

Primer relevamiento ornitológico en la Cordillera Mosestenes, con una comparación latitudinal de comunidades de aves en los Yungas bajos de Bolivia

First ornithological survey of Cordillera Mosestenes, with a latitudinal comparison among lower Yungas bird communities in Bolivia

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RESUMEN

La Cordillera Mosestenes en los Yungas bajos del departamento de Cochabamba se caracteriza por ser uno de los mayores vacíos de conocimiento ornitológico en los Andes bolivianos. El presente trabajo informa sobre la primera expedición ornitológica a esta cordillera y presenta datos sobre la diversidad, composición y importancia para la conservación de la comunidad de aves terrestres en los alrededores de la Laguna Carachupa (1180-1600 m.s.n.m.) en la parte central de la Cordillera Mosestenes. Los datos fueron obtenidos en agosto y septiembre de 2003 con un método de muestreo estandarizado semi-cuantitativo. Los resultados son comparados con aquellos de dos otras localidades yungeñas a altitudes muy similares que fueron muestreadas con el mismo método y durante la misma época (mediados a finales de la época seca). Registré un total de 183 especies de aves terrestres en la Laguna Carachupa, incluyendo nueve especies de rango restringido, cuatro de las cuales son casi endémicas de Bolivia, una especie 'vulnerable', dos 'casi amenazadas' y 24 especies indicadoras para Bosque Siempre Verde Montano Tropical Superior (BSMTS). Las dos especies 'casi amenazadas' fueron consideradas como 'vulnerable' hasta muy recientemente. Datos obtenidos en el presente estudio contribuyeron al cambio en su categoría de amenaza, y la Cordillera Mosestenes aparentemente es el sitio de mayor concentración de sus publicaciones, lo que subraya su importancia para la conservación. La riqueza total estimada de especies para la Laguna Carachupa (aproximadamente 200 especies) fue muy similar a la de Cerro Asunta Pata en el departamento de La Paz, y fue considerablemente mayor que en la Serranía de Callejas al oeste del Parque Nacional Carrasco (aproximadamente 145 especies). Estas diferencias probablemente son relacionadas con variaciones en las características del hábitat y niveles de precipitación. La similitud en la composición de las comunidades fue mayor entre Laguna Carachupa y Serranía de Callejas (69 %), y menor entre esta última y Cerro Asunta Pata (52 %). El porcentaje de especies exclusivamente andinas y especies indicadoras para BSMTS mostró un incremento latitudinal pronunciado desde Cerro Asunta Pata hacia la Serranía de Callejas al sur. Tal grado de recambio geográfico de especies sugiere que la conservación de la diversidad de aves yungeñas requiere de varias áreas protegidas interconectadas a lo largo de la vertiente oriental de los Andes.

Palabras Clave: composición de comunidades de aves, especies indicadoras del hábitat, método de las listas de 10 especies, Yungas, Bolivia

ABSTRACT

Cordillera Mosestenes in the lower Yungas of depto. Cochabamba represents one of the largest ornithological knowledge gaps in the Bolivian Andes. Here I report on the first ornithological expedition to this mountain range and present data on the diversity, composition, and conservation importance of the forest bird community at Laguna Carachupa (1180-1600 m altitude) on central Cordillera Mosestenes obtained in August-September 2003 using a standardized, semi-quantitative survey method. Results are compared to those from two other Yungas localities at very similar altitudes surveyed with the same method and in the same season (mid to late dry season). I recorded a total of 183 terrestrial species at Laguna Carachupa, including nine restricted-range species, four of which are Bolivian near endemics, one 'vulnerable', two 'near threatened', and 24 habitat indicator species for Upper Tropical Montane Evergreen Forest (UTMEF). Both 'near threatened' species were considered 'vulnerable' until recently. Data obtained during this study contributed to the status change, and Cordillera Mosestenes appears to be their stronghold, underlining its conservation importance. Estimated total species richness at Laguna Carachupa (about 200 species) was very similar to that of Cerro Asunta Pata in depto. La Paz and considerably greater than on Serranía de Callejas in western Parque Nacional Carrasco (about 145 species). These differences appear to be related to variations in habitat characteristics and precipitation levels. Similarity in community composition was greatest between Laguna Carachupa and Serranía de Callejas (69 %) and lowest between the latter and Cerro Asunta Pata (52 %). The proportion of exclusively Andean species and indicator species for UTMEF showed a pronounced latitudinal increase from Cerro Asunta Pata southward to Serranía de Callejas. This high degree of geographic species turnover suggests that the conservation of Bolivian Yungas bird diversity requires several interconnected protected areas along the east Andean slope.

Key Words: bird community composition, habitat indicator species, 10-species-list method, Yungas, Bolivia

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INTRODUCTION

Our knowledge about the distribution of Bolivian birds has improved considerably over the past 10-15 years, especially with respect to montane forests on the east Andean slope in the Yungas ecoregion (Hennessey *et al.*, 2003b; Herzog *et al.*, 2008). Much recent field research has been carried out in or adjacent to protected areas (e.g., Perry *et al.*, 1997; Hennessey & Gomez, 2003; Hennessey *et al.*, 2003a; Herzog *et al.*, 2005) and to a lesser degree in biogeographically interesting but unprotected localities (e.g., Herzog *et al.*, 1999; Herzog & Kessler, 2002; MacLeod *et al.*, 2005). Nonetheless, considerable gaps remain in the distribution of bird inventory sites across the Bolivian Yungas, hampering biodiversity research and informed conservation planning.

By far the most significant of these gaps is Cordillera Mosetenes in depto. Cochabamba due to its remoteness and complex topography, resulting in exceedingly difficult access to this outlying Andean ridge. The only ornithological data from the region were obtained in 2001 by MacLeod *et al.* (2005) at the Río Altamachi at the southwest base of Cordillera Mosetenes, and in 2004 by S.K.H. (unpubl. data) and R. Soria-Auza at the northwest tip. However, nothing is known about the bird communities on the slopes of Cordillera Mosetenes itself, which comprises no less than about 3,000 km² of ornithologically uncharted terrain.

The aim of my field work on Cordillera Mosetenes was an extensive rapid assessment of the diversity, composition, and conservation importance of the bird community using a standardized, semi-quantitative survey method (Herzog *et al.*, 2002). I used the same method at over 50 study sites throughout the east slope of the Bolivian Andes, allowing for unique comparisons.

In this paper, I present a description of the bird community at a site on central Cordillera Mosetenes and compare it with two other Yungas localities at very similar or identical altitudes, which lend themselves especially well to a direct comparison with Cordillera Mosetenes: (1) Serranía de Callejas south of Cordillera Mosetenes in western Parque Nacional Carrasco (Herzog *et al.*, 2005); and (2) Cerro Asunta Pata to the north in depto. La Paz (see Herzog *et al.*, 2002). The latter site is a mountain range of similar altitude as Cordillera Mosetenes.

MATERIALS AND METHODS

Cordillera Mosetenes is separated from the main Andes by the Río Altamachi. It is about 130 km long, 20-25 km wide, up to 2,050 m high, and probably contains the largest completely uninhabited forest tract in Bolivia. It is one of the country's most humid regions (Macía & Fuertes, 2008) and of extremely difficult access due to its steep topography. Parts of the area are protected in the Terri-torio Indígena y Parque Nacional Isiboro-Sécure, including my study area.

I conducted bird surveys within a radius of about 1 km around a small lagoon (Laguna Carachupa, 16°13'58"S, 66°24'54"W; Fig. 1; mean annual precipitation ca. 4,000 mm, Müller *et al.*, 2002) from 28 August to 21 September 2003. Rather than habitat characteristics, the sole criterion for choosing this site was the availability of an open area where a helicopter could land. Surveys extended from stream valleys at 1,180 m altitude to a mountain ridge at 1,600 m, although survey effort was most intensive at 1,250-1,400 m. All of the main habitat types (see below) were covered by the survey. On 27-28 August 2003, I made opportunistic observations during a layover at San Agustín (16°45'52"S, 66°14'39", ca. 1,460 m; Fig. 1) at the upper Río Altamachi on the east slope of Cordillera Cocapata. The site comprised a large clearing, secondary scrub, degraded humid forest edge, and alder (*Alnus* spp.) groves in ravines. Because this area also is remote and of difficult access, the birds observed at San Agustín are included in Appendix 1.

The vegetation at Laguna Carachupa can be divided into five main categories (for further details see Macía & Fuertes, 2008). As determined from several overflights by small airplane and helicopter, this habitat mosaic stretches across 80-90 % of the area of Cordillera Mosetenes: (1) Mature forest was 20-25 m tall, had a rather open understory and was restricted to scattered patches about 0.1-0.5 ha in extent. Epiphytic plants were present in moderate density and abundant only on scattered, up to 35 m tall emergent trees (*Ficus* spp.). (2) Most of the area was covered by regenerating forest of variable age, caused by natural disturbances due to landslides or tree falls. Older regenerating forest differed from mature forest in its lower canopy height (10-20 m), lack of thick-trunked trees, denser understory, and fewer epiphytes. (3) Less widespread young successional stages were dominated by dense scrub (*Panicum* sp., *Solanum* spp., *Acalypha* spp., *Hedyosmum* spp.), with emergent trees (*Cecropia* spp.) to 12 m tall. (4) Large tracts were formed by up to 15 m tall *Guadua* bamboo

forest. Within dense bamboo stands very little tree regeneration was observed. (5) Stunted ridge forest occurred at 1,500-1,600 m, with trees 3-12 m tall (exceptionally to 15 m) and thickly covered in liverworts, mosses, and vascular epiphytes. Small *Chusquea* bamboo was frequent, but did not form dense thickets.

For a quantitative assessment of the study area's bird species richness I used a modified version of the *m*-species-list method (Herzog *et al.*, 2002). The survey method is detailed in Herzog *et al.* (2002) and only briefly summarized here. While walking slowly and quietly from dawn to dusk (and occasionally before dawn and after dusk) along newly cut trails and "randomly" through the habitat where feasible, all visual and acoustical observations of birds (including numbers of individuals per species) within 50 m of the observer (Schieck, 1997) were recorded continuously. Observations of birds at distances of > 50 m were also noted but excluded from quantitative analysis. The observer's movement rate depended largely on the level of bird activity. Tape recordings were made extensively to supplement observations and for later identification of unknown voices (Parker, 1991; Haselmayer & Quinn, 2000), and they were integrated into the master list of temporally consecutive observations. When spending longer time periods in one spot (e.g., to observe mixed-species flocks) and during re-sampling of the same area, repeated counts of obviously territorial individuals were avoided.

The master list of temporally consecutive bird observations at Laguna Carachupa was divided into lists of 10 species: the first list consists of the first 10 species observed, the second list includes the following 10 species and may contain species already found on the first list, and so on. Cumulative species number was then plotted as a function of list number, treating each 10-species list as a separate sample. By randomizing sample accumulation order 50 times using the program *EstimateS* 6.0 (Colwell, 2000) I obtained sample-based rarefaction curves and estimated total species richness with the MMMean statistic (Raaijmakers, 1987; Keating & Quinn, 1998), the estimator recommended by Herzog *et al.* (2002). Aquatic species were excluded from this analysis.

Each species encountered during field work was assigned to one of five relative abundance categories (see Appendix 1). In addition, the relative abundance of each species recorded during the quantitative species richness assessment was expressed as the proportion of 10-species lists that contained the given species.

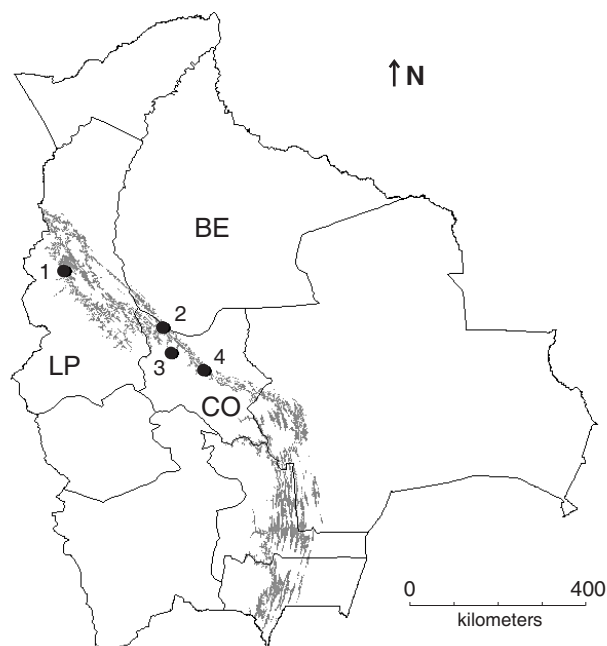


Figure 1. Location of the study areas (black dots) in the Bolivian Yungas (LP = depto. La Paz; CO = depto. Cochabamba; BE = depto. Beni). Numbers correspond to the following localities: 1 = Cerro Asunta Pata; 2 = Laguna Carachupa on Cordillera Mosestenes; 3 = San Agustín; 4 = Serranía de Callejas. Gray shading denotes areas at altitudes of 1150-1600 m on the east Andean slope.

The same methods were used to collect and analyze data from two Yungas localities characterized by lower montane evergreen forest and to which the results from Laguna Carachupa are compared here:

(1) Cerro Asunta Pata (15°03'S, 68°29'W; Fig. 1; see Herzog *et al.*, 2002) is located ca. 260 km northwest of Laguna Carachupa in depto. La Paz along the road from Charazani to Apolo at the border of the Área Natural de Manejo Integrado Apolobamba. An altitudinal gradient from 1,150 m to 1,500 m was surveyed for 10 days in June 1997; altitudes above 1,500 m were not accessible. The area's vegetation consisted of up to 30 m tall forest in a transition from lowland to montane altitudinal belts. Mean annual precipitation is approximately 2,500 mm (Müller *et al.*, 2002).

(2) Serranía de Callejas is located ca. 135 km southeast of Laguna Carachupa (385 km southeast of Cerro Asunta Pata) in western Parque Nacional Carrasco (17°08'S, 65°35'W; Fig. 1; Herzog *et al.*, 2005), depto. Cochabamba. Here I surveyed the same altitudinal gradient as on Cordillera Mosestenes (1,180-1,600 m) for nine days in late August 1996. In late October and early

November 1997, at the onset of the rainy season, I re-surveyed the area from 1,180-1,500 m for five days. To avoid double sampling of the same individuals, those data were excluded from the quantitative assessment of species richness and relative abundance; however, they were included in a comparison of similarity in overall community composition between sites (see below). In contrast to Cerro Asunta Pata, the area was situated on an extensive, steep altitudinal gradient from treeline to Amazonian lowlands, and canopy height averaged only 19-20 m. Mean annual precipitation is approximately 6,000 mm (Müller *et al.*, 2002).

Differences in overall community composition (excluding aquatic species) between the three localities were determined with Sorensen's similarity coefficient. To examine differences in community composition in more detail, all species were assigned to two mutually exclusive categories (Herzog *et al.*, 2005) based on the distributional data in Parker *et al.* (1996) and Hennessey *et al.* (2003b): (1) Andean species, i.e., species restricted to montane areas (including foothill zones) that are generally absent from the lowlands (below 300 m); and (2) lowland species, i.e., species present in the lowlands below 300 m that may or may not occur in montane areas. Finally, I examined trends in the number and proportion of indicator species of Upper Tropical (900-1,600 m) Montane Evergreen Forest listed by Parker *et al.* (1996: 424) for the Central Andes zoogeographic region.

RESULTS AND DISCUSSION

General results and noteworthy records

A total of 187 species were recorded at Laguna Carachupa, including four aquatic species (Appendix 1). Two additional species associated with aquatic habitats (Fasciated Tiger-Heron *Tigrisoma fasciatum*, Black Phoebe *Sayornis nigricans*) were observed by D. Embert (pers. com.) at a stream at 1080 m altitude not visited by the author. During the layover at San Agustín on the upper Río Altamachi I recorded 55 species, including 12 species not observed on Cordillera Mosetenes (Appendix 1), resulting in a total of 201 species recorded throughout the entire expedition. At Laguna Carachupa, 123 species (66 %) were documented by tape recordings (Appendix 1).

The three most species-rich bird families at Laguna Carachupa were tyrant flycatchers (Tyrannidae, 27 species), tanagers (Thraupidae, 23), and ovenbirds

(Furnariidae, 19) (Appendix 1). Ovenbirds were exceptionally well represented even when excluding seven species of woodcreepers (subfamily Dendrocolaptinae), which were merged into the Furnariidae only recently (see Remsen *et al.* 2008). Of the 37 Bolivian indicator species for Upper Tropical (900-1,600 m) Montane Evergreen Forest listed by Parker *et al.* (1996) for the Central Andes zoogeographic region, 24 were recorded at Laguna Carachupa (Appendix 1). However, six of the 37 indicator species are known in Bolivia only from as far south as depto. La Paz and/or from altitudes above 1,600 m (see Hennessey *et al.*, 2003b). Thus, 77 % of the 31 potentially occurring indicator species were recorded. Additionally, I found three indicator species for Bamboo, five for Hill Tropical (500-900 m) Humid Broadleaf Forest, and 11 for Midmontane (1,600-2,600 m) Evergreen Forest (Appendix 1) (Parker *et al.*, 1996).

Four species nearly endemic to Bolivia (*Simoxenops striatus*, *Thamnophilus aroyae*, *Myrmotherula grisea*, *Hemitriccus spodiops*) and nine restricted-range species (i.e., species whose distributional ranges do not exceed 50,000 km²; Stattersfield *et al.*, 1998) (the four aforementioned species and *Pseudotriccus simplex*, *Zimmerius bolivianus*, *Myiophobus inornatus*, *Chiroxiphia boliviana*, *Tangara argyrofenges*) were found in the study area. One 'vulnerable' (*Ara militaris*) and two 'near threatened' (*Simoxenops striatus*, *Myrmotherula grisea*) species also were recorded (BirdLife International, 2008). Until recently, *S. striatus* and *M. grisea* were considered 'vulnerable', but data obtained during this study contributed to a status change of both species to 'near-threatened' (Herzog *et al.*, 2008; BirdLife International, 2008). With estimated population densities of 20 and 15 pairs/km², respectively, Cordillera Mosetenes is a stronghold for both species (Herzog *et al.*, 2008)

Several observations represent new and noteworthy distributional records (as compared to Hennessey *et al.*, 2003b). The presence of *Cochlearius cochlearius* at Laguna Carachupa extends the species' known upper altitudinal limit in Bolivia from 600 m to 1,300 m and represents the first report of the species for the Yungas ecoregion. *Ara militaris* was observed just once when two pairs flew over the camp site, which represents the first record of the species in the region between the northern La Paz Yungas and southeast Parque Nacional Carrasco. *Glaucidium parkeri* was previously only known from depto. La Paz. This owl went undetected until playback of a reference recording of the species stimulated an individual to reply vocally. *Glaucidium parkeri* has recently also been observed in southeast

Parque Nacional Amboró in depto. Santa Cruz (author, unpublished data), so its occurrence at Laguna Carachupa was not entirely unexpected. The bamboo specialist *Drymophila devillei* (which, surprisingly, was not considered a bamboo specialist by Parker *et al.*, 1996) occurred up to 1,400 m, representing an upward altitudinal range extension of 400 m. Similarly, *Cissopis leveriana* was known to occur only up to an altitude of about 1,000 m, whereas a pair was observed repeatedly at 1,310 m. Finally, two *Tiaris obscura* observed repeatedly at Laguna Carachupa represent the first report of this species for depto. Cocha-bamba.

Diversity and biogeography

The species accumulation curve at Laguna Carachupa did not approach an asymptote (Fig. 2), suggesting that a number of species present in the study area had not been detected despite the intensive survey effort (> 3 weeks) and the relatively small survey area (ca. 20 ha). Alternatively, the extensive survey period may have been too long for a snap-shot assessment of the bird community at a given moment in time, and instead the survey was influenced by temporal variation in local community composition (i.e., due to species' movements into the study area during the survey period).

As apparent in Fig. 2 and Table 1, survey effort (i.e., number of 10-species lists compiled, number of individuals recorded) at Laguna Carachupa was about 30-35 % higher than on Cerro Asunta Pata and Serranía de Callejas. Both the raw species accumulation curves (Fig. 2A) and the curves of estimated total species richness (Fig. 2B) indicated similarly high species richness on Cerro Asunta Pata and at Laguna Carachupa (slightly higher on Cerro Asunta Pata), and considerably lower species richness on Serranía de Callejas. After standardizing estimated species richness for survey effort following the procedure suggested by Herzog *et al.* (2002; see also Herzog *et al.*, 2005), both Cerro Asunta Pata and Laguna Carachupa were predicted to contain about 200 species, whereas Serranía de Callejas fell short of this value by over 55 species (Table 1). The comparatively low species richness on Serranía de Callejas is likely related to the area's low forest stature (especially compared with Cerro Asunta Pata) and excessively high precipitation. By contrast, high species richness despite the paucity of tall, mature forest at Laguna Carachupa probably is a result of a high degree of habitat diversity and heterogeneity.

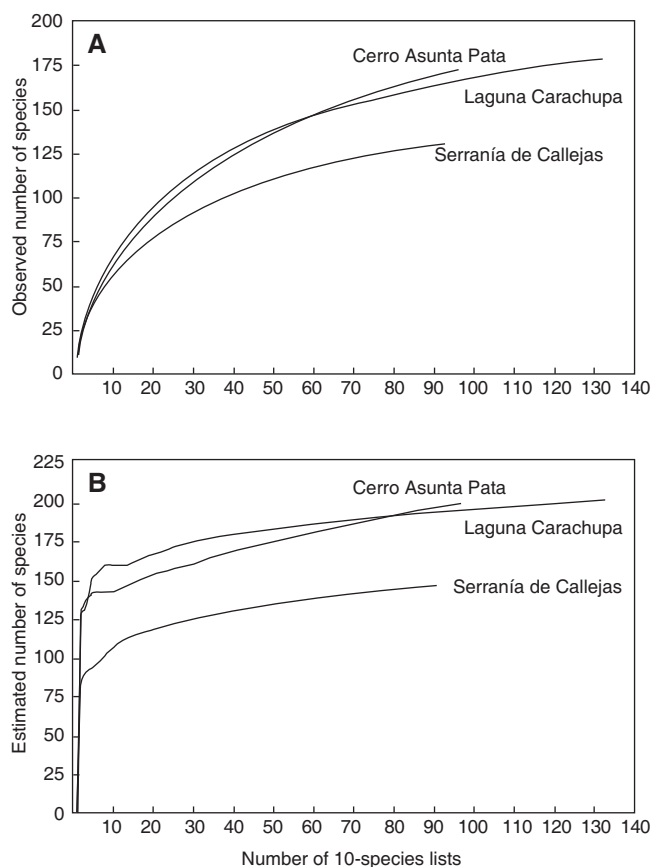


Figure 2. Observed (A) and estimated (B) number of species as a function of the number of 10-species lists compiled at three lower Yungas localities in the Bolivian Andes. Sample accumulation order of all curves was randomized 50 times using EstimateS 6.0 (Colwell 2000). Total species richness estimated with the MMMean statistic (Raaijmakers, 1987; Keating & Quinn, 1998).

On Serranía de Callejas a total of 158 species were recorded during both visits (20 species were exclusive to the 1997 rainy season survey), whereas 177 species were observed on Cerro Asunta Pata. The total number of species recorded at all three localities combined was 285. Laguna Carachupa and Serranía de Callejas shared 118, Laguna Carachupa and Cerro Asunta Pata 102, and Cerro Asunta Pata and Serranía de Callejas 87 species. Seventy-four species occurred at all three sites, whereas 126 species were each observed at only one locality. Cerro Asunta Pata had by far the highest number of unique species (62), whereas Laguna Carachupa and Serranía de Callejas had similar numbers (37 *versus* 27, respectively). The Sorensen similarity coefficient

indicated highest similarity between Laguna Carachupa and Serranía de Callejas (69 %) and lowest similarity between Serranía de Callejas and Cerro Asunta Pata (52 %), with an intermediate value for Laguna Carachupa versus Cerro Asunta Pata (57 %).

Table 1. Diversity statistics for three survey localities in the lower Bolivian Yungas (1150-1600 m altitude).

| Parameter | Cerro Asunta Pata | Laguna Carachupa | Serranía de Callejas |
|--|-------------------|------------------|----------------------|
| Number of 10-species lists compiled | 97 | 133 | 93 |
| Mean number of individuals per list \pm SD | 13.8 \pm 2.6 | 13.2 \pm 4.9 | 14.5 \pm 2.5 |
| Total number of individuals recorded | 1341 | 1757 | 1352 |
| Number of species recorded (excluding aquatic birds) | 175 | 180 | 131 |
| Estimated total species richness ¹ | 200 | 202 | 147 |
| Estimated richness standardized for survey effort ² | 200 | 198 | 143 |

¹ Estimated with the MMean statistic (Raaijmakers, 1987; Keating & Quinn, 1998).

² Following the procedure suggested by Herzog *et al.* (2002, 2005).

The three sites further exhibited a pronounced latitudinal gradient in community composition (Fig. 3). The proportion of exclusively Andean species increased from 36 % at Cerro Asunta Pata to 45 % at Laguna Carachupa to 59 % on Serranía de Callejas (Fig. 3). The same latitudinal trend was apparent in the proportion of indicator species for Upper Tropical (900-1,600 m) Montane Evergreen Forest, which increased from 9 % (16 species) on Cerro Asunta Pata to 17 % (27 species) on Serranía de Callejas (Fig. 4).

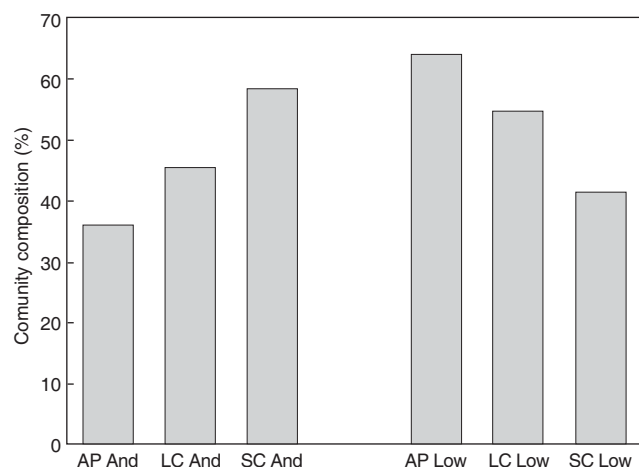


Figure 3. The proportion of bird species restricted to the Andes (And) increases from northwest to southeast at three lower Yungas localities in the Bolivian Andes (AP = Cerro Asunta Pata; LC = Laguna Carachupa on Cordillera Mosetenes; SC = Serranía de Callejas in western Parque Nacional Carrasco). The reverse is true for species occurring in the lowlands (Low).

As all species are weighted equally by Sorensen's qualitative similarity coefficient regardless of their relative abundance, Figures 5 and 6 shows pair-wise comparisons of the relative abundance of the 25 most common species at each locality. In two identical communities all data points would fall exactly on the central diagonal line, whereas the spread of data points increases with increasing dissimilarity between communities. Laguna Carachupa and Cerro Asunta Pata ($n = 39$ species) exhibit a fairly strong degree of dissimilarity (Fig. 5). Six of the most common species on Cerro Asunta Pata were absent from Laguna Carachupa, and four common species at Laguna Carachupa were not recorded on Cerro Asunta Pata. Some indicator species for Upper Tropical Montane Evergreen Forest, e.g. *Basileuterus tristriatus*, *Chamaeza campanisona*, and *Conopophaga ardesiaca*, were much more common at Laguna Carachupa than on Cerro Asunta Pata, whereas the reverse is true for species typical of lowland forest such as *Saltator maximus*, *Tangara chilensis*, and *Myrmeciza hemimelaena* (Fig. 5). The relationship between Laguna Carachupa and Serranía de Callejas ($n = 36$ species) is skewed towards higher relative abundances on Serranía de Callejas, culminating in the very high values for *B. tristriatus*, *Henicorhina leucophrys*, and *Chlorospingus ophthalmicus* (Fig. 6), but the two sites nonetheless are more similar overall than Laguna Carachupa and Cerro Asunta Pata. For example, more data points are located close to the central diagonal line, and only one species (*Philydor rufum*) was not recorded at both sites. Thus, the general result exhibited by Sorensen's similarity coefficient is confirmed also when examining relative abundances of the most common species.

Conservation implications

The three Yungas forest localities compared here exhibit considerable variation in species richness, community composition, and abundances of individual species despite being situated at the same or very similar altitudes within the same ecoregion and at relatively short distances from each other (the linear distance between the northernmost and southernmost locality is 385 km). Such a high degree of geographic species turnover strongly suggests that the conservation of the diversity of Bolivian Yungas birds requires several interconnected protected areas spread out along the east Andean slope. Reliance on just one or two of the seven currently existing national-level protected areas that are at least partly situated in the Yungas ecoregion would be an insufficient conservation strategy.

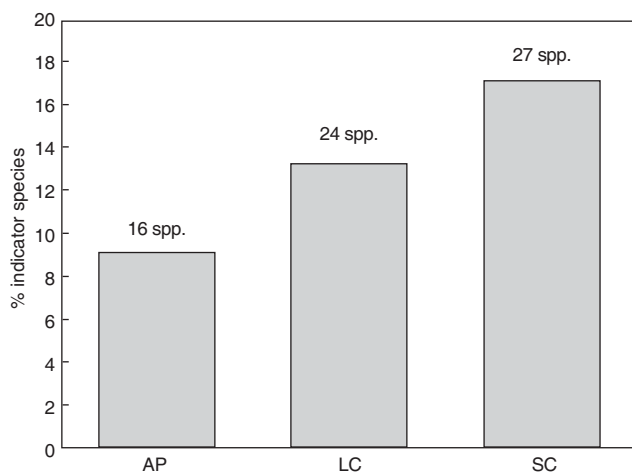


Figure 4. The proportion of indicator species for Upper Tropical (900-1,600 m) Montane Evergreen Forest (Parker *et al.*, 1996) increases latitudinally from northwest to southeast at three lower Yungas localities in the Bolivian Andes (AP = Cerro Asunta Pata; LC = Laguna Carachupa on Cordillera Mosestenes; SC = Serranía de Callejas in western Parque Nacional Carrasco).

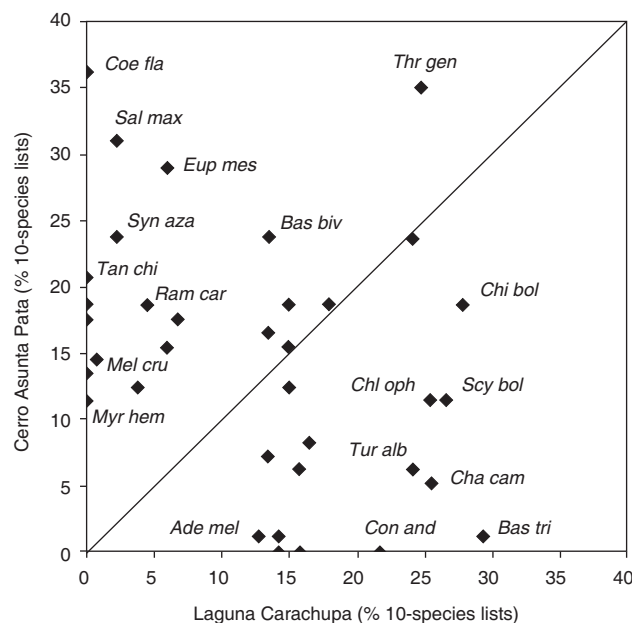


Figure 5. Relative abundance (percent of 10-species lists containing a given species) of the 25 most common species at Laguna Carachupa compared to that of the 25 most common species on Cerro Asunta Pata (*Ade mel* = *Adelomyia melanogenys*; *Bas biv* = *Basileuterus bivittatus*; *Bas tri* = *Basileuterus tristriatus*; *Cha cam* = *Chamaeza campanisona*; *Chi bol* = *Chiroxiphia boliviana*; *Chl oph* = *Chlorospingus ophthalmicus*; *Coe fla* = *Coereba flaveola*; *Con ard* = *Conopophaga ardesiaca*; *Eup mes* = *Euphonia mesochrysa*; *Mel cru* = *Melanerpes cruentatus*; *Myr hem* = *Myrmeciza hemimelaena*; *Ram car* = *Ramphocelus carbo*; *Sal max* = *Saltator maximus*; *Scy bol* = *Scytalopus bolivianus*; *Syn aza* = *Synallaxis azarae*; *Tan chi* = *Tangara chilensis*; *Thr gen* = *Thryothorus genibarbis*; *Tur alb* = *Turdus albicollis*).

The high species richness and distinct community composition along with the presence of apparently viable populations of two 'near threatened' species nearly endemic to Bolivia (*Simoxenops striatus*, *Myrmotherula grisea*) at Laguna Carachupa render Cordillera Mosestenes of high conservation importance. Both species are scarce elsewhere and Cordillera Mosestenes appears to be a stronghold for them. In addition, the natural protection of Cordillera Mosestenes from human colonization due to its remoteness make its formal, government and non-government sponsored protection economically feasible.

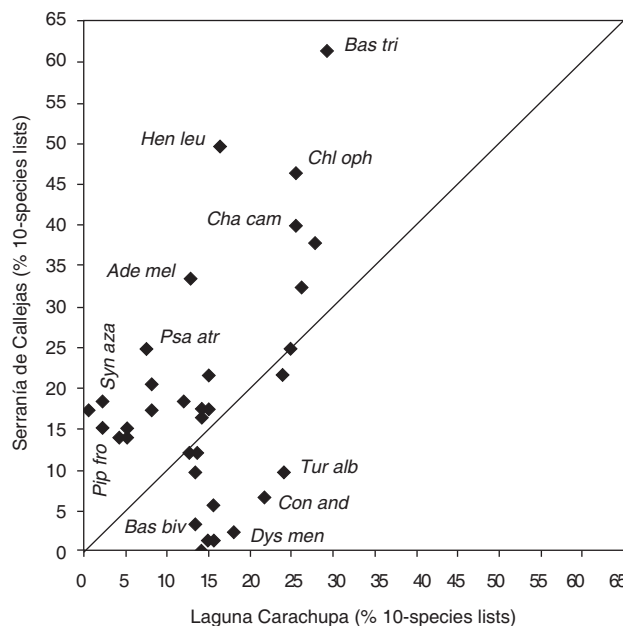


Figure 6. Relative abundance (percent of 10-species lists containing a given species) of the 25 most common species at Laguna Carachupa compared to that of the 25 most common species on Serranía de Callejas, respectively (*Ade mel* = *Adelomyia melanogenys*; *Bas biv* = *Basileuterus bivittatus*; *Bas tri* = *Basileuterus tristriatus*; *Cha cam* = *Chamaeza campanisona*; *Chl oph* = *Chlorospingus ophthalmicus*; *Con ard* = *Conopophaga ardesiaca*; *Dys men* = *Dysithamnus mentalis*; *Hen leu* = *Henicorhina leucophrys*; *Pip fro* = *Pipreola frontalis*; *Psa atr* = *Psarocolius atrovirens*; *Syn aza* = *Synallaxis azarae*; *Tur alb* = *Turdus albicollis*).

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Appendix 1. Bird species recorded on 27-28 August 2003 at San Agustín, upper Río Altamachi (16°45'51.8"S, 66°14'39", ca. 1,460 m), and from 28 August to 21 September 2008 at Laguna Carachupa, Cordillera Mosestenes (16°13'58"S, 66°24'54"W, 1,180-1,600 m). Species sequence and taxonomy follow Remsen *et al.* (2008). *Abundance categories*: r = rare, between one and four individuals observed (or at most two observations of small flocks for parrots and swifts); u = uncommon, between five and 10 individuals observed or estimated; f = fairly common, between 11 and 20 individuals observed or estimated; c = common, between 21 and 35 individuals observed or estimated; a = abundant, more than 35 individuals observed or estimated. Evidence: T = tape recording; P = photograph; V = visual observation; A = acoustical observation. Habitat indicator species in the Central Andes zoogeographic region according to Parker *et al.* (1996): HT = Hill Tropical (500-900 m) Humid Broadleaf Forest; UT = Upper Tropical (900-1,600 m) Montane Evergreen Forest; MM = Midmontane (1,600-2,600 m) Evergreen Forest; B = Bamboo.

| Family/Scientific name | Common name | San Agustín | Laguna Carachupa | | |
|----------------------------------|----------------------------|-------------|------------------|----------|-------------------|
| | | | Rel. Abundance | Evidence | Indicator species |
| Tinamidae (2) | | | | | |
| <i>Tinamus tao</i> | Gray Tinamou | | r | T | |
| <i>Crypturellus obsoletus</i> | Brown Tinamou | x | f | T | |
| Cracidae (3) | | | | | |
| <i>Penelope montagnii</i> | Andean Guan | | u | T | |
| <i>Pipile cumanensis</i> | Blue-throated Piping-Guan | x | u | T | |
| <i>Ortalis guttata</i> | Speckled Chachalaca | | c | T | |
| Odontophoridae (1) | | | | | |
| <i>Odontophorus speciosus</i> | Rufous-breasted Wood-Quail | x | u | A | MM |
| Podicipedidae (1) | | | | | |
| <i>Tachybaptus dominicus</i> | Least Grebe | | u | T | |
| Phalacrocoracidae (1) | | | | | |
| <i>Phalacrocorax brasilianus</i> | Neotropic Cormorant | | r | V | |
| Ardeidae (1) | | | | | |
| <i>Cochlearius cochlearius</i> | Boat-billed Heron | | u | T | |
| Cathartidae (2) | | | | | |
| <i>Cathartes aura</i> | Turkey Vulture | | r | V | |
| <i>Sarcoramphus papa</i> | King Vulture | | r | V | |
| Accipitridae (9) | | | | | |
| <i>Chondrohierax uncinatus</i> | Hook-billed Kite | x | — | — | |
| <i>Elanoides forficatus</i> | Swallow-tailed Kite | | c | V | |
| <i>Harpagus bidentatus</i> | Double-toothed Kite | | r | V | |
| <i>Ictinia plumbea</i> | Plumbeous Kite | | r | V | |
| <i>Accipiter striatus</i> | Sharp-shinned Hawk | x | — | — | |
| <i>Harpyhaliaetus solitarius</i> | Solitary Eagle | | r | V | |
| <i>Buteo magnirostris</i> | Roadside Hawk | x | r | V | |
| <i>B. brachyurus</i> | Short-tailed Hawk | | r | V | |
| <i>Spizaetus isidori</i> | Black-and-chestnut Eagle | | r | P/T | |
| Falconidae (2) | | | | | |
| <i>Micrastur ruficollis</i> | Barred Forest-Falcon | | u | T | |
| <i>M. semitorquatus</i> | Collared Forest-Falcon | | r | A | |
| Columbidae (2) | | | | | |
| <i>Patagioenas plumbea</i> | Plumbeous Pigeon | x | c | T | |
| <i>Geotrygon frenata</i> | White-throated Quail-Dove | | f | T/V | MM |
| Psittacidae (6) | | | | | |
| <i>Ara militaris</i> | Military Macaw | | r | V, A | |
| <i>Pyrrhura molinae</i> | Green-cheeked Parakeet | x | c | V, A | |
| <i>Bolborhynchus lineola</i> | Barred Parakeet | | r | A | B |
| <i>Pionus menstruus</i> | Blue-headed Parrot | x | f | T | |
| <i>Pionus sordidus</i> | Red-billed Parrot | x | — | — | |
| <i>Amazona farinosa</i> | Mealy Parrot | x | f | T | |
| Cuculidae (2) | | | | | |
| <i>Piaya cayana</i> | Squirrel Cuckoo | | u | T | |
| <i>Dromococcyx pavoninus</i> | Pavonine Cuckoo | | u | T | |
| Strigidae (3) | | | | | |
| <i>Megascops ingens</i> | Rufescent Screech-Owl | x | u | T | |
| <i>Pulsatrix melanota</i> | Band-bellied Owl | | r | T | HT |
| <i>Glaucidium parkeri</i> | Subtropical Pygmy-Owl | | r | A | |

Cont. Appendix 1.

| Family/Scientific name | Common name | San Agustín | Laguna Carachupa | | |
|--|-------------------------------|-------------|------------------|----------|-------------------|
| | | | Rel. Abundance | Evidence | Indicator species |
| Nyctibiidae (2) | | | | | |
| <i>Nyctibius grandis</i> | Great Potoo | | r | A | |
| <i>N. griseus</i> | Common Potoo | | r | A | |
| Caprimulgidae (2) | | | | | |
| <i>Lurocalis rufiventris</i> | Rufous-bellied Nighthawk | | u | T | MM |
| <i>Nyctiphrynus ocellatus</i> | Ocellated Poorwill | | u | T | |
| Apodidae (3) | | | | | |
| <i>Streptoprocne rutila</i> | Chestnut-collared Swift | | r | V | |
| <i>S. zonaris</i> | White-collared Swift | | f | V | |
| <i>Aeronautes montivagus</i> | White-tipped Swift | x | u | V | |
| Trochilidae (11) | | | | | |
| <i>Phaethornis stuarti</i> | White-browed Hermit | | u | T | |
| <i>P. malaris</i> | Great-billed Hermit | | c | T | |
| <i>Doryfera ludovicae</i> | Green-fronted Lancebill | | r | V | |
| <i>Colibri thalassinus</i> | Green Violet-ear | | u | T | |
| <i>C. coruscans</i> | Sparkling Violet-ear | | f | T | |
| <i>Adelomyia melanogenys</i> | Speckled Hummingbird | | f | T | MM |
| <i>Ocreatus underwoodii</i> | Booted Racquet-tail | | r | V | |
| <i>Heliodoxa leadbeateri</i> | Violet-fronted Brilliant | | r | T | UT |
| <i>Chaetocercus mulsant</i> | White-bellied Woodstar | | r | V | |
| <i>Klais guimeti</i> | Violet-headed Hummingbird | | r | T | UT |
| <i>Thalurania furcata</i> | Fork-tailed Woodnymph | x | r | V, A | |
| Trogonidae (3) | | | | | |
| <i>Pharomachrus antisianus</i> | Crested Quetzal | | f | T | UT |
| <i>Trogon curucui</i> | Blue-crowned Trogon | | r | T | |
| <i>T. personatus</i> | Masked Trogon | | r | A | UT |
| Alcedinidae (1) | | | | | |
| <i>Megaceryle torquata</i> | Ringed Kingfisher | x | r | T | |
| Capitonidae (1) | | | | | |
| <i>Eubucco versicolor</i> | Versicolored Barbet | | u | T | |
| Ramphastidae (4) | | | | | |
| <i>Ramphastos tucanus</i> | White-throated Toucan | | r | A | |
| <i>R. vitellinus</i> | Channel-billed Toucan | x | u | T | |
| <i>Aulacorhynchus derbianus</i> | Chestnut-tipped Toucanet | | f | T | |
| <i>Pteroglossus castanotis</i> | Chestnut-eared Aracari | | u | T | |
| Picidae (6) | | | | | |
| <i>Melanerpes cruentatus</i> | Yellow-tufted Woodpecker | | r | V | |
| <i>Picooides fumigatus</i> | Smoky-brown Woodpecker | | r | T | |
| <i>Veniliornis nigriceps</i> | Bar-bellied Woodpecker | | r | A | |
| <i>Colaptes rubiginosus</i> | Golden-olive Woodpecker | x | u | T | |
| <i>Dryocopus lineatus</i> | Lineated Woodpecker | x | u | T | |
| <i>Campephilus rubicollis</i> | Red-necked Woodpecker | | r | T | |
| Furnariidae (19) | | | | | |
| <i>Synallaxis azarae</i> | Azara's Spinetail | x | r | T | |
| <i>S. cabanisi</i> | Cabanis's Spinetail | | f | T | |
| <i>Cranioleuca curtata</i> | Ash-browed Spinetail | | u | T | |
| <i>Premnoplex brunnescens</i> | Spotted Barbtail | | c | T | UT |
| <i>Anabacerthia striaticollis</i> | Montane Foliage-gleaner | | f | T | UT |
| <i>Syndactyla rufosuperciliata</i> | Buff-browed Foliage-gleaner | x | c | T | UT |
| <i>Simoxenops striatus</i> | Bolivian Recurvebill | | f | T | HT |
| <i>Philydor erythrocerum</i> | Rufous-rumped Foliage-gleaner | | u | T | |
| <i>P. rufum</i> | Buff-fronted Foliage-gleaner | | c | T | |
| <i>Thripadectes holostictus</i> | Striped Treehunter | | f | T | MM |
| <i>Automolus ochrolaemus</i> | Buff-throated Foliage-gleaner | | c | T | |
| <i>Lochmias nematura</i> | Sharp-tailed Streamcreeper | | r | A | |
| <i>Sittasomus griseicapillus</i> | Olivaceous Woodcreeper | x | u | T | |
| <i>Xiphocolaptes promeropirhynchus</i> | Strong-billed Woodcreeper | | r | T | MM |
| <i>Dendrocolaptes picumnus</i> | Black-banded Woodcreeper | | r | T | |
| <i>Xiphorhynchus ocellatus</i> | Ocellated Woodcreeper | | c | T | UT |

Cont. Appendix 1.

| Family/Scientific name | Common name | San Agustín | Laguna Carachupa | | |
|--|-----------------------------|-------------|------------------|----------|-------------------|
| | | | Rel. Abundance | Evidence | Indicator species |
| <i>X. triangularis</i> | Olive-backed Woodcreeper | | u | T | UT |
| <i>Lepidocolaptes albolineatus</i> | Lineated Woodcreeper | | r | T | |
| <i>Campylorhynchus trochilirostris</i> | Red-billed Scythebill | | f | T | |
| Thamnophilidae (9) | | | | | |
| <i>Thamnophilus palliatus</i> | Chestnut-backed Antshrike | | u | T | |
| <i>T. caerulescens</i> | Variable Antshrike | | r | V, A | |
| <i>T. aethiops</i> | White-shouldered Antshrike | | u | T | |
| <i>T. aroyae</i> | Upland Antshrike | | c | T | |
| <i>Dysithamnus mentalis</i> | Plain Antwren | | c | T | UT |
| <i>Myrmotherula longicauda</i> | Stripe-chested Antwren | | f | T | |
| <i>M. grisea</i> | Yungas Antwren | | f | T | HT |
| <i>Drymophila devillei</i> | Striated Antbird | | u | T | |
| <i>Pyriglena leuconota</i> | White-backed Fire-eye | x | c | T | |
| Formicariidae (2) | | | | | |
| <i>Chamaeza campanisona</i> | Short-tailed Antthrush | x | a | T | UT |
| <i>Grallaria guatemalensis</i> | Scaled Antpitta | | u | T | UT |
| Conopophagidae (1) | | | | | |
| <i>Conopophaga ardesiaca</i> | Slaty Gnatcatcher | | a | T | UT |
| Rhinocryptidae (1) | | | | | |
| <i>Scytalopus bolivianus</i> | Bolivian Tapaculo | x | a | T | |
| Tyrannidae (27) | | | | | |
| <i>Phyllomyias sclateri</i> | Sclater's Tyrannulet | x | u | T | |
| <i>Mecocerculus hellmayri</i> | Buff-banded Tyrannulet | | u | T | |
| <i>M. leucophrys</i> | White-throated Tyrannulet | x | r | V, A | |
| <i>Pseudotriccus simplex</i> | Hazel-fronted Pygmy-Tyrant | | r | A | UT |
| <i>Zimmerius bolivianus</i> | Bolivian Tyrannulet | | u | T | MM |
| <i>Phylloscartes ophthalmicus</i> | Marble-faced Bristle-Tyrant | | u | T | |
| <i>P. ventralis</i> | Mottle-cheeked Tyrannulet | | u | T | |
| <i>Mionectes striaticollis</i> | Streak-necked Flycatcher | | r | T | |
| <i>M. macconnelli</i> | McConnell's Flycatcher | | u | T | |
| <i>Leptopogon superciliosus</i> | Slaty-capped Flycatcher | | c | T | UT |
| <i>Hemitriccus spodiops</i> | Yungas Tody-Tyrant | x | f | T | B |
| <i>Poecilatriccus plumbeiceps</i> | Ochre-faced Tody-Flycatcher | x | u | T | |
| <i>Platyrrhynchus mystaceus</i> | White-throated Spadebill | | r | V | UT |
| <i>Myiophobus inornatus</i> | Unadorned Flycatcher | | r | T | UT |
| <i>M. fasciatus</i> | Bran-colored Flycatcher | x | u | T | |
| <i>Pyrrhomyias cinnamomeus</i> | Cinnamon Flycatcher | | u | T | |
| <i>Lathrotriccus euleri</i> | Euler's Flycatcher | | u | T | |
| <i>Contopus fumigatus</i> | Smoke-colored Pewee | x | — | — | |
| <i>Colonia colonus</i> | Long-tailed Tyrant | x | r | P | |
| <i>Legatus leucophaeus</i> | Piratic Flycatcher | x | r | T | |
| <i>Myiodynastes chrysocephalus</i> | Golden-crowned Flycatcher | x | u | T | |
| <i>M. maculatus</i> | Streaked Flycatcher | | u | T | |
| <i>Megarynchus pitangua</i> | Boat-billed Flycatcher | x | — | — | |
| <i>Tyrannus melancholicus</i> | Tropical Kingbird | x | r | T | |
| <i>Rhytipterna simplex</i> | Grayish Mourner | | u | T | |
| <i>Myiarchus tuberculifer</i> | Dusky-capped Flycatcher | | u | T | |
| <i>M. cephalotes</i> | Pale-edged Flycatcher | x | u | T | |
| Cotingidae (3) | | | | | |
| <i>Pipreola frontalis</i> | Scarlet-breasted Fruiteater | | r | V | |
| <i>Rupicola peruvianus</i> | Andean Cock-of-the-Rock | | u | T | UT |
| <i>Cephalopterus ornatus</i> | Amazonian Umbrellabird | | r | V | |
| Pipridae (1) | | | | | |
| <i>Chiroxipteria boliviana</i> | Yungas Manakin | x | a | T | UT |
| Tityridae (3) | | | | | |
| <i>Tityra semifasciata</i> | Masked Tityra | | r | T | |
| <i>Schiffornis turdina</i> | Thrush-like Schiffornis | | u | A | |
| <i>Pachyrhamphus castaneus</i> | Chestnut-crowned Becard | | u | T | |

Cont. Appendix 1.

| Family/Scientific name | Common name | San Agustín | Laguna Carachupa | | |
|-----------------------------------|------------------------------|-------------|------------------|----------|-------------------|
| | | | Rel. Abundance | Evidence | Indicator species |
| Incertae Sedis (1) | | | | | |
| <i>Piprites chloris</i> | Wing-barred Piprites | | r | A | |
| Corvidae (3) | | | | | |
| <i>Cyanolyca viridicyanus</i> | White-collared Jay | | r | T | |
| <i>Cyanocorax cyanomelas</i> | Purplish Jay | x | — | — | |
| <i>Cyanocorax yncas</i> | Green Jay | | r | V | |
| Hirundinidae (1) | | | | | |
| <i>Pygochelidon cyanoleuca</i> | Blue-and-white Swallow | x | f | V | |
| Troglodytidae (3) | | | | | |
| <i>Troglodytes aedon</i> | House Wren | x | — | — | |
| <i>Thryothorus genibarbis</i> | Moustached Wren | x | a | T | |
| <i>Henicorhina leucophrys</i> | Gray-breasted Wood-Wren | | c | T | UT |
| Turdidae (4) | | | | | |
| <i>Myadestes ralloides</i> | Andean Solitaire | x | r | T | |
| <i>Catharus dryas</i> | Spotted Nightingale-Thrush | | u | T | UT |
| <i>Turdus nigriceps</i> | Slaty Thrush | | f | T | |
| <i>T. albicollis</i> | White-necked Thrush | | a | T | |
| Thraupidae (23) | | | | | |
| <i>Cissopis leverianus</i> | Magpie Tanager | | r | V | |
| <i>Hemispingus melanotis</i> | Black-eared Hemispingus | | u | T | MM, B |
| <i>Thlypopsis ruficeps</i> | Rust-and-yellow Tanager | | r | V | |
| <i>Trichothraupis melanops</i> | Black-goggled Tanager | | u | T | UT |
| <i>Ramphocelus carbo</i> | Silver-beaked Tanager | x | f | T | |
| <i>Thraupis palmarum</i> | Palm Tanager | x | u | T | |
| <i>Anisognathus somptuosus</i> | Blue-winged Mountain-Tanager | | f | T | MM |
| <i>Pipraeidea melanonota</i> | Fawn-breasted Tanager | | r | V | |
| <i>Chlorochrysa calliparaea</i> | Orange-eared Tanager | | r | V | |
| <i>Tangara ruficervix</i> | Golden-naped Tanager | | r | V | |
| <i>T. argyrofenges</i> | Green-throated Tanager | | u | T | |
| <i>T. punctata</i> | Spotted Tanager | | r | V | |
| <i>T. nigroviridis</i> | Beryl-spangled Tanager | | r | V | |
| <i>T. mexicana</i> | Turquoise Tanager | | r | V | |
| <i>T. gyrola</i> | Bay-headed Tanager | | r | V | HT |
| <i>T. chrysotis</i> | Golden-eared Tanager | | r | V | |
| <i>T. xanthocephala</i> | Saffron-crowned Tanager | | u | V | |
| <i>T. arthus</i> | Golden Tanager | | u | T | |
| <i>Tersina viridis</i> | Swallow-Tanager | x | — | — | |
| <i>Dacnis cayana</i> | Blue Dacnis | | u | V | |
| <i>Cyanerpes caeruleus</i> | Purple Honeycreeper | | u | V | |
| <i>Diglossa sittoides</i> | Rusty Flowerpiercer | | r | V | |
| <i>D. glauca</i> | Deep-blue Flowerpiercer | | u | T | |
| Incertae Sedis (3) | | | | | |
| <i>Chlorospingus ophthalmicus</i> | Common Bush-Tanager | | a | T | UT |
| <i>Tiaris obscurus</i> | Dull-colored Grassquit | | r | V | |
| <i>Saltator maximus</i> | Buff-throated Saltator | | r | T | |
| Emberizidae (5) | | | | | |
| <i>Sicalis flaveola</i> | Saffron Finch | x | — | — | |
| <i>Sporophila caerulescens</i> | Double-collared Seedeater | | r | V | |
| <i>Arremon torquatus</i> | Stripe-headed Brush-Finch | x | f | T | MM |
| <i>Atlapetes rufinucha</i> | Rufous-naped Brush-Finch | x | — | — | |
| <i>Coryphospingus cucullatus</i> | Red-crested Finch | x | — | — | |
| Cardinalidae (3) | | | | | |
| <i>Piranga flava</i> | Hepatic Tanager | | r | V | |
| <i>P. leucoptera</i> | White-winged Tanager | | u | T | |
| <i>Pheucticus aureoventris</i> | Black-backed Grosbeak | | r | V | |
| Parulidae (7) | | | | | |
| <i>Parula pitiayumi</i> | Tropical Parula | | u | T | |
| <i>Geothlypis aequinoctialis</i> | Masked Yellowthroat | | r | V, A | |

Cont. Appendix 1.

| Family/Scientific name | Common name | San Agustín | Laguna Carachupa | | |
|---------------------------------|--------------------------|-------------|------------------|----------|-------------------|
| | | | Rel. Abundance | Evidence | Indicator species |
| <i>Myioborus miniatus</i> | Slate-throated Redstart | x | c | T | |
| <i>Basileuterus bivittatus</i> | Two-banded Warbler | x | c | T | |
| <i>B. coronatus</i> | Russet-crowned Warbler | | c | T | MM |
| <i>B. tristriatus</i> | Three-striped Warbler | x | a | T | UT |
| <i>Phaeothlypis rivularis</i> | Riverbank Warbler | | r | A | |
| Icteridae (5) | | | | | |
| <i>Psarocolius angustifrons</i> | Russet-backed Oropendola | | a | T | |
| <i>P. atrovirens</i> | Dusky-green Oropendola | x | f | T | |
| <i>P. decumanus</i> | Crested Oropendola | x | f | T | |
| <i>Icterus cayanensis</i> | Epaulet Oriole | | r | V | |
| <i>Molothrus oryzivorus</i> | Giant Cowbird | x | — | — | |
| Fringillidae (7) | | | | | |
| <i>Carduelis olivacea</i> | Olivaceous Siskin | | u | V | |
| <i>Carduelis xanthogastra</i> | Yellow-bellied Siskin | | r | V | |
| <i>Euphonia lanirostris</i> | Thick-billed Euphonia | | r | T | |
| <i>E. cyanocephala</i> | Golden-rumped Euphonia | | r | A | |
| <i>E. mesochrysa</i> | Bronze-green Euphonia | | f | T | |
| <i>E. xanthogaster</i> | Orange-bellied Euphonia | | c | T | HT |
| <i>Chlorophonia cyanea</i> | Blue-naped Chlorophonia | | c | T | |