad para la conservación y la idoneidad de nombrarla como un área de importancia para las aves.

Madidi National Park was established in 1995 and protects 18,957 km^2 of pristine Amazonian and Andean ecosystems at 180–5,760 m above sea level[29,30]. With an estimate of more than 1,000 bird species, Madidi is suspected to be one of the most species-rich protected areas on Earth, holding c.10% of the world's bird species[11,30]. The exceptional biodiversity and large number of endemic, threatened and range-restricted species of plants and vertebrates make the area a biodiversity hotspot of high conservation priority[23,24]. Together with Manu Biosphere Reserve and adjacent Bahuaja-Sonene National Park, in southern Peru, and Pilón Lajas Biosphere Reserve in Bolivia, Madidi protects a unique Andean–Amazonian system, and an important biological corridor on the east slope of the Andes[29,37].

Madidi National Park is experiencing a slow but increasing rate of deforestation caused by rapid colonisation of border areas and increased access to the park[11,14,17]. Evaluating the ecological consequences of deforestation is crucial to efficient conservation management and to counteract the future reduction of biodiversity in the national park (e.g. shifting baseline syndrome)[20,21,27]. This requires monitoring of biodiversity and population trends, as well as mapping patterns of land-use change in and around Madidi[22,23].

This study aimed to determine the current conservation value and potential threats to Serranía Sadiri, in the Andean foothills adjacent to the Yucumo–Ixiamas road, in and along the main access road to San José de Uchupiamonas community in Madidi National Park (Fig. 1). The area lies within the Yungas ecoregion, which is Bolivia's highest priority for bird conservation[18], and is an Endemic Bird Area (Bolivian and Peruvian Lower and Upper Yungas EBA)[6]. Although several avifaunal studies have been conducted in Madidi[29] and distribution data are available for the lowlands, the avifauna of many outlying ridges is poorly studied. Previous ornithological surveys in Serranía Sadiri were limited to three visits over 15 days[20], which produced the first bird list for the area. The present study is the first survey of the area conducted over an extended period, with estimations of abundance, movements and altitudinal distribution. The primary objectives were to: (1) survey avifaunal composition; (2) collect data on the presence of species of conservation concern; and (3) review the need for conservation management and opportunities for sustainable development. Here, we present the results of a three-month bird survey in Serranía Sadiri, and highlight the importance of conservation management to influence decision-makers[16].

Study area and Methods

Study area.—Serranía Sadiri forms part of an outlying ridge that runs nearly 360 km from

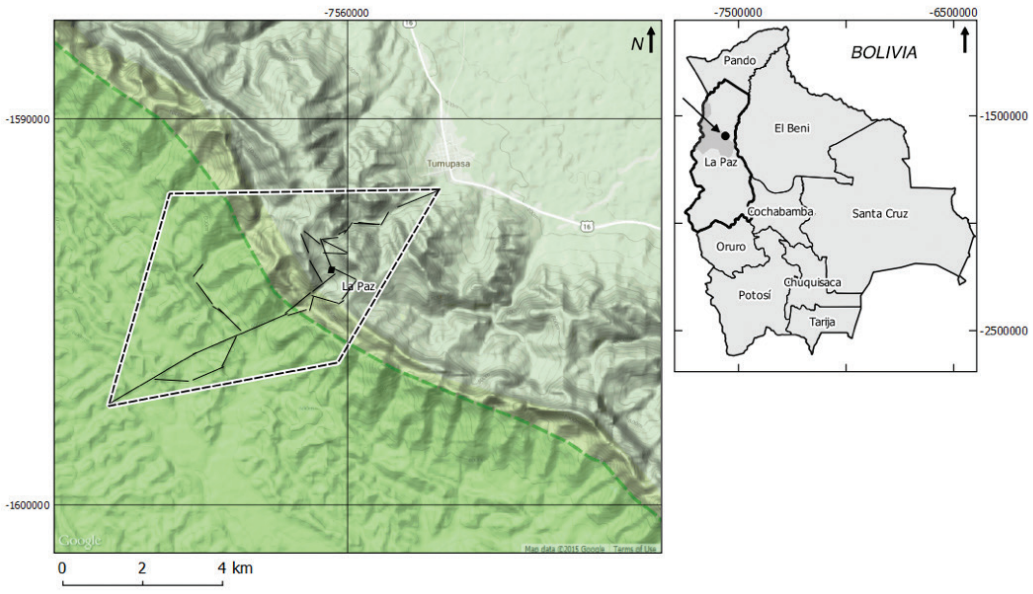

Figure 1. Map of Serranía Sadiri showing the border of Madidi National Park (green) in dpto. La Paz, © Google Earth version 7.1.5 (2015). The survey was undertaken within the dashed area and was focused on the forest trails (black lines). The camp (black square) is at 950 m above sea level.

south-east Peru to north-west Bolivia. It is the first such outermost ridge of the Andes south of an area of plains-level lowland dry forest, with the Beni pampas to the north-east. Being the first Andean ridge, it receives prevailing winds from the northern lowlands, resulting in increased precipitation compared to ridges further west. In contrast to other ridges in the region, Serranía Sadiri is isolated from the central Andes by lowland forest below 450 m (Fig. 1). The nearest ridge with similar topography is c.20 km south-west of Serranía Sadiri and the closest peak above 1,800 m is 53 km south-west. From the village of Tumupasa (14°8'46"S 67°53'18"W; 450 m) a dirt road leads over the ridge of Serranía Sadiri (14°10'10"S 67°55'01"W; 950 m) and down to the lowlands in the west (Fig. 1–3). The highest peaks of Serranía Sadiri reach c.1,200 m. Geologically, much of the ridge consists of limestone, schist, and unstable soils, resulting in frequent landslides on steeper slopes. Numerous streams and moist ravines traverse the foothill zone, and these flow into a larger river in the lowland forest west of the ridge. The exposed ridgetops and dry east side of Serranía Sadiri are characterised by a stunted species-poor forest just 2–5 m tall (Fig. 2). The west side of the ridge consists of 25–40 m-tall primary tropical forest. The forest in the foothill zone possesses a rich cover of epiphytic mosses, ferns and bromeliads, the result of higher precipitation. Most areas of this forest are characterised by dense undergrowth, although some areas have a remarkably open understorey. Frequent natural treefall gaps occur throughout. Although some selective logging occurred in the past (<10 years ago), the forest is predominantly undisturbed. There is also a 5-ha spiny bamboo (*Guadua* sp.) stand 2 km south-west of the ridge. The lowland forest east of the ridge mostly consists of 30–40 m-tall semi-humid primary forest that has undergone more selective logging pressure near the village of Tumupasa (Fig. 1).

Avifaunal sampling.—Bird surveys were conducted between 22 November 2010 and 22 February 2011, which period includes the transition from the late dry season to rainy season, and corresponds to the breeding season of several species in the foothills and lowlands. Surveys were conducted at 450–1,200 m, with an emphasis on the foothill zone (800–1,200 m) and covered c.20 km^2 (Fig. 1). The principal survey method was non-systematic visual and auditory observations. On a daily basis, MB walked from the camp, at 950 m, along the road, on trails and in dense forest. Regular hikes were made to the level-ground lower region south-west of the ridge (Fig. 3). Field work was carried out every day from sunrise to c.11h00 and between 17h00 and sunset. Nocturnal inventories were conducted 1–2 times per week. Playback was used to verify identifications, as well as to locate several shy or rare species. Observed numbers of each species were later summarised and classified following the relative abundance classification of Parker *et al.*[28]: common (several individuals encountered daily in appropriate habitat); fairly

Figure 2. The peaks of Serranía Sadiri are covered with dry stunted forest. View towards the level-ground semi-dry *cerrado* forest to the east (Martin Berg)

Figure 3. Humid west slope of Serranía Sadiri (foreground) covered in primary evergreen foothill forest; tropical lowland forest in the background (Martin Berg)

common (small numbers almost daily); uncommon (recorded in small numbers most weeks); and rare (recorded just once or a few times during the entire survey). Species identification follows Schulenberg *et al.*[36] and taxonomy Remsen *et al.*[31].

Results

Avifaunal sampling.—Some 274 species were recorded (see Appendix), of which 77 were restricted to the foothill zone (28%), 70 to the lowlands (26%) and 127 were recorded throughout (46%). Given that 'new' species were recorded during most visits

Table 1. Summary of Nearctic migratory birds in the Serranía Sadiri, dpto. La Paz, Bolivia in November 2010–February 2011; elevation, relative abundance (C: common, F: fairly common, U: uncommon, R: rare), and period during which the species were observed. *Might also involve resident *V. o. chivi*.

Species	Elevational range (m)	Relative abundance	Period
Broad-winged Hawk *Buteo platypterus*	-	F	Nov–Feb
Swallow-tailed Kite *Elanoides forficatus*	-	F	Nov–Feb
Spotted Sandpiper *Actitis macularius*	400–800	F	Nov–Feb
Swainson's Thrush *Catharus ustulatus*	500–1,200	C	Nov–Feb
Red-eyed Vireo* *Vireo olivaceus*	700–1,100	C	Nov–Feb
Sulphur-bellied Flycatcher *Myiodynastes luteiventris*	500–1,200	C	Nov–Feb
Olive-sided Flycatcher *Contopus cooperi*	500–850	U	Nov–Feb
Eastern Wood Pewee *Contopus virens*	400–1,100	C	Nov–Feb
Western Wood Pewee *Contopus sordidulus*	750	R	Dec
Scarlet Tanager *Piranga olivacea*	600–1,200	F	Nov–Feb
Summer Tanager *Piranga rubra*	600–1,200	F	Nov–Feb

to the lowlands immediately south-west of the ridge, even at the end of the survey, the bird list of the Serranía Sadiri is certainly incomplete. This total represents c.35% of the total number of bird species in Madidi National Park[30].

The lowland tropical forest south-west of the ridge harbours a rich community of widespread Amazonian species. In November–December, this area was relatively dry and bird activity low, with some species observed in small numbers compared to nearby similar habitats[17]. In contrast, activity in the foothill zone peaked in November–December when most birds increased territorial song and display activity (e.g., Sharpbill *Oxyruncus cristatus* and White-browed Hermit *Phaethornis stuarti*). Following heavy rainfall in January–February, the lowland forest became increasingly moist, which resulted in high water level in streams, and an abundance of forest bogs and marshes throughout the area. While bird activity in the upper foothill zone declined in January–February, due to often prolonged periods of heavy rain, abundance and diversity of bird species in the lowlands increased, possibly due to a shift in food resources[32]. Species recorded in appropriate habitat only during the wet season were Green Heron *Butorides virescens*, Fasciated Tiger Heron *Tigrisoma fasciatum* and Hoatzin *Opisthocomus hoazin*, indicating local movements between the wet and dry seasons. Nocturnal birds (six owl species, two potoos and four nightjars) were mostly recorded in the foothill zone and almost exclusively in November–December.

Raptor migration.—In early–mid December, a large number of Swallow-tailed Kites *Elanoides forficatus* passed over Serranía Sadiri. It is unclear if these birds were of the migratory race *E. f. forficatus*, which relatively commonly over-winters over large parts of Central and South America[4], or resident *E. f. yetapa*. Flocks typically involved 4–20 birds and flew south-east to north-northwest following the Andean ridge. Numbers increased to more than 50 per day in mid December, with the max. 120 on 18 December, in flocks of 10, 20 and 80, plus singles. Given that most time was spent in forest below the canopy each day, many more birds might have passed over the ridge. It is unclear if the large number of *E. forficatus* was a result of a cold front further south or movements between local feeding areas[26]. The species was seen in 'good' numbers until 22 December. Thereafter, numbers declined to a few birds in January–early February. Three flocks consisting of 20, 11 and 14 birds were seen again in mid February. These flocks were moving in the same direction as those in November–December. Other raptors observed with the flocks of *E. forficatus* were Plumbeous Kite *Ictinia plumbea* and Broad-winged Hawk *Buteo platypterus*, which was seen in numbers on migration in February, but rarely in November–January.

Nearctic migrants.—A total of 11 Nearctic migrants was observed in the area during the survey (Table 1). The most abundant were: Swainson's Thrush *Catharus ustulatus*, Red-eyed Vireo *Vireo olivaceus*, Eastern Wood Pewee *Contopus virens* and Scarlet Tanager *Piranga olivacea*. Numbers of Nearctic migrants were greater in the foothill zone than in the lowlands, where only *C. ustulatus* was observed.

Species accounts

Harpy Eagle *Harpia harpyja* NT

Globally rare and declining, and appears rare but regular in the Serranía Sadiri. Although never observed during this survey, local people are familiar with the species and indicate that they have seen it on several occasions in the lowlands.

It is, however, unclear whether some of these observations might have involved the similar-looking Crested Eagle *Morphnus guianensis*, which potentially occurs in the area. During the survey, knowledgeable local people saw an immature *H. harpyja* beside the road on the lower part of the ridge, south-west of Serranía Sadiri, in February 2011. The eagle was perched in a large tree 10–15 m above ground, and was identified from *M. guianensis* by the grey breast-band and prominent dark, bifurcated crest.

Solitary Eagle *Buteogallus solitarius* **NT**
Two adults were regularly observed over the ridge of Serranía Sadiri and nearby peaks throughout the survey period. They were often seen soaring together. *B. solitarius* appears to be rare throughout its range, but its population status and threats are poorly understood[8].

Military Macaw *Ara militaris* **VU**
This rare and globally threatened macaw was observed 1–4 times per week during the entire period, but was more frequent in January–February. They were most frequently located by their loud calls in flight, in groups of 2–4 over the canopy in the foothill zone. They were rarely seen perched, and there are currently no signs of breeding in the area. Hosner *et al.*[20] reported it as common in Serranía Sadiri in 2009, with flocks of 2–20, and a max. count of 36 individuals in one flock. As known for many other macaws in Bolivia, it is possible that *A. militaris* is only present seasonally in the area and that its abundance varies according to local movements in response to food availability[10]. Hosner *et al.*[20] suggested that the *A. militaris* seen possibly were the same as those observed in the upper río Tuichi Valley, where it occurs only during the dry season[29]. Further evidence consistent with this hypothesis is that numbers of *A. militaris* in Serranía Sadiri increase during the wet season (January–February) compared to the late dry season (November).

Rufous-vented Ground Cuckoo *Neomorphus geoffroyi* **VU**
This rare and secretive species was seen once on a steep forest slope 300 m north of the camp, in the foothill zone at 950 m, in February 2011. It was observed for several minutes in low undergrowth and on a forest trail. *N. geoffroyi* has been reported from humid forest in dpto. Pando, Noel Kempff National Park and the central Río Tuichi dry forest, deeper into Madidi National Park[19], but is possibly overlooked due to its secretive behaviour.

Subtropical Pygmy Owl *Glaucidium parkeri*
This globally rare and patchily distributed owl was described as recently as 1995[33], but was documented in Bolivia for the first time based on recordings made by T. A. Parker in 1979 during an expedition to Serranía Bellavista, dpto. La Paz (Macaulay Library ML13885). In Bolivia, it has since been frequently reported at Serranía Eslabón, Madidi National Park (ABH pers. obs.) and Pilón Lajas[17]. In Serranía Sadiri it was frequently recorded in 2007[20]. During the present survey, *G. parkeri* was heard on most calm evenings and early mornings in November–December from camp, at 950 m, and on the lower west slope of Serranía Sadiri at 700 m. Two were simultaneously heard at dusk on 10 December 2010, which suggests that there is more than one territory in the area. Considered a restricted-range species[7], but its abundance and status are poorly known[19,36].

White-chinned Swift *Cypseloides cryptus* **/ American Black Swift** *Cypseloides niger*
On 3 January 2011, MB observed three juvenile *Cypseloides* swifts foraging within a large flock comprising White-collared *Streptoprocne zonaris*, White-tipped *Aeronautes montivagus*, Short-tailed *Chaetura brachyura* and White-chested Swifts *Cypseloides lemosi*. The flock was feeding over humid forest immediately south-west of the peak of Serranía Sadiri. The *Cypseloides* were observed on several occasions that day, sometimes at close range and for several minutes. They had dark plumage and diffuse but clearly visible white fringes on the lower belly, which are not shown by the otherwise similar juvenile Chestnut-collared Swift *Streptoprocne rutila*. The proportions of the *Cypseloides* were larger than *A. montivagus* in the same flock, but all were considerably smaller than the *S. zonaris*. Based on their relatively stocky proportions, uniformly dark plumage, and diffuse white fringes on the lower belly, the three swifts were initially identified as *C. cryptus*. The Bolivian distribution of *C. cryptus* is poorly known[19], with no recent records. There are, however, two records from dpto. Puno, southern Peru, immediately adjacent to dpto. La Paz, Bolivia, suggesting that it might have been overlooked[34,36]. Although there are no records of *C. niger* in Bolivia or Peru, a study using light-logger data suggests that the species forages over north-west Bolivia and southern Peru in the non-breeding season[3], making occurrence at Serranía Sadiri plausible. Nevertheless, identification of these species is difficult or, in many cases, almost impossible in the field.

White-chested Swift *Cypseloides lemosi*
MB observed an adult *C. lemosi* on 3 January 2011 foraging in the same large flock of swifts described above. It was seen from an outlook under good conditions several times during the day. Identification was confirmed by the triangular white breast patch, uniformly dark plumage, and

smaller size than *S. zonaris* but larger size than *A. montivagus*. Additionally, MB observed two adults in a large group of *S. zonaris* and *A. montivagus* near the village of San José de Uchupiamonas, a few km south-west of the survey area, on 28 December 2010. These observations suggest more regular occurrence of *C. lemosi* in the region at this season than previously believed. Status in Bolivia is poorly known[19]; the above-mentioned observations are the third and fourth records in the country. Previous observations are from Caranavi, dpto. La Paz, on 28 December 2005, and Rurrenabaque, dpto. La Paz, on 29 December 2005[34]. The species has recently also been reported on eBird[12] as follows: three seen at Campamento base, near Atén, on 29 October 2011; two at Camino via Crusis, on 4 November 2011; and ten at Tolopampa, on 12 December 2016, all of them near the Apolo area in north-west Bolivia[12].

Red-billed Tyrannulet *Zimmerius cinereicapilla* **VU**
Frequently seen and heard in the upper foothill zone at 900–1,200 m in November–December. It was usually found foraging in the canopy with mixed-species flocks. It was previously recorded in Serranía Sadiri in November 2009[20], at Chalalan Ecolodge in 1998 (ABH pers. obs.) and Serranía Eslabón[7]. *Z. cinereicapilla* is a restricted-range species patchily distributed in the east Andean foothills of Peru and Ecuador[1]. Its population is declining due to deforestation, road construction and mining[5].

Cinnamon-faced Tyrannulet *Phylloscartes parkeri*
Described as recently as 1997[13], this species was fairly common in the foothill zone, frequently associated with mixed-species flocks, and most often detected by voice. It is known from just four sites in dpto. La Paz[19], including a previous record from Serranía Sadiri by ABH in 1999[20].

Scaled Fruiteater *Ampelioides tschudii*
Common in the foothill zone at 800–1,100 m, where 5–15 birds were heard daily, with a peak in November–December. *A. tschudii* was hard to locate, even using playback, and always remained high in the canopy. In Bolivia, this species is known from Serranía Cuchilla, dpto. Beni[17], the río Tuichi Valley[29], and Pilón Lajas Biosphere Reserve[17,18].

Sharpbill *Oxyruncus cristatus*
Relatively common in the foothill zone at 700–1,100 m. Often heard in November–December, but not in January–February. When not singing, it was usually detected 1–2 times per day as singles or pairs with mixed-species flocks, mostly close to the camp at the ridge. Rare in Bolivia, the species is known from just seven sites in dpto. La Paz[19].

Scarlet Tanager *Piranga olivacea*
Observed in pairs or small flocks on most days in the upper foothill zone at 600–1,200 m. Numbers increased until late November and declined significantly in late January, when many males were moulting to summer plumage. The species has suffered a population decline due to habitat loss on the wintering grounds, and habitat fragmentation in North America[35]. It was common to fairly common during the previous ornithological survey in Serranía Sadiri[20] and has also been observed regularly at Pilón Lajas Biosphere Reserve[17].

Discussion

We recorded a total of 274 species during our three-month survey. An additional 32 species have previously been observed in the area[20]. The abundance and diversity of birds in Serranía Sadiri appear similar to the ridges of Serranía Pilón, where 332 species have been observed[17]. Serranía Pilón covers an elevational range of 400–1,200 m, and is 180 km south-southeast of Serranía Sadiri.

Serranía Sadiri is located within the Bolivian and Peruvian Lower Yungas EBA[6], with four species restricted to this EBA[6,19,36]. With large numbers of the globally Vulnerable *Ara militaris* regularly seen in the foothill zone, confirmed territories of the Vulnerable *Zimmerius cinereicapilla*, three globally Near Threatened species, four restricted-range species, as well as many biome-restricted species, Serranía Sadiri area fulfils three of four the criteria to be proposed as an Important Bird Area (IBA)[6,38]. Among conservation priority species, seven have their centre of abundance in lower tropical forest (<500 m), and ten in foothill-upper tropical forest (500–1,100 m)[28]. Eleven of the 22 species of high and medium conservation priority occur at relative higher abundance on Serranía Sadiri than globally (Table 2)[28].

Although habitat is apparently suitable, we did not record two species near-endemic to Bolivia, Bolivian Recurvebill *Simoxenops striatus* and Yungas Antwren *Myrmotherula grisea*. Overall, Serranía Sadiri covers just 400–500 m of the altitudinal ranges of these species (640–1,500 m for *Simoxenops striatus*; 600–1,400 m for *Myrmotherula grisea*), which might be too narrow to sustain viable populations[18]. *Simoxenops striatus* shows a preference for *Guadua* bamboo, so it is possible that Serranía Sadiri does not support sufficient bamboo to meet the species' requirements[18]. The closest known site to Serranía Sadiri for *Simoxenops striatus* and *Myrmotherula grisea* is Serranía Eslabón (B. M. Whitney & A. Perry pers. comm.).

Serranía Sadiri is mainly located in the Integrated Management Natural Areas (IMNA) of Madidi National Park, which is under a sustainable resource management regime by the local population[14]. However, there are several threats.

Table 2. Species of conservation concern recorded at Serranía Sadiri, dpto. La Paz, Bolivia, in November 2010–February 2011. High (H) and medium (M) conservation priority following Parker *et al.*[28]. Species marked ** = globally Vulnerable, * = globally Near Threatened. Conservation priority and research priority: High (H), Medium (M) and Low (L) following Parker *et al.*[28]. Centre of abundance: Lower tropical (LT), Upper tropical (UT), Foothill (FH). Relative abundance: rare (R), uncommon (U), fairly common (F), common (C); patchily distributed (P).

Species	Conservation priority	Research priority	Centre of abundance	Relative Abundance	Serranía Sadiri abundance
Tataupa Tinamou *Crypturellus tataupa*	H	M	LT	F	U
Rufous-vented Ground Cuckoo *Neomorphus geoffroyi***	M	M	LT	R	R
Silky-tailed Nightjar *Antrostomus sericocaudatus*	M	M	LT	R/P	F
White-chinned Swift *Cypseloides cryptus*	M	M	UT	U/P	U
White-chested Swift *Cypseloides lemosi*	H	H	UT	R/P	U
White-browed Hermit *Phaethornis stuarti*	M	M	UT	F/P	F
Rufous-crested Coquette *Lophornis delattrei*	M	M	UT	R/P	U
Pale-winged Trumpeter *Psophia leucoptera*	H	L	LT	U	U
Fasciated Tiger Heron *Tigrisoma fasciatum*	M	H	FH	U/P	R
Solitary Eagle *Buteogallus solitarius**	M	H	UT	R	F
Harpy Eagle *Harpia harpyja**	M	H	LT	R	R
Band-bellied Owl *Pulsatrix melanota*	M	M	FH	F	F
Subtropical Pygmy Owl *Glaucidium parkeri*	M	M	FH	U	U
Scarlet Macaw *Ara macao*	M	M	LT	F	R
Red-and-green Macaw *Ara chloropterus*	M	L	LT	F	C
Military Macaw *Ara militaris***	H	M	UT	U/P	F
Rough-legged Tyrannulet *Phyllomyias burmeisteri*	M	M	UT	U	U
Spectacled Bristle Tyrant *Phylloscartes orbitalis*	M	M	FH	F	F
Cinnamon-faced Tyrannulet *Phylloscartes parkeri*	H	H	FH	F	F
White-bellied Pygmy Tyrant *Myiornis albiventris*	M	M	UT	U	U
Red-billed Tyrannulet *Zimmerius cinereicapilla***	H	H	FH	R	U
Buff-throated Tody-Tyrant *Hemitriccus rufigularis**	M	M	FH	U/P	R
Scaled Fruiteater *Ampelioides tschudii*	M	M	UT	U	C
Bronze-green Euphonia *Euphonia mesochrysa*	M	L	UT	U	C

First, a major road from San Buena Ventura (14°26'S 68°31'W) to Tumupasa (14°08'S 67°53'W), over the ridge of Serranía Sadiri, to the community of San José de Uchupiamonas (14°12'S 68°03'W) enables future settlement in areas adjacent to the Serranía, and increased access to the reserve. The park is trying to counteract this by installing a guard station at the crest of Serranía Sadiri. However, during our survey, the station was largely unoccupied. Secondly, hunting within Serranía Sadiri appears regular, with gunshots heard during the survey. Hunting pressure in the lowlands, especially adjacent to San José de Uchupiamonas, seems high. Studies have shown that dispersal between source and sink habitats is evident and that unsustainable hunting pressure in adjacent areas may also affect Serranía Sadiri[15,25], possibly explaining our relatively few encounters with large gamebirds such as piping guans and curassows, which are common in more remote areas[2].

Madidi National Park is suffering a slow but increasing rate of deforestation[14]. The primary concern is unregulated land and resource management caused by rapid colonisation of border areas and increased access to the park[11,14,17]. These threats are especially severe in the Madidi Integrated Natural Management Area (IMNA), which represents 33% of the park. The most significant cause of deforestation is agriculture and infrastructure development along the Yucumo–Ixiamas road. This road was opened by a logging company to serve its mill in Alto Madidi and follows the park's north-east border. Consequently, increasing numbers of people have settled the roadsides in search of inexpensive land for agriculture and logging[14,22]. Slash-and-burn agriculture includes forest clearance, burning of debris, and cropping, and will probably increase in the future[22]. The increased edge effect disrupts biotic processes such as seed dispersal, whereas control of insect herbivores leads to reduced biodiversity and a less resilient ecosystem[9]. Increased accessibility to the park may also elevate the risk of pollution and serve as a corridor for invasive species, e.g. cogon grass *Imperata cylindrica*)[39].

Our study confirms that Serranía Sadiri harbours several species restricted to the outlying ridges of northern Bolivia and southern Peru. The combination of populations of several restricted-range, globally Near Threatened and threatened species, as well as high species diversity within a relatively small area, makes Serranía Sadiri a major conservation priority. The area also lies within Madidi National Park, which was designated to preserve one of the world's most important biodiversity hotspots. With the increasing development of areas adjacent to Serranía Sadiri, stronger protection is clearly required.

Acknowledgements

We thank Fundación Pueblo Nuevo for sponsoring the project; we are especially grateful to its director Ruth Alipaz for her support and logistic assistance to MB. Thanks are due to Sandro Valdez and Ricardo Cuqui for their companionship in the field and for sharing their extensive knowledge of the forest. The friendly people of Uchupiamonas permitted MB to stay in the region and shared their knowledge of the environs. We are also grateful to J. V. Remsen, P. A. Hosner and J. F. Freile for helpful comments on the submitted version of this paper.

References

1. Barnes, R., Butchart, S. H. M., Davies, C. W. N., Fernández, M. & Seddon N. (1997) New distributional information on eight bird species from northern Peru. *Bull. Brit. Orn. Club* 117: 69–74.
2. Bates J. M., Stotz, D. F. & Schulenberg T. S. (1998) Avifauna of Parque Nacional Noel Kempff Mercado. In: Killeen, T. J. & Schulenberg, T. S. (eds.) *A biological assessment of Parque Nacional Noel Kempff Mercado, Bolivia*. RAP Working Papers 10. Washington DC: Conservation International.
3. Beason, J. P., Gunn, C., Potter, K. M., Sparks, R. A. & Fox, J. W. (2012) The Northern Black Swift: migration path and wintering area revealed. *Wilson J. Orn.* 124: 1–8.
4. Bildstein, K. L. (2004) Raptor migration in the Neotropics: patterns, processes, and consequences. *Orn. Neotrop.* 15: 83–99.
5. Bird, J. P., Buchanan, G. M., Lees, A. C., Clay, R. P., Develey, P. F., Yépez, I. & Butchart, S. H. M. (2012) Integrating spatially explicit habitat projections into extinction risk assessments: a reassessment of Amazonian avifauna incorporating projected deforestation. *Divers. Distributions* 18: 273–281.
6. BirdLife International (2014) Endemic Bird Area factsheet: Bolivian and Peruvian Lower Yungas. http://www.birdlife.org/datazone/ebafactsheet.php?id=58 (accessed 21 December 2014).
7. BirdLife International (2014) IUCN Red List of threatened species. V. 2014.3. http://www.iucnredlist.org (accessed 21 December 2014).
8. BirdLife International (2019) Species factsheet: *Buteogallus solitarius*. http://www.birdlife.org (accessed 25 March 2019).
9. Bregman, T. P., Sekerçioğlu, C. H. & Tobias, J. A. (2014) Global patterns and predictors of bird species responses to forest fragmentation: implications for ecosystem function and conservation. *Biol. Conserv.* 169: 372–383.
10. Contreras-González, A. M., Rivera-Ortiz, F. A., Soberanes-González, C., Valiente-Banuet, A. & Arizmendi, M. C. (2009) Feeding ecology of Military Macaws (*Ara militaris*) in a semi-arid region of central Mexico. *Wilson J. Orn.* 121: 384–391.
11. Coppolillo, P., Gómez, H., Maisels, F. & Wallace, R. (2004) Selection criteria for suites of landscape species as a basis for site-based conservation. *Biol. Conserv.* 115: 419–430.
12. eBird (2019) eBird: an online database of bird distribution and abundance. Ithaca, NY: Cornell Lab of Ornithology. http://www.ebird.org (accessed 25 March 2019).
13. Fitzpatrick, J. W. & Stotz, D. F. (1997) A new species of tyrannulet (*Phylloscartes*) from the Andean foothills of Peru and Bolivia. In: Remsen, J. V. (ed.) *Studies in Neotropical ornithology honoring Ted Parker*. *Orn. Monogr.* 48.
14. Forrest, J. L., Sanderson, E. W., Wallace, R., Lazzo S., T. M., Gómez Cervero, L. H. & Coppolillo, P. (2008) Patterns of land cover change in and around Madidi National Park, Bolivia. *Biotropica* 40: 285–294.
15. Gavin, M. C. (2007) Foraging in the fallows: hunting patterns across a successional continuum in the Peruvian Amazon. *Biol. Conserv.* 134: 64–72.
16. Haack, B. & English, R. (1996) National land cover mapping by remote sensing. *World Develop.* 24: 845–855.
17. Hennessey, A. B., Herzog, S. A., Kessler, M. & Robson, D. (2003) Avifauna of the Pilon Lajas Biosphere Reserve and communal lands, Bolivia. *Bird Conserv. Intern.* 13: 319–349.
18. Herzog, S. K., Hennessey, A. B., Kessler, M. & García-Solíz, V. H. (2008) Distribution, natural history and conservation status of two endemics of the Bolivian Yungas, Bolivian Recurvebill *Simoxenops striatus* and Yungas Antwren *Myrmotherula grisea*. *Bird Conserv. Intern.* 18: 331–348.
19. Herzog, S. K., Terrill, R. S., Jahn, A. E., Remsen, J. V., Maillard, Z., O., García-Solíz, V. H., MacLeod, R., Maccormick, A. & Vidoz, J. Q. (2016) *Birds of Bolivia: field guide*. Santa Cruz de la Sierra: Asociación Armonía.
20. Hosner, P. A., Behrens, K. D. & Hennessey, A. B. (2009) Birds (Aves), Serranía Sadiri, Parque Nacional Madidi, Depto. La Paz, Bolivia. *Check List* 5: 222–237.
21. Laurance, W. F., Albernaz, A. K. M., Schroth, G., Fearnside, P. M., Bergen, S. E., Venticinque, M. & Da Costa, C. (2002) Predictors of deforestation in the Brazilian Amazon. *J. Biogeogr.* 29: 737–748.

22. Locklin, C. C. & Haack, B. (2003) Roadside measurements of deforestation in the Amazon area of Bolivia. *Environ. Manag.* 31: 774–783.
23. Mittermeier, R. A, Myers, N., Thomsen, J. B., da Fonseca, G. A. B. & Olivieri, S. (1998) Biodiversity hotspots and major tropical wilderness areas: approaches to setting conservation priorities. *Conserv. Biol.* 12: 516–520.
24. Myers, N., Mittermeier, R. A., Mittermeier, C. G., da Fonseca, G. A. B. & Kent, J. (2000) Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858.
25. Novaro, A. J., Redford, K. H. & Bodmer, E. R. (2000) Effect of hunting in source-sink systems in the Neotropics. *Conserv. Biol.* 14: 713–721.
26. Olivo, C. (2005) Cold fronts and raptor migration in Bolivia. *Orn. Neotrop.* 16: 109–115.
27. Pauly, D. (1995) Anecdotes and the shifting base-line syndrome of fisheries. *Trends Ecol. & Evol.* 10: 430–430.
28. Parker, T. A., Stotz, D. F. & Fitzpatrick, J. W. (1996) Ecological and distributional databases. In: Stotz, D. F., Fitzpatrick, J. W., Parker, T. A. & Moskovits, D. K. (eds.) *Neotropical birds: ecology and conservation*. Chicago: University of Chicago Press.
29. Perry, A., Kessler, M. & Helme, N. (1997) Birds of the central Río Tuichi valley, with emphasis on dry forest, Parque Nacional Madidi, Depto. La Paz, Bolivia. In: Remsen, J. V. (ed.) *Studies in Neotropical ornithology honoring Ted Parker*. *Orn. Monogr.* 48.
30. Remsen, J. V. & Parker, T. A. (1995) Bolivia has the opportunity to create the planet's richest park for terrestrial biota. *Bird Conserv. Intern.* 5: 181–199.
31. Remsen, J. V., Areta, J. I., Cadena, C. D., Jaramillo, A., Nores, M., Pacheco, J. F., Robbins, M. B., Schulenberg, T. S., Stiles, F. G., Stotz, D. F. & Zimmer, K. J. (2018) A classification of the bird species of South America. http://www.museum.lsu.edu/~Remsen/SACCBaseline.htm (accessed 31 March 2018).
32. Richards, L. A. & Windsor, D. M. (2007) Seasonal variation of arthropod abundance in gaps and the understory of a lowland moist forest in Panama. *J. Trop. Ecol.* 23: 169–176.
33. Robbins, M. B. & Howell, S. N. G. (1995) A new species of pygmy-owl (Strigidae, *Glaucidium*) from the eastern Andes. *Wilson Bull.* 107: 1–6.
34. Roesler, I., Kirwan, G. M., Agostini, M. G., Beadle, D., Shirihai, H. & Binford, L. C. (2009) First sight records of White-chested Swift *Cypseloides lemosi* in Bolivia, with documented records of *C. lemosi* and White-chinned Swift *C. cryptus* in Peru. *Bull. Brit. Orn. Club* 129: 222–228.
35. Rosenberg, K. V., Lowe, J. D. & Dhondt, A. A. (1999) Effects of forest fragmentation on breeding tanagers: a continental perspective. *Conserv. Biol.* 13: 568–583.
36. Schulenberg, T. S., Stotz, D. F., Lane, D. F., O'Neill, J. P. & Parker, T. A. (2007) *Birds of Peru*. London, UK: Christopher Helm.
37. Spector, S. (2002) Biogeographic crossroads as priority areas for biodiversity conservation. *Conserv. Biol.* 16: 1480–1487.
38. Stattersfield, A. J., Crosby, M. J., Long, A. J. & Wege, D. C. (1998) *Endemic Bird Areas of the world: priorities for biodiversity conservation*. Cambridge, UK: BirdLife International (Conserv. Ser. 7).
39. Veldman, J. W. & Putz, F. E. (2011) Grass-dominated vegetation, not species-diverse natural savanna, replaces degraded tropical forests on the southern edge of the Amazon basin. *Biol. Conserv.* 144: 1419–1429.

Martin Berg
Dept. of Biology, Lund University, Sölvegatan 37, 223 62 Lund, Sweden. E-mail: martin.berg20@gmail.com.

A. Bennett Hennessey
Asociación Civil Armonía, Av. Lomas de Arena, Casilla 3566, Santa Cruz de la Sierra, Bolivia.

Appendix. Bird species recorded at Serranía Sadiri, Madidi National Park, dpto. La Paz, Bolivia, 22 November 2010–22 February 2011. Species sequence and scientific nomenclature follow Remsen *et al.*[31].

Abundance

C = common, several individuals encountered daily in appropriate habitat.
F = fairly common, encountered almost daily in small numbers.
U = uncommon, encountered infrequently.
R = rare, only one or a few records.

Elevation (m)

L = lowlands below 450 m

Seasonality

AM = austral migrant
BM = boreal migrant

Evidence

L = local information
S = sight
V = voice

Sites

E = dry east slope
F = foothill zone
L = lowland
T = village of Tumupasa
B = bamboo

Scientific name	English name	Abundance	Sites	Elevation	Seasonality	Evidence
TINAMIDAE						
Tinamus tao	Grey Tinamou	C	F	700–1,100		S, V
Tinamus major	Great Tinamou	C–R	L, F	L–1,100		V
Crypturellus soui	Little Tinamou	C	F	700–1,200		S, V

Scientific name	English name	Abundance	Sites	Elevation	Seasonality	Evidence
Crypturellus obsoletus	Brown Tinamou	C	F	600–1,200		S, V
Crypturellus undulatus	Undulated Tinamou	U	L	400		V
Crypturellus tataupa	Tataupa Tinamou	R	E, F	L–1,100		V
CRACIDAE						
Penelope jacquacu	Spix's Guan	U	L, F	400–1,100		S, V
Pipile cumanensis	Blue-throated Piping Guan	R	L F	400–1,100		S, V
Mitu tuberosum	Razor-billed Curassow	R	L, F	400–1,100		S, V
ODONTOPHORIDAE						
Odontophorus stellatus	Starred Wood Quail	F	F	800–1,100		S, V
COLUMBIDAE						
Patagioenas speciosa	Scaled Pigeon	C	L, F	400–1,100		S, V
Patagioenas plumbea	Plumbeous Pigeon	C	F, L	400–1,100		S, V
Patagioenas subvinacea	Ruddy Pigeon	C	F	700–900		S, V
Geotrygon violacea	Violaceous Quail-Dove	U	F	900–1,100		S
Leptotila rufaxilla	Grey-fronted Dove	C	L, F	L–1,100		S, V
CUCULIDAE						
Dromococcyx phasianellus	Pheasant Cuckoo	R	L	L		V
Neomorphus geoffroyi	Rufous-vented Ground Cuckoo	R	F	1,100		S
Piaya cayana	Squirrel Cuckoo	C	L, F	L–1,100		S, V
NYCTIBIIDAE						
Nyctibius aethereus	Long-tailed Potoo	R	F	700–900		S, V
Nyctibius griseus	Common Potoo	U	L	L		V
CAPRIMULGIDAE						
Chordeiles minor	Common Nighthawk	R	L	L	BM	S
Lurocalis semitorquatus	Short-tailed Nighthawk	U	F	950		S, V
Nyctipolus nigrescens	Blackish Nightjar	U	F	700–900		S
Antrostomus sericocaudatus	Silky-tailed Nightjar	F	L	L		S, V
APODIDAE						
Cypseloides lemosi	White-chested Swift	R	F	900		S
Cypseloides cryptus	White-chinned Swift	R	F	900		S
Streptoprocne zonaris	White-collared Swift	C	L, F	L–1,200		S
Chaetura cinereiventris	Grey-rumped Swift	F	L, F	L–1,200		S
Chaetura egregia	Pale-rumped Swift	F	L, F	L–1,200		S
Chaetura brachyura	Short-tailed Swift	F	L, F	L–1,200		S
Aeronautes montivagus	White-tipped Swift	C	L, F	L–1,200		S
Panyptila cayennensis	Lesser Swallow-tailed Swift	U	L	L		S
TROCHILIDAE						
Florisuga mellivora	White-necked Jacobin	U	F, L	L–1,000		S
Threnetes leucurus	Pale-tailed Barbthroat	R	L	L		S
Phaethornis ruber	Reddish Hermit	F	F, L	L–900		S
Phaethornis stuarti	White-browed Hermit	F	F	600–950		S, V
Phaethornis hispidus	White-bearded Hermit	R	L	L		S
Heliothryx auritus	Black-eared Fairy	F	F, L	L–1,100		S
Lophornis chalybeus	Festive Coquette	U	L	L		S
Lophornis delattrei	Rufous-crested Coquette	R	F	600–900		S
Klais guimeti	Violet-headed Hummingbird	R	F	600–1,100		S
Calliphlox amethystina	Amethyst Woodstar	U	F	600–1,000		S
Chaetocercus mulsant	White-bellied Woodstar	R		500–1,000		S
Campylopterus largipennis	Grey-breasted Sabrewing	F	F, L	L–1,000		S, V
Thalurania furcata	Fork-tailed Woodnymph	F	F	600–1,100		S, V
Chlorostilbon mellisugus	Blue-tailed Emerald	C	F, L	L–1,150		S, V

Scientific name	English name	Abundance	Sites	Elevation	Seasonality	Evidence
Chrysuronia oenone	Golden-tailed Sapphire	F	F, L	L–1,000		S
OPISTHOCOMIDAE						
Opisthocomus hoazin	Hoatzin	R	L	L		S, V
PSOPHIIDAE						
Psophia leucoptera	Pale-winged Trumpeter	U	L	400		L
SCOLOPACIDAE						
Actitis macularius	Spotted Sandpiper	C	L, F	400–900	BM	S
Tringa solitaria	Solitary Sandpiper	R	L	400	BM	S
EURYPYGIDAE						
Eurypyga helias	Sunbittern	F	L	400		S
ARDEIDAE						
Ardea cocoi	Cocoi Heron	U	L	400		S
Tigrisoma fasciatum	Fasciated Tiger Heron	R	F	700		S
CATHARTIDAE						
Sarcoramphus papa	King Vulture	U	L, F	400–1,200		S
Coragyps atratus	Black Vulture	C	F, L	400–1,200		S
Cathartes aura	Turkey Vulture	C	F, L	400–1,200		S
Cathartes melambrotus	Greater Yellow-headed Vulture	F	L, F	400–1,200		S
ACCIPITRIDAE						
Elanoides forficatus	Swallow-tailed Kite	C–U	L, F	400–1,200	BM	S
Ictinia plumbea	Plumbeous Kite	C–U	L, F	400–1,200		S
Harpagus bidentatus	Double-toothed Kite	C	L, F	400–1,200		S
Accipiter striatus	Sharp-shinned Hawk	R	F	900		S, V
Pseudastur albicollis	White Hawk	C	F	700–1,200		S, V
Buteo platypterus	Broad-winged Hawk	F-U	L, F	400–1,200	BM	S
Buteo brachyurus	Short-tailed Hawk	R	T	400		S
Spizaetus ornatus	Ornate Hawk-Eagle	R	F	1,100		S
Spizaetus tyrannus	Black Hawk-Eagle	R	F	1,200		S
Buteogallus solitarius	Solitary Eagle	F	F	800–1,200		S
Harpia harpyja	Harpy Eagle	R	L	400		L
Buteogallus urubitinga	Great Black Hawk	U	L, F	400–1,100		S
STRIGIDAE						
Megascops guatemalae	Vermiculated Screech Owl	C	F	700–1,200		V
Lophostrix cristata	Crested Owl	F	F	600–1,100		V
Ciccaba huhula	Black-banded Owl	F	F	600–1,100		V
Pulsatrix melanota	Band-bellied Owl	C	F	600–1,100		V
Glaucidium parkeri	Subtropical Pygmy Owl	U	F	800–1,200		V
Glaucidium hardyi	Amazonian Pygmy Owl	F	L, F	L–1,100		V
TROGONIDAE						
Trogon melanurus	Black-tailed Trogon	C	F, L	L–1,100		S, V
Trogon viridis	Green-backed Trogon	R	L	L		S, V
Trogon curucui	Blue-crowned Trogon	F	F, L	L–1,100		S, V
Trogon collaris	Collared Trogon	C	F, L	L–1,100		S, V
MOMOTIDAE						
Electron platyrhynchum	Broad-billed Motmot	F	L	L		S, V
Baryphthengus martii	Rufous Motmot	F	F	700–1,000		S, V
Momotus momota	Amazonian Motmot	C	F, L	L–700		S, V
ALCEDINIDAE						
Megaceryle torquata	Ringed Kingfisher	F	L	L		S
Chloroceryle amazona	Amazon Kingfisher	F	L	L		S
Chloroceryle aenea	American Pygmy Kingfisher	R	L	L		S

Scientific name	English name	Abundance	Sites	Elevation	Seasonality	Evidence
Chloroceryle americana	Green Kingfisher	U	L	L		S
BUCCONIDAE						
Nystalus obamai	Western Striolated Puffbird	U	F, L	L–1,000		S
Malacoptila fulvogularis	Black-streaked Puffbird	U	F	950–1,000		V
Monasa morphoeus	White-fronted Nunbird	F	L	L		S
Chelidoptera tenebrosa	Swallow-winged Puffbird	U	L	L		S
CAPITONIDAE						
Capito auratus	Gilded Barbet	C	F, L	L–1,100		S, V
Eubucco richardsoni	Lemon-throated Barbet	F	F, L	L–1,100		S, V
RAMPHASTIDAE						
Ramphastos tucanus	White-throated Toucan	F	F, L	L–1,100		S, V
Ramphastos vitellinus	Channel-billed Toucan	U	F, L	L–1,100		S, V
Aulacorhynchus prasinus	Emerald Toucanet	F	F	600–1,100		S, V
Selenidera reinwardtii	Golden-collared Toucanet	U	F, L	L–1,200		S, V
Pteroglossus inscriptus	Lettered Araçari	R	L	L		S
Pteroglossus beauharnaesii	Curl-crested Araçari	U	E, F, L	L–1,000		S
PICIDAE						
Picumnus aurifrons	Bar-breasted Piculet	F	F	600–1,000		S
Melanerpes cruentatus	Yellow-tufted Woodpecker	F	L	L		S
Veniliornis passerinus	Little Woodpecker	R	F	1,000		S
Veniliornis affinis	Red-stained Woodpecker	U	F	600–1,100		S
Campephilus rubricollis	Red-necked Woodpecker	F	F, L	L–1,100		S
Piculus leucolaemus	White-throated Woodpecker	F	F, L	L–1,100		S
FALCONIDAE						
Micrastur ruficollis	Barred Forest Falcon	C	L, F	400–800		S, V
Micrastur semitorquatus	Collared Forest Falcon	F	L, F	400–1,100		S, V
Falco rufigularis	Bat Falcon	R	L	400		S
Falco peregrinus	Peregrine Falcon	R	F	1,200		S
PSITTACIDAE						
Pionus menstruus	Blue-headed Parrot	C	L	L		S, V
Amazona farinosa	Mealy Parrot	F	L, F	L–900		S, V
Pyrrhura roseifrons	Rose-fronted Parakeet	F-C	F	700–1,100		S, V
Ara chloropterus	Red-and-green Macaw	C	L, F	L–1,200		S, V
Ara militaris	Military Macaw	F	F	700–1,200		S, V
Ara macao	Scarlet Macaw	R	L	500		S, V
Pionites leucogaster	White-bellied Parrot	F	L	L		S, V
Psittacara leucophthalmus	White-eyed Parakeet	U	L, F	400–1,200		S, V
THAMNOPHILIDAE						
Cymbilaimus lineatus	Fasciated Antshrike	U	F, L	L–1,100		S, V
Thamnophilus schistaceus	Plain-winged Antshrike	R	L	L		S
Thamnomanes ardesiacus	Dusky-throated Antshrike	R	L	L		S, V
Myrmotherula axillaris	White-flanked Antwren	F	L	L		S, V
Herpsilochmus rufimarginatus	Rufous-winged Antwren	F	F	700–1,200		S, V
Epinecrophylla ornata	Ornate Antwren	R	L	L		S, V
Dysithamnus mentalis	Plain Antvireo	C	L	L		S, V
Cercomacra cinerascens	Grey Antbird	R	L	L		S, V
Dichrozona cincta	Banded Antbird	R	L	L		S, V
Myrmoborus myotherinus	Black-faced Antbird	F	F, L	L–1,200		S, V
Pyriglena leuconota	White-backed Fire-eye	U	F	700–1,100		S, V
Myrmelastes brunneiceps	Brownish-headed Antbird	F	F	500–900		S, V
Sciaphylax hemimelaena	Chestnut-tailed Antbird	C	F, L	L–1,100		S, V

Scientific name	English name	Abundance	Sites	Elevation	Seasonality	Evidence
Rhegmatorhina melanosticta	Hairy-crested Antbird	U	L, F	L–800		S
Drymophila devillei	Striated Antbird	R	B	1,000		S, V
Gymnopithys salvini	White-throated Antbird	R	F	900		S, V
Willisornis poecilinotus	Common Scale-backed Antbird	U	F, L	L–900		S, V
Hylophylax punctulatus	Dot-backed Antbird	R	L	L		S
GRALLARIIDAE						
Hylopezus berlepschi	Amazonian Antpitta	U	L	L		V
FORMICARIIDAE						
Formicarius colma	Rufous-capped Antthrush	U	L	L		S, V
Formicarius analis	Black-faced Antthrush	C	L, F	L–1,100		S, V
FURNARIIDAE						
Sclerurus mexicanus	Tawny-throated Leaftosser	U	F	600–900		S, V
Sclerurus caudacutus	Black-tailed Leaftosser	F	L	L		S, V
Sclerurus albigularis	Grey-throated Leaftosser	F	F	600–900		S, V
Sittasomus griseicapillus	Olivaceous Woodcreeper	U	F, L	500–950		S, V
Deconychura longicauda	Long-tailed Woodcreeper	F	F	700–950		S, V
Xiphocolaptes promeropirhynchus	Strong-billed Woodcreeper	F	F, L	L–950		S, V
Xiphorhynchus ocellatus	Ocellated Woodcreeper	R	F	950		S, V
Xiphorhynchus elegans	Elegant Woodcreeper	C	F, L	L–1,200		S, V
Xiphorhynchus guttatus	Buff-throated Woodcreeper	F	L	L		S, V
Lepidocolaptes fuscicapillus	Rondônia Woodcreeper	F	F, L	500–1,000		S, V
Xenops minutus	Plain Xenops	C	F	600–1,100		S
Philydor erythrocercum	Rufous-rumped Foliage-gleaner	U	F	700–1,100		S
Philydor erythropterum	Chestnut-winged Foliage-gleaner	F	F	800–1,150		S
Philydor ruficaudatum	Rufous-tailed Foliage-gleaner	U	F	700–1,200		S
Anabacerthia striaticollis	Montane Foliage-gleaner	U	F	900–1,100		S
Ancistrops strigilatus	Chestnut-winged Hookbill	U	L, F	L–800		S
Automolus ochrolaemus	Buff-throated Foliage-gleaner	C	L	L		S, V
Automolus subulatus	Striped Woodhaunter	F	L	L		S
TYRANNIDAE						
Phyllomyias burmeisteri	Rough-legged Tyrannulet	U	F	600–1,000		S, V
Myiopagis gaimardii	Forest Elaenia	U	F, L	L–950		S, V
Myiopagis caniceps	Grey Elaenia	U	F, L	L–950		S, V
Tyrannulus elatus	Yellow-crowned Tyrannulet	R	F, L	L–950		S
Ornithion inerme	White-lored Tyrannulet	U	F, L	L–950		S, V
Mecocerculus hellmayri	Buff-banded Tyrannulet	U	F	700–950		S, V
Zimmerius cinereicapilla	Red-billed Tyrannulet	U	F	600–950		S, V
Zimmerius gracilipes	Slender-footed Tyrannulet	F	F, L	L–900		S, V
Phylloscartes orbitalis	Spectacled Bristle Tyrant	F	F	600–1,200		S, V
Phylloscartes parkeri	Cinnamon-faced Tyrannulet	F	F	500–800		S, V
Mionectes oleagineus	Ochre-bellied Flycatcher	C	F, L	L–950		S, V
Leptopogon amaurocephalus	Sepia-capped Flycatcher	F	F, L	L–700		S, V
Leptopogon superciliaris	Slaty-capped Flycatcher	U	F	500–700		S, V
Myiornis albiventris	White-bellied Pygmy Tyrant	U	F	700–1,200		S, V
Myiornis ecaudatus	Short-tailed Pygmy Tyrant	F	F, L	L–700		S, V
Hemitriccus rufigularis	Buff-throated Tody-Tyrant	R	F	950		S, V
Hemitriccus griseipectus	White-bellied Tody-Tyrant	F	F, L	L–1,200		S, V
Todirostrum chrysocrotaphum	Golden-browed Tody-Flycatcher	U	F	500–1,100		S, V
Ochthornis littoralis	Drab Water Tyrant	U	L	L		S
Tolmomyias assimilis	Yellow-margined Flycatcher	U	F, L	L–1,100		S
Tolmomyias poliocephalus	Grey-crowned Flycatcher	R	L	L		S, V

Scientific name	English name	Abundance	Sites	Elevation	Seasonality	Evidence
Tolmomyias flaviventris	Yellow-breasted Flycatcher	F	F, L	L		S, V
Platyrinchus coronatus	Golden-crowned Spadebill	U	L	L		S
Terenotriccus erythrurus	Ruddy-tailed Flycatcher	U	F, L	L–700		S
Onychorhynchus coronatus	Royal Flycatcher	U	F, L	L–1,000		S
Lathrotriccus euleri	Euler's Flycatcher	C	F	600–950		S, V
Contopus cooperi	Olive-sided Flycatcher	U	F	700	BM	S
Contopus sordidulus	Western Wood Pewee	R	F	700	BM	S, V
Contopus virescens	Eastern Wood Pewee	F	F, L	L–1,200	BM	S, V
Sayornis nigricans	Black Phoebe	U	L	L		S
Myiozetetes similis	Social Flycatcher	R	L	L		S
Myiozetetes luteiventris	Dusky-chested Flycatcher	F	L	L		S
Myiozetetes cayanensis	Rusty-margined Flycatcher	U	F	500–1,200		S
Myiodynastes maculatus	Streaked Flycatcher	R	F	700		S
Myiodynastes luteiventris	Sulphur-bellied Flycatcher	C	F, L	L–1,200	BM	S
Megarynchus pitangua	Boat-billed Flycatcher	F	L	L		S
Tyrannus tyrannus	Eastern Kingbird	U	L	L		S
Rhytipterna simplex	Greyish Mourner	U	L	L		S, V
Attila spadiceus	Bright-rumped Attila	U	L	L		S, V
OXYRUNCIDAE						
Oxyruncus cristatus	Sharpbill	F	F	700–1,100		S, V
COTINGIDAE						
Ampelioides tschudii	Scaled Fruiteater	C	F	800–1,100		S, V
Querula purpurata	Purple-throated Fruitcrow	F	F, L	L–800		S, V
Lipaugus vociferans	Screaming Piha	C	F, L	L–1,200		S, V
PIPRIDAE						
Lepidothrix coronata	Blue-crowned Manakin	U	F	700–1,100		S, V
Machaeropterus pyrocephalus	Fiery-capped Manakin	U	F	L		S, V
Ceratopipra chloromeros	Round-tailed Manakin	C	F, L	L–1,100		S, V
TITYRIDAE						
Tityra semifasciata	Masked Tityra	U	F, L	L–1,000		S, V
Laniocera hypopyrra	Cinereous Mourner	U	F, L	L–800		S, V
Pachyramphus minor	Pink-throated Becard	U	F, L	L–1,200		S, V
Schiffornis turdina	Brown-winged Schiffornis	F	F, L	L–1,200		S, V
INCERTAE SEDIS						
Piprites chloris	Wing-barred Piprites	F	F, L	L–1,000		S, V
VIREONIDAE						
Vireolanius leucotis	Slaty-capped Shrike-Vireo	C	F, L	L–1,200		S, V
Pachysylvia hypoxantha	Dusky-capped Greenlet	C	F, L	L–1,100		S
Tunchiornis ochraceiceps	Tawny-crowned Greenlet	C	F	800–1,100		S
Vireo olivaceus	Red-eyed Vireo	C	F, L	L–1,200	BM	S
Vireo flavoviridis	Yellow-green Vireo	F	F	700–1,000		S
CORVIDAE						
Cyanocorax violaceus	Violaceus Jay	F	L	L		S
TROGLODYTIDAE						
Cyphorhinus arada	Musician Wren	F	L	L		V
Pheugopedius genibarbis	Moustached Wren	F	F, L	L–1,100		S, V
POLIOPTILIDAE						
Microbates cinereiventris	Half-collared Gnatwren	R	F	950		S, V
Ramphocaenus melanurus	Long-billed Gnatwren	R	L	L		S
TURDIDAE						
Catharus ustulatus	Swainson's Thrush	C	F, L	L–1,200	BM	S
Turdus hauxwelli	Hauxwell's Thrush	C	L	L		S

Scientific name	English name	Abundance	Sites	Elevation	Seasonality	Evidence
Turdus lawrencii	Lawrence's Thrush	U	L	L		S
Turdus ignobilis	Black-billed Thrush	F	L	L		S
ICTERIDAE						
Cacicus cela	Yellow-rumped Cacique	F	L	L		S
Psarocolius decumanus	Crested Oropendola	U	L	L		S
Icterus cayanensis	Epaulet Oriole	C	F, L	L–1,000		S
FRINGILLIDAE						
Euphonia laniirostris	Thick-billed Euphonia	R	F	950		S
Euphonia mesochrysa	Bronze-green Euphonia	F	F	600–950		S
Euphonia xanthogaster	Orange-bellied Euphonia	U	F	800–1,100		S
Euphonia minuta	White-vented Euphonia	U	F, L	L–1,000		S
Euphonia rufiventris	Rufous-bellied Euphonia	F	F, L	L–1,200		S
PARULIDAE						
Setophaga pitiayumi	Tropical Parula	F	F	700–950		S
Myiothlypis bivittata	Two-banded Warbler	C	F	600 –950		S
Myiothlypis chrysogaster	Golden-bellied Warbler	U	F	600–900		S
Myiothlypis fulvicauda	Buff-rumped Warbler	F	F, L	L–850		S
Myioborus miniatus	Slate-throated Redstart	U	F	700–1,100		S
CARDINALIDAE						
Piranga flava	Hepatic Tanager	U	F	600–950		S
Piranga rubra	Summer Tanager	F	F	600–1,200	BM	S
Piranga olivacea	Scarlet Tanager	F	F	600–1,200	BM	S
Habia rubica	Red-crowned Ant Tanager	F	F, L	L–1,200		S, V
Cyanoloxia brissonii	Ultramarine Grosbeak	F	F	500–950		S
THRAUPIDAE						
Parkerthraustes humeralis	Yellow-shouldered Grosbeak	F	F	500–950		S
Hemithraupis guira	Guira Tanager	F	F, L	L–1,000		S
Hemithraupis flavicollis	Yellow-backed Tanager	F	F, L	L–1,000		S
Dacnis lineata	Black-faced Dacnis	F	F, L	L–1,000		S
Dacnis flaviventer	Yellow-bellied Dacnis	R	L	L		S
Dacnis cayana	Blue Dacnis	F	F, L	L–1,000		S
Tersina viridis	Swallow Tanager	R	F	700		S
Cyanerpes caeruleus	Purple Honeycreeper	U	F, L	L–1,000		S
Chlorophanes spiza	Green Honeycreeper	U	F, L	L–1,100		S
Saltator maximus	Buff-throated Saltator	F	F, L	L–1,000		S
Sporophila caerulescens	Double-collared Seedeater	R	T	L	AM	S
Volatinia jacarina	Blue-black Grassquit	C	T	L		S
Ramphocelus carbo	Silver-beaked Tanager	C	L	L		S
Stilpnia nigrocincta	Masked Tanager	F	F, L	L–1,000		S
Tangara chilensis	Paradise Tanager	C	F, L	L–1,000		S
Tangara schrankii	Green-and-gold Tanager	C	F, L	L–950		S
Tangara gyrola	Bay-headed Tanager	C	F, L	L–1,200		S
Tangara mexicana	Turquoise Tanager	C	F, L	L–1,000		S
Tangara velia	Opal-rumped Tanager	U	L	L		S
Thraupis palmarum	Palm Tanager	R	F, L	L–950		S
Ixothraupis xanthogastra	Yellow-bellied Tanager	U	F, L	L–950		S
Chlorothraupis carmioli	Carmiol's Tanager	C	F	500–1,000		S, V
Tachyphonus rufiventer	Yellow-crowned Tanager	U	F	600–1,100		S
Lamprospiza melanoleuca	Red-billed Pied Tanager	R	L	L		S