# Birds of Serranía de los Churumbelos, their conservation and elevational distribution

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## Resumen
Un total de 462 especies de aves fueron registradas en la Serranía de los Churumbelos empleando observaciones, grabación de las vocalizaciones y captura con redes de niebla. Un total de 3,196 aves fueron capturadas de 246 especies durante 142,730 horas-red. El ensamble de aves mostró afinidades cercanas entre SS1 y SS2 (350-700m), SS3 y SS4 (1,100-1,400m), SS5-SS6-SS7 (1,900-2,450m). Un total de dos especies amenazadas y diez casi-amenazadas fueron registradas, con cinco especies del Área de Endemismo de Aves (EBA) de los Andes Orientales de Ecuador-Perú (SS2-SS4) y cuatro especies del EBA de las Laderas Interandinas de Colombia (SS5-SS7). Se estima que el número de especies de aves que occurren en la región superan las 550, una excepcional diversidad que hace de la Serranía un "hotspot" ornitológico global de extrema importancia para la conservación.

## Summary
A total of 462 bird species were recorded in Serranía de los Churumbelos using observation, tape recordings and mist-netting. A total of 3,196 mist-net captures of 247 species were captured over 142,730 MNH. Avifauna assemblages showed close affinities between SS1-SS2 (350-700m); SS3-SS4 (1,100-1,400m) and SS5-SS6-SS7 (1,900-2,450 m). A total of 2 Threatened and 11 Near-Threatened species were recorded, with five Ecuador-Peru East Andes EBA (SS3-4) and four Colombian Inter-Andean Slopes EBA (SS5-7) endemics. Over 100 species recorded represent major range/altitude extensions previously unrecorded in Colombia. It is estimated that the probable total number of bird species regularly occurring in the region exceeds 550 species: an exceptional diversity, making the Serranía a global avian "hotspot" and meriting conservation action for the region.

## Introduction
Colombia is of great ornithological importance as it supports the world's greatest diversity of birds, with about 1,869 species, representing 19% of the World's species in less that 0.8% of the world's land surface (Salaman *et al.* 2007). A total of 1,300 bird species are encountered in Colombia's Eastern Cordillera to the Amazonian foothills (Salaman *et al* 2001), making the region of great global importance for biodiversity and conservation..

Surveying and documenting the poorly known avifauna of the tropics can play an important role in assisting biological conservation. Conservation of tropical birds and their habitats requires an in-depth knowledge of species' ecology; for example their ability to survive habitat alteration; their specific habitat requirements; and variations in abundance due to changing environmental conditions. Without such information conservation efforts may be significantly undermined.

Historical difficulties with access have resulted in few ornithological studies being conducted on the Andean east slope (Blake 1961, Meyer de Schauensee 1952, Olivares 1963, 1971). The paucity of information for the Colombian Andean East slope avifauna is striking. However, despite growing political instability caused by the government's ongoing conflict with insurgent guerrilla groups, ornithological studies have been increasingly conducted throughout the region in the 1990s (Salaman *et al.* 2002).

Before our work, research on the distribution and abundance of birds in the Churumbelos was considered vital and urgent, as deforestation, which has so drastically altered habitat in other parts of the Colombian Andes, has left the Churumbelos massif largely untouched. The need for natural habitat protection in the tropics is a global priority as human pressures mount, thus rapid biological assessments are needed to identify sites for conservation. These assessments must be based on the few relatively well-known groups of organisms, such as birds. Birds are excellent preliminary indicators for biological conservation, because avian taxonomy and geographical distribution has already been well documented, compared to other groups in the region. Intensive bird inventories by 3-5 ornithologists were undertaken at each study site.

## Methods

To determine the composition and relative abundance of bird communities at each study site, a two-fold standardised effort was employed by five ornithologists in 1998 (AC, Liliana Dávalos, DD, TD and PS), three in 1999 (AC, TD and PS) and four in 2000 (AC, TD, JO and PS):

1. Intensive diurnal non-systematic field observations, supplemented with tape recording and playback of skulking and nocturnal birds, were conducted by 2-4 team members at all times. This was preferred to the use of point counts or variable circular plots, where any population estimates would be highly inaccurate in such a short time, and may create biases strongly in favour of highly-recognisable and vocal species. With targeted intensive, non-systematic observation data, relatively constant at each site, a more complete inventory was achieved without the constraints of routine transects. Ecological notes were taken where possible.
2. Diurnal mist-netting (246-368 m along transects) was conducted at each site. At SS1 in 1998 two transects were conducted as artificial poles allowed easy and fast net installation and relocation.

These methods complement one other well to produce a rapid, large and good inventory, with phtographic documentation of captured species. Each site from SS1–7 was studied for 5-7 days during 1998 and 1999. We then returned to SS1 to conduct further surveys in 2000, as we felt that this site remained comparatively not fully saturated during our first study compared to other sites, as over 20 new bird species were recorded on the last two days of fieldwork in 1998 (cf. typically 4-5 new birds at other sites on last 2 days of fieldwork). Indeed, 52 additional species for the site, including 31 additional species for the Churumbelos, were recorded in 7 days' fieldwork in August 2000.

Local knowledge: Interviews with local hunters were useful in gleaning knowledge on the presence of several large non-passerine species, which maintain low population densities. The plates from Hilty and Brown (1986) were shown to several local people, such that familiar species could be pointed out. For species not previously seen, further questions were asked on location, abundance and species' habits and behaviour to corroborate the information presented. Hunters were generally accurate in their identification of species, as almost all species pointed out were either seen by the expedition or are considered likely to occur based on distribution maps.

## Results

A total of 462 bird species were recorded in Serranía de los Churumbelos using observation, sound recording, and mist-netting, including 334 species recorded in 1998, with the addition of 97 species to the list from 167 species recorded in 1999, and an addition of 31 species, 52 of which were new for SS1, amongst 162 species recorded in 2000. The bird species inventory with mist-net captures for each site is presented in **Appendix I**. A breakdown of bird results and fieldwork effort for all sites is provided in **Table 1** and species overlap between study sites is detailed in **Table 2**. If other species such as nearctic migrants (our studies took place in the nearctic Summer) and species of secondary growth considered likely in the region by Hilty & Brown (1986) are taken into consideration, we estimate that the total number of bird species present in Serranía de los Churumbelos is over 550 species. This exceptional diversity - over double the number of breeding species found in most western European countries, for example - makes the Serranía a global avian "hotspot" and stongly merits conservation action for the region.

A total of two Threatened and 10 Near-Threatened species were recorded, with five Ecuador-Peru East Andes EBA and four Colombian Inter-Andean Slopes EBA endemic species (per Stattersfield *et al*. 1998). For many species, a great deal of information, from ecology and range distribution to biometrics and plumage variations, was collected, and has been presented in several scientific publications (e.g. Salaman *et al.* 1999, 2002). Various species were sound-recorded, with tapes deposited with Wildlife Sounds, National Sound Archives (British Library). A total of 103 bird specimens were collected (from a combination of mist-netting mortality and some selectively-taken specimens) and have been deposited at ICN-MHN, Universidad Nacional de Colombia.

Range extensions and noteworthy records are detailed in Salaman et al. (2002). Some more minor range extensions are detailed in **Appendix II**, including:

- two new species for Colombia (*Phylloscartes gualaquizae* and *Piculus leucolaemus*)
- Confirmation of two additional species for Colombia previously considered hypotheitcal: *Iridosornis analis* and *Epinecrophylla spodionota*;
- one new subspecies for Colombia (*Myiophobus p. phoenicomitra*);
- the first location in Colombia for *Pulsatrix melanota*, being previously known from specimens without locality information;

- the second Colombian locality for six species (*Campylopterus villaviscensio, Pipreola chlorolepidota, Neopipo cinnamonea, Thripadectes melanorhynchus, Pipra isidorei,* and *Snowornis subalaris*).
- the first records of 34 species for the 1,000 km long Andean East slope of Colombia;
- 22 species represented significant northwards range-extensions;
- 56 species represented significant southwards range extensions;
- 33 species records lie within apparent species distributional 'gaps' along the Andean east slope; and
- 42 minor range extensions of less than 100 km (Appendix II).

Numerous small range extensions for Colombia were also noted. Additionally, there were significant downward altitude extensions for 11 species and upward extensions for 14 species. Our new distributional data presents a significant re-evaluation of Colombian bird distributions, with an astonishing number of significant range extensions and additions to the Colombian Andean East slope avifauna. The paucity of distributional information for widespread and common species e.g. *Premnoplex brunnescens*, *Pipra isidorei*, *Mionectes olivaceus*, *Platyrinchus mystaceus* and *Polioptila plumbea*, serves to emphasise the lack of previous ornithological knowledge of the region.

Rufous Motmot *Baryphthengus martii* (left), Great Jacamar *Jacamerops aurea* (middle) found at SS1. Cinnamon Manakin-Tyrant *Neopipo cinnamomea* (right), found at SS2, representing a range extension of several hundred kilometres within Colombia.

**Table 1:** Summary of ornithological fieldwork effort and results, Churumbelos 1998-1999.

| Location | Person-days' | Total sp. | Forest Sp.[1] | RDB sp.[2] | Mist-net hrs | MNH[3] | Total caps. | Re-traps | Sp. caps. |
|---|---|---|---|---|---|---|---|---|---|
| SS1: Puerto Bello | 1999: 40<br>2000: 24 | 221<br>(165/158) | 120 | 1 NT | 124.30<br>(72.50/52) | 60,805<br>(32,535/25,272) | 947<br>611/336 | 222 | 84<br>60/72 |
| SS2: Río Nabueno | 35 | 134 | 125 | 2NT; 1E | 60.00 | 27,000 | 660 | 164 | 85 |
| SS3: Alto Hornoyaco | 35 | 114 | 101 | 1T; 2NT;4E | 45.00 | 19,710 | 297 | 31 | 75 |
| SS4: Villa Iguana | 35 | 104 | 100 | 1T; 2NT;2E | 60.00 | 26,280 | 209 | 32 | 47 |
| SS5: Nabú | 18 | 110 | 101 | 1T; 2NT;3E | 52.00 | 19,130 | 386 | -[5] | 59 |
| SS6: Tatauí | 15 | 63 | 59 | 1NT | 40.00 | 9,840 | 212 | -[5] | 39 |
| SS7: El Dorón | 15 | 109 | 99 | 4NT; 3E | 30.30 | 8,235 | 459 | -[5] | 49 |
| Totals[4] | 217 | 462 (853) | 352 / 704 | 2T;11NT; 9E | 412.30 | 171,000 | 3,197 | 375 | 246/<br>414 |

[1] Forest dependant species (total less characteristically open country species)
[2] RDB= Red Data Book sp. (Collar *et al.* 1992); T= Threatened; N= Near-threatened; E= EBA sp.
[3] MNH = Mist-Net Hours per meterage (1 metre of net per hour = 1).
[4] Where two numbers appear in the totals, the first number refers to the total number of species in the Churumbelos. The second number is the sum of the column (i.e. a total of every site-species).
[5] Retrap data not available

**Study site avifauna summaries:** The principal avian elements and interesting species recorded at each site are summarised below, with additional information already presented in the journal *Cotinga* (Salaman *et al*. 1999).

**SS1: Puerto Bello** (350 m), is the most diverse site for birds with a total of 221 species recorded, but when non-forest species are excluded, a total of 120 forest-dependent species is comparable with that of other study sites. The site was characterised by a high diversity of Ramphastidae (6 spp.), Thamnophilidae (12 spp.) and Pipridae (8 spp.). In almost all groups, birds were representative of an Amazonian avifauna, but with Andean Solitaire

*Myadestes ralloides* the most notable exception, representing a significant downslope elevational extension. Lined Forest-falcon *Micrastur gilvicollis* was regularly heard in dawn surveys here (and at SS2), but was replaced at SS3 and SS4 by Barred Forest-falcon *M. ruficollis*. The elusive Cinnamon Manakin-Tyrant *Neopipo cinnamomea* was caught in primary forest, only the second location known for the species in Colombia. Other rare species with a poorly known distribution recorded here include Gould's Jewelfront *Heliodoxa aurescens*, White-shouldered Antshrike *Thamnophilus aethiops* and Swainson's Flycatcher *Myiarchus swainsoni*. A Crested Eagle *Morphnus guianensis* (Near-Threatened) was observed perched low in the forest in August 2000, but no endemic species were registered. The site is of much interest with several poorly-known species and distributional extensions, and with the highest diversity of all sites.

**Table 2**: Frequency (%) of species overlap between study sites (with study site uniqueness in bold).

| Sites | SS1 | SS2 | SS3 | SS4 | SS5 | SS6 | SS7 |
|---|---|---|---|---|---|---|---|
| SS1 | **49%** | 70% | 41% | 21% | 10% | 11% | 14% |
| SS2 | 43% | **15%** | 42% | 22% | 10% | 10% | 8% |
| SS3 | 21% | 36% | **20%** | 44% | 22% | 10% | 8% |
| SS4 | 10% | 17% | 40% | **13%** | 46% | 27% | 28% |
| SS5 | 5% | 8% | 21% | 46% | **19%** | 55% | 53% |
| SS6 | 3% | 4% | 5% | 16% | 33% | **6%** | 50% |
| SS7 | 7% | 7% | 8% | 29% | 56% | 89% | **20%** |

**SS2: Río Nabueno** (700 m). Of the 137 species recorded, 37 were not recorded at other study sites. Mist-netting proved immensely successful with 85 species caught, the highest of all sites, excluding 2000 results. The main reason for the success of mist-netting at this site was probably the location of the transect along a ridge-top, which funnelled species from all strata of the canopy into our nets. Thamnophilidae (11 spp.) and Pipridae (8 spp.) continued to dominate, although more species of Thraupinae (12 spp.) were recorded than at SS1. Trochilidae diversity and abundance appeared to be much increased on the basis of mist-net captures. The site was also most notable with 16 elevational range extensions, largely new highest records of Amazonian species. One Near-Threatened species was recorded: Pink-throated Brilliant *Heliodoxa gularis*. *H. gularis* is known in Colombia from just one specimen, collected in 1971 in Putumayo (Hilty and Brown 1986) and was found sympatric with Black-throated Brilliant *H. schreibersii*. Band-bellied Owl *Pulsatrix melanota* was previously known in Colombia from one specimen of undetermined location or date (Hilty and Brown 1986) and a recent sight record by PS (Salaman *et al*. 2002). Individuals and pairs were regularly heard and tape-recorded in primary forest at SS2 and SS3, with one adult caught and photographed at SS2. Another species that has previously been considered threatened was found at this site: Lanceolated Monklet *Micromonacha lanceolata*. Grey-tailed Piha *Snowornis subalaris* is well-known in Ecuador, but a recent addition to the Colombian list, following the discovery of two specimens taken in the 1960s (Dick 1991). Several individuals were seen in the subcanopy and four birds were trapped. Additional notable range extensions include Buff-tailed Sicklebill *Eutoxeres condamini* (sympatric with White-tipped Sicklebill *E. aquila*), Striped Treehunter *Thripadectes holosticus*, Hairy-crested Antbird *Rhegmatorhina melanosticta* and Olive Tanager *Chlorothraupis carmioli*.

Band-bellied Owl *Pulsatrix melanota* - the first confirmed locality for Colombia.

**SS3: Alto Río Hornoyaco** (1,100 m). A total of 114 species were recorded here, being mostly typically Andean or foothill species, including 15 Thraupinae species. Two Near-Threatened species were recorded: Ecuadorian Piedtail *Phlogophilus hemileucurus* (previously known in Colombia from just one location in Putumayo (Hilty and Brown 1986)) and Fiery-throated Fruiteater *Pipreola chlorolepidota*. Napo Sabrewing *Campylopterus villaviscensio*, caught several times here and at SS4, was unknown in Colombia prior to 1998 (Salaman and Mazariegos 1998). One individual of Scaled Piculet *Picumnus squamulatus*, a species typically restricted to dry open woodland in the Orinoco basin (Hilty and Brown 1986), was captured in an isolated patch of secondary growth within a vast forest wilderness at SS3: representing a significant range extension. Foothill Antwren *Epinecrophylla spodionota*, with observations and ten mist-net captures in both primary and secondary forest at SS3, was previously known only from sight records in Colombia (Willis 1988). Blue-rumped Manakin *Pipra isidorei*, with a total of 27 mist-net captures at SS1-3 (of which 20 were at SS3) was previously known from just one Colombian record (Hilty and Brown 1986). Among other significant distributional records at this site, Golden-winged Tody-flycatcher *Todirostrum calopterum* is an Upper Amazon/Napo lowlands EBA endemic. Colombia's first individual of the nominate subspecies of Orange-crested Flycatcher *Myiophobus p. phoenicomitra* was photographed. A pair of White-winged Tanagers *Piranga leucoptera* observed on the forest edge represent a significant range extension and the first east slope record for Colombia. Ecuadorian Bristle-Tyrant *Phylloscartes gualaquizae* was mist-netted but not collected at this site [*contra* Salaman et al. (2002), not collected and not at SS5].

**SS4: Villa Iguana** (1,400 m). 106 species were recorded here. The avifauna was almost entirely Andean in composition, with, e.g. just four Formicariidae, but 16 Thraupinae. There were some notable exceptions. For example, Golden-headed Manakin *Pipra erythrocephala* was recorded at its highest elevation to date. One Threatened species—Military Macaw *Ara militaris* considered Vulnerable (Collar *et al.* 1992) - was observed daily in flocks of up to 12 birds around the mesetas, at SS3 and SS4 from 4–17 August 1998. The considerable localised activity, particularly in forests adjacent to the large limestone cliffs of Alto Cagadero suggests that the Churumbelos are an important area for the species. Yellow-throated Tanager *Iridosornis analis*, a recent addition to the Colombian list, was observed several times in the forest canopy. Other highlights included White-tipped Swift *Aeronautes montivagus*, Lyre-tailed Nightjar *Uropsalis lyra*, Rufous-vented Whitetip *Urosticte ruficrissa*, Violet-fronted Brilliant *Heliodoxa leadbeateri*, Black-billed Treehunter *Thripadectes melanorhynchus,* Rufous-tailed Tyrant *Knipolegus poecilurus*, and Vermilion Tanager *Calochaetes coccineus.*

**SS5: Nabú** (1,900 m). A total of 109 species were recorded, with Thraupinae (14 sp.) predictably diverse, but with strikingly high diversity of Tyrannidae (16 sp.) and Furnariidae (10 sp.). Two individuals of the Vulnerable Hooded Antpitta *Grallaricula cucullata* were captured at this site. Other poorly-known species and important range extensions noted include Red-billed Parrot *Pionus sordidus*, Spectacled Prickletail *Siptornis striaticollis*, Schwarz's Antthrush *Chamaeza turdina* and White-capped Tanager *Sericossypha albocristata*.

**SS6: Tatauí** (2,200 m). A significantly reduced avian richness was noted at this site (63 species), with few arboreal insectivores e.g. Furnariidae and Dendrocolaptidae. However, the ridgetop physiognomy facilitated improved canopy observations, and a greater number of higher-elevation supracanopy species, e.g. Psitticidae and Accipitridae, were recorded than at SS5 or SS7. Nectarivorous birds were encouraged by the high density of flowering Bromeliads, with hummingbirds the most dominant family. *Diglossa* Flowerpiercers (four spp.) dominated multi-species foraging flocks. The Near-Threatened Black-and-Chestnut Eagle *Spizaetus isidorei* was observed soaring over the forest. Another notable range extension was Flammulated Treehunter *Tripadectes flammulatus*. A male Purple Honeycreeper *Cyanerpes caeruleus* observed foraging on bromeliads on an exposed summit peak at 2,300m presents a substantial elevation extension from 1,400 m (Hilty and Brown 1986).

**SS7: El Dorón** (2,450 m). A total of 112 species were recorded. The slightly greater diversity encountered here than at SS5-6 was due to the presence of typically secondary growth species in addition to forest species. Trochilidae were extremely abundant and diverse with 15 species recorded, including the poorly-known Gorgeted Woodstar *Acestrura heliodor* and Rufous-vented Whitetip *Urocsticte ruficrissa*, endemic to EBA 044. Three Galliformes, especially vulnerable to human settlement, were recorded: Wattled Guan *Aburria aburri* (Vulnerable), Chestnut Wood-Quail *Odontophorus hyperythrus* (Near-Threatened), and Sickle-winged Guan *Chaemepetes goudotii*. Dusky-headed Brush-Finch *Atlapetes fuscoolivaceus* (Near-Threatened) was observed briefly on separate occasions in scrub growth around the communication installations, in multi-species foraging flocks. Other interesting range extensions include Stygian Owl *Asio stygius* and Ocellated Tapaculo *Acropternis orthonyx*.

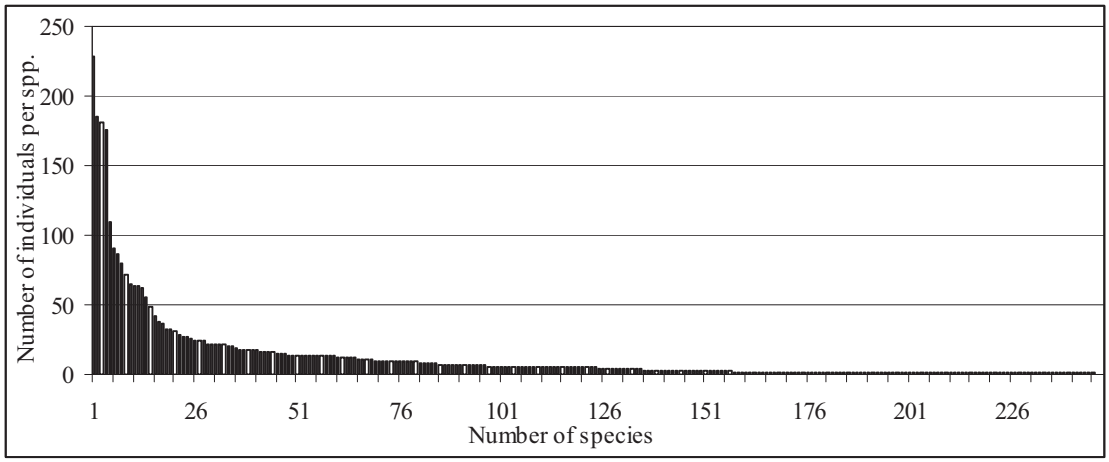
**Mist-netting results:** A total of 3,196 mist-net captures (1,804 in 1998; 1,057 in 1999; 336 in 2000) of 246 species were captured over 142,730 MNH. The most productive site for mist-netting was SS7, with over 200 individuals caught in one day, whilst SS2 produced over 100 captures on three consecutive days. The most abundant species (>24 captures or >0.8% of the sample) caught across all sites are summarised in **Table 3**. The rank-ordered relative abundance curve for the 246 species is presented in **Figure 1**, and illustrates the small number of "common" species and a long tail of "rare" species (with 49.2% of species represented by <5 captures), typical of tropical mist-net studies. A summary of biometric statistics for selected noteworthy species is presented in **Table 4**.

Between bird families, Trochilidae (Hummingbirds) dominated captures, with 887 captures (27.7% overall) of 41 species, closely followed by Tyrannidae (Tyrant-Flycatchers) with 632 captures (19.7% overall) of 33 species. Dendrocolaptidae (Woodcreepers) and Thamnophilidae (Typical Antbirds) represented 8.0 and 6.3% of captures, but species diversity was very different, with 11 versus 30 species, respectively. Thamnophilidae diversity showed strong affinities to altitude with greatest diversity represented at 350 m with 48% captures /12 spp. declining to 7% captures /3 spp. at 1,400 m and <1% captures/ 2 species at 2,450 m. Furthermore, Thamnophilidae diversity correlated strongly with terrestrial ant diversity (see Entomology - Ants).

**Table 3:** The most abundant species mist-netted in Serranía de los Churumbelos (all those with >24 captures).
(F = Frugivore; I = Insectivore; N = Nectivore)

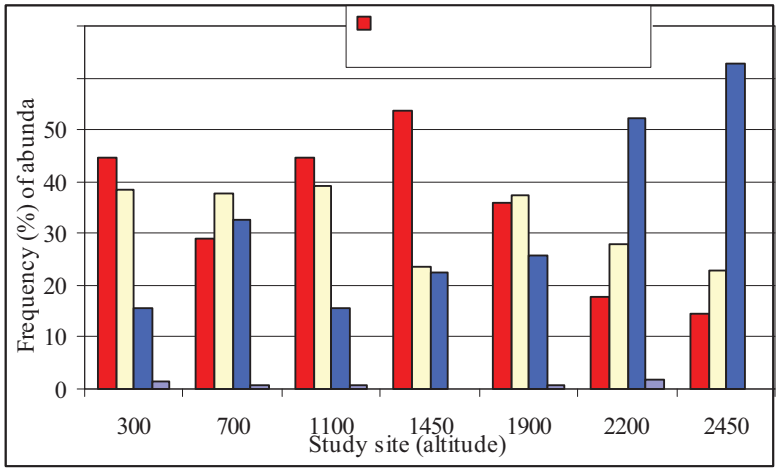
| Species | # of captures | Species | # of captures |
|---|---|---|---|
| Olive-striped Flycatcher (F) | 229 | Orange-bellied Euphonia (F) | 62 |
| Blue-crowned Manakin (F) | 185 | Greenish Puffleg (N) | 55 |
| Streak-necked Flycatcher (F) | 181 | Golden-headed Manakin (F) | 49 |
| Wedge-billed Woodcreeper (I) | 176 | Straight-billed Hermit (N) | 42 |
| Speckled Hummingbird (N) | 110 | Buff-tailed Sicklebill (N) | 38 |
| Ochre-bellied Flycatcher (I) | 90 | White-flanked Antwren (I) | 36 |
| Long-tailed Hermit (N) | 87 | Golden-winged Manakin (F) | 32 |
| Collared Inca (N) | 80 | Tawny-bellied Hermit (N) | 32 |
| Pale-tailed Barbthroat (N) | 71 | Bronzy Inca (N) | 31 |
| White-plumed Antbird (I) | 65 | Ocellated Woodcreeper (I) | 28 |
| Andean Solitaire (F) | 64 | Blue-rumped Manakin (F) | 27 |
| Emerald-bellied Puffleg (N) | 63 | Purple Honeycreeper (N) | 27 |
| | | Spotted Barbtail (I) | 26 |

**Figure 1**: Rank order of relative abundance for each species for all study sites in Serranía de los Churumbelos.



Three principal trophic guilds –frugivores, nectarivores and insectivores- dominate the sample, whilst carnivores represent 19 captures of 7 species, including four raptors and a large owl. There were very few granivore species recorded, highlighting that mist-netting was conducted exclusively within forest (where seedeaters are largely absent). Based on numbers of mist-net captures, the abundance of each guild was roughly equal, with the community composed of 30.2%, 34.3% and 34.7% nectarivores, frugivores and insectivores respectively. However, species richness across trophic guilds was variable, with 18.7% (46 spp.), 24.0% (59 spp.), and 55.7% (137 spp.) for nectarivores, frugivores and insectivores, respectively. Insectivores have the highest species richness with 137 species, and an average capture total for each species of just 8 individuals versus 21 for nectarivores. A breakdown of the proportion of captures for each guild across the altitudinal gradient (**Figure 2**) reveals the distinct trends of increasing nectarivore abundance and declining insectivore abundance with increasing altitude, being particularly pronounced above 2,000 m elevation. Frugivore dominance in mist-net samples was remarkably consistent across sites, and is greatly influenced by the very high abundance of *Mionectes* species (*olivaceus oleaginus* and/or *striaticollis*) at all elevations.

**Figure 2**: The comparison of abundance (percentage frequency) for each trophic guild in each study site across the altitudinal gradient in Serranía de los Churumbelos.




**Interviews with local hunters:** Through such talks, useful information was gained on conspicuous species (e.g. Psitticidae and Icteridae) and on species which are a frequent target of hunting (e.g. Cracids and Tinamous). Many species identified as being present by hunters were later confirmed by fieldwork. However, the following records were recorded by hunters and considered noteworthy and reliable:

**Grey Tinamou** *Tinamus tao*, recorded only at **SS4** during the expedition, was recognised as present, at low elevations and into the foothills (around **SS2-3**). **Cinereous Tinamou** *C. cinereus* was identified at **SS1** (with a near-perfect rendition of the species' call). **Highland Tinamou** *Nothocercus bonapartei* was identified by a guide during fieldwork at **SS5**. The Threatened **Black Tinamou** *Tinamus osgoodi* was also highlighted as being present by two guides in the region of **SS5**. **Salvin's Curassow** *Mitu salvini* was identified as present by all hunters in the lowlands. This was confirmed in August 2000, when we photographed a locally-captured juvenile in captivity. The presence of **Wattled Curassow** *Crax globulosa* was debated by hunters; some claimed to have seen it, others not. **Black Curassow** *Crax alector* was identified and the call of **Common Piping-Guan** *Pipile pipile* was pointed out by one local person in the field at dusk. All hunters interviewed in the lowlands identified **Nocturnal Curassow** *Nothocrax urumutum*, as a brown 'paujil' which calls at night in lowland regions. The diagnostic **Striped Owl** *Rhinoptynx clamator* (unrecorded on the expedition) was noted as present around SS1. In addition to the common Egrets, **Fasciated Tiger-Heron** *Tigrisoma facsciatum* and **Striated Heron** *Butorides striatus* were noted as present. **Black-banded Crake** *Amerolimnas fasciatus* was recognised from around SS1, and may have been the unidentified Crake seen briefly during fieldwork in 2000.

**Distributional patterns:** Species distributional patterns from the lowlands to highlands in the Cordillera Oriental are illustrated for certain groups in **Appendix I**, particularly within families and genera. For example, within the genera *Dendrocincla*, *Thripadectes*, *Mionectes*, *Henicorhina* and *Cyclarhis*, altitudinal species replacements are evident from the capture data. Only a small number of species (62) were recorded at SS6 owing to the species-poor stunted forest

**Table 4:** Summary statistics for biometrics for noteworthy species mentioned in the text presented as mean ± standard deviation, *n.* flattened wing cord (mm), body length (mm), weight (grams).

| Species | *n.* | wing len. | s.d. | body len. | s.d. | weight | s.d. |
|---|---|---|---|---|---|---|---|
| **Band-bellied Owl** *Pulsatrix melanota* | 1 | 285.00 | - | 370.00 | - | - | - |
| **Blue-fronted Lancebill** *Doryfera johannae* | 21 | 56.38 | ±5.32 | 109.52 | ±7.56 | 5.40 | ±3.31 |
| **Green Hermit** *Phaethornis guy* | 11 | 60.82 | ±1.54 | 146.91 | ±8.32 | 5.20 | ±0.31 |
| **Buff-tailed Sicklebill** *Eutoxeres condamini* | 22 | 73.86 | ±5.08 | 133.77 | ±6.00 | 12.40 | ±1.62 |
| **Napo Sabrewing** *Campylopterus villaviscensio* | 13 | 72.00 | ±3.65 | 137.31 | ±8.27 | 8.30 | ±1.43 |
| **Brown Violetear** *Colibri delphinae* | 2 | 73.50 | ±0.71 | 112.00 | ±2.83 | 6.35 | ±0.21 |
| **Violet-headed Hummingbird** *Klais guimeti* | 2 | 60.50 | ±0.70 | 83.50 | ±9.19 | 2.80 | ±0.42 |
| **Rufous-vented Whitetip** *Urosticte ruficrissa* | 7 | 58.14 | ±2.91 | 106.14 | ±8.95 | 4.30 | ±0.22 |
| **Ecuadorian Piedtail** *Phlogophilus hemileucurus* | 3 | 52.33 | ±1.53 | 94.66 | ±1.53 | 3.50 | ±0.00 |
| **Gould's Jewelfront** *Heliodoxa aurescens* | 5 | 60.00 | ±2.74 | 106.40 | ±5.03 | 6.60 | ±0.58 |
| **Black-throated Brilliant** *Heliodoxa schreibersii* | 6 | 67.17 | ±0.41 | 125.50 | ±3.62 | 7.97 | ±0.84 |
| **Pink-throated Brilliant** *Heliodoxa gularis* | 2 | 64.00 | ±0.00 | 109.50 | ±0.71 | 5.90 | ±0.20 |
| **Violet-fronted Brilliant** *Heliodoxa leadbeateri* | 7 | 69.71 | ±4.64 | 118.86 | ±6.28 | 7.00 | ±0.53 |
| **Black-throated Trogon** *Trogon rufus* | 4 | 115.25 | ±5.91 | 258 | ±14.58 | 57.10 | ±1.03 |
| **Lanceolated Monklet** *Micromonacha lanceolata* | 2 | 61.50 | ±0.71 | 129.00 | ±1.41 | 20.90 | - |
| **Black-streaked Puffbird** *Malacoptila fulvogularis* | 1 | 95.00 | - | 210.00 | - | 49.80 | - |
| **Scaled Piculet** *Picumnus squamulatus* | 1 | 55.00 | - | 97.00 | - | 11.00 | - |
| **Black-banded Woodcreeper** *Dendrocolaptes picumnus* | 3 | 135.67 | ±4.04 | 306.67 | ±2.89 | 136.50 | ±12.02 |
| **Striped Treehunter** *Thripadectes holosticus* | 2 | 83.50 | ±0.71 | 180.00 | ±2.83 | 30.30 | ±0.71 |
| **Black-billed Treehunter** *Thripadectes melanorhynchus* | 7 | 92.71 | ±2.56 | 195.29 | ±12.66 | 41.80 | ±7.25 |
| **Gray-throated Leaftosser** *Sclerurus albigularis* | 1 | 91.00 | - | 180.00 | - | 43.30 | - |
| **Sharp-tailed Streamcreeper** *Lochmias nematura* | 1 | 73.00 | - | 147.00 | - | 30.00 | - |
| **White-shouldered Antshrike** *Thamnophilus aethiops* | 2 | 71.00 | ±4.24 | 149.00 | ±11.31 | 29.00 | - |
| **Russet Antshrike** *Thamnistes anabatinus* | 2 | 74.50 | ±3.54 | 160.00 | ±16.97 | 23.45 | ±3.88 |
| **White-streaked Antvireo** *Dysithamnus leucostictus* | 1 | 71.00 | - | 138.00 | - | 20.20 | - |
| **Stipple-throated Antwren** *Epinecrophylla haematonota* | 2 | 50.50 | ±0.71 | 110.00 | ±4.24 | 9.95 | ±1.06 |
| **Foothill Antwren** *Epinecrophylla spodionota* | 9 | 53.00 | ±1.22 | 113.44 | ±4.19 | 10.84 | ±0.53 |
| **Hairy-crested Antbird** *Rhegmatorhina melanosticta* | 1 | 80.00 | - | 146.00 | - | 31.40 | - |
| **Spot-winged Antbird** *Schistocichla leucostigma* | 4 | 68.25 | ±1.89 | 151.50 | ±5.74 | 25.70 | ±1.20 |
| **White-plumed Antbird** *Pithys albifrons* | 26 | 69.65 | ±1.72 | 130.68 | ±5.67 | 20.39 | ±1.91 |
| **Scale-backed Antbird** *Hylophylax poecilinota* | 3 | 68.67 | ±2.08 | 130.33 | ±3.21 | 18.65 | ±1.48 |
| **Short-tailed Antthrush** *Chamaeza campanisona* | 8 | 94.25 | ±1.75 | 192.13 | ±7.28 | 82.30 | ±6.27 |
| **Golden-headed Manakin** *Pipra erythrocephala* | 30 | 60.20 | ±3.39 | 97.258 | ±8.46 | 12.40 | ±2.11 |
| **Blue-rumped Manakin** *Pipra isidorei* | 25 | 51.38 | ±1.55 | 87.36 | ±2.91 | 7.800 | ±0.78 |
| **Scaled Fruiteater** *Ampelioides tschudii* | 1 | 105.00 | - | 200.00 | - | 79.00 | - |
| **Gray-tailed Piha** *Snowornis subalaris* | 3 | 131.33 | ±4.51 | 244.67 | ±5.03 | 79.10 | ±4.00 |
| **White-eyed Tody-Tyrant** *Hemitriccus zosterops* | 6 | 49.67 | ±3.50 | 110.33 | ±6.47 | 8.50 | ±0.74 |
| **Golden-winged Tody-Flycatcher** *Todirostrum calopterum* | 1 | 51.00 | - | 93.00 | - | - | - |
| **Cinnamon Manakin-Tyrant** *Neopipo cinnamomea* | 1 | 51.00 | - | 100.00 | - | 7.20 | |
| **Orange-crested Flycatcher** *Myiophobus phoenicomitra* | 2 | 62.50 | ±0.71 | 126.50 | ±4.95 | 11.70 | ±0.64 |
| **Orange-eared Tanager** *Chlorochrysa calliparaea* | 5 | 67.20 | ±3.27 | 120.60 | ±9.56 | 16.50 | ±0.64 |
| **Olive Tanager** *Chlorothraupis carmioli* | 13 | 86.23 | ±3.39 | 162.31 | ±10.25 | 36.58 | ±2.23 |

Only two species (0.4%), Orange-bellied Euphonia *Euphonia xanthogaster* and Andean Solitaire *Myadestes ralliodes* were recorded at all sites. Three other species: Black Vulture *Coragyps atratus*, White-collared Swift *Streptoprocne zonaris* and Golden-winged Manakin *Masius chrysopterus* were recorded at all but one site.

219 species (47% of the total) were recorded at one site only, with SS1 the most "unique", with 109 species recorded at this site only, although greater fieldwork efffort at this site led to more species being recorded and may exaggerate the "uniqueness" recorded. As shown in Table 1, the species totals from both 1998 and 2000 at SS1 (164 and 158 spp. respectively), were remarkably similar, despite very different person-days effort (40 and 24, respectively).

Table 1 illustrates the "uniqueness" of each site (i.e. percentage of species for the site which were recorded at that site only). The average "uniqueness" was 20%, with SS1 the highest (49%) and SS6 the lowest (6%). It should be noted that sites on the extremes (SS1 and SS7) have exaggerated uniqueness compared to sites with two adjacent sites. For example, SS5 (1800 m) contains some species also found at SS4 (1450 m) and others found at SS6 (2200 m), whereas there is no SS0 at 0 m, nor SS8 at 2800 m which would reduce apparent "uniqueness" of SS1 / SS7.

Table 1 illustrates the extent of species overlap between sites. Sites 1 & 2; 3 & 4; and 5 & 6 & 7 show closest general affinities, although adjacent sites (e.g. SS2 – 3) also show some affinities. The highest affinity of all was between SS6 and SS7, with 89% of SS6 species also recorded at SS7. The overlap between sites shows a very consistent pattern, especially when percentages are inspected, with affinities decreasing with increasing vertical distance between sites. The affinity between SS1 and SS7 shows a surprisingly close overlap, because

of the partially secondary habitat that characterised both these sites. SS6 also provides deviations from the norm, as with only 62 species, overlaps with other sites are low.

When non-forest-dependent species are excluded from each site's species richness total (*ca*.69 characteristically open-country species), site inventory totals are quite similar (with the exception of SS6 as previously explained). However, site species richness totals still reveal a general decrease in diversity along the altitudinal gradient, from SS1 in the Amazonian foothills to SS7 in upper premontane Andean forest. The general decrease can be attributed to three factors: decreasing habitat structural complexity (physionomy); decrease in productivity/reduced biomass; and decrease in geographical areas of certain elevation with altitude. These factors lead to less available resources and narrower niches with increasing elevation. Forest-dependent species accounted for 84% (352) of all species recorded. The exceptionally high level of species congruity to forest at all sites (with the exception of SS1 and SS7 which also encompassed some non-forest areas) is a reflection of the quality of natural forest in the region.

Significantly lower person-effort in 1999 (3 ornithologists) verses 1998 (5 ornithologists) did not apparently result in significant changes in species richness measured, e.g. 106 species recorded at SS4 (1998) and 109 species at SS5 (1999). Four ornithologists at SS1 in 2000 registered just 11 fewer species in 3 fewer days of fieldwork than five ornithologists in 1998. With comparable results between years, considerable benefits of the smaller teams included large budget savings and easier logistics. A reason for this efficiency in 1999 and 2000 may be increased experience of the team with the species of the region and the general effectiveness of mist-nets.

Taking into account variations in fieldwork effort, several patterns of avifauna distribution emerge:

- overall avian species richness gradually declines along the altitudinal gradient from 350 m to 2,450 m,
- forest-dependent species richness remains fairly constant with increasing elevation;
- the majority of threatened species were encountered at premontane and lower montane elevations.
- range-restricted species define study site zoogeographical affiliations, with two major zoogeographic regions, the *Northern Andean* (NAN) and *Amazonia North* (AMN), strongly influencing the Serranía;
  a) SS1 & SS2 (**below 1,000 m**) = great biological affinities to **AMN zoogeographic region**.
  b) SS3 - SS7 (**above 1,000 m**) = close biological affinities to the **NAN zoogeographic region**.
- greater definition can be assigned as a large proportion of species originate from two zoogeographic subregions; *Eastern Slope Andes* (within NAN) and *Río Negro West* (within AMN).

**Threatened species recorded in Serranía de los Churumbelos**

The following species are classified as Threatened or Near-Threatened by BirdLife International (2004). As these species are in danger of extinction, it is of utmost importance that where such species are found, information on ecology should be collected and distributed, and that suitable habitats are protected. The protection of Threatened species also helps protect the forests in which they live, its biological communities and other non-threatened species. A total of 10 threatened species (2 Vulnerable and 8 Near-Threatened species) were recorded in Serranía de los Churumbelos.

**Black-and-Chestnut Eagle *Spizaetus isidorei*** **Status: Near-Threatened**

Although distributed from Venezuela south to Argentina, this species has a highly fragmented range. *O. isidorei* was recognised as present by local people around **SS5**, and one individual soared overhead at **SS6** where a low canopy facilitated improved conditions for raptor watching.

**Crested Eagle** *Morphnus guianensis* **Status: Near-Threatened**

Crested Eagle is sparsely distributed throughout its extensive range from Guatemala through Colombia to northern Argentina. It is found in lowland tropical and subtropical forest, typically below 600 m. Its large size and low population densities make the species particularly vulnerable to hunting and deforestation pressures with recent contractions of range and serious declines in population noted (BirdLife International 2004). Whilst a typically vocal Toucanet was being extracted out of a mist-net by PS at **SS1** in August 2000, an individual flew up and perched beside the net (*ca*.5 m) to observe the commotion. Although the full body was not seen (obscured by vegetation), the lower body and tail were exposed and the enormous bird was observed flying away through the subcanopy. Whilst it is hard to differentiate this species from an immature Harpy Eagle *Harpia harpyja* (which has no breast band) in such a brief observation period, the sleeker body and long tail in flight seem consistent for Crested Eagle.

**Chestnut Wood-Quail *Odontophorus hyperythrus*** **Status: Near-Threatened**
After talks with hunters identified this species, its presence was confirmed at **SS4** (heard), **SS5** (seen and heard), **SS6** (heard) and **SS7** (daily heard and tape-recorded). At **SS7**, probably two family groups were present along the 1 000 m transect. These records represent a small southeast range extension from the head of the Magdalena valley, but the first records for the Andean East slope. This range of this poorly-known species may be greater than is currently thought.

**Wattled Guan *Aburria aburri*** **Status: Near-Threatened**
Wattled Guan is regarded as a Very High Conservation Priority by the *Cracid Specialist Group* due to high levels of hunting and deforestation in its range (e.g. *c*. 95% deforestation of the Colombian Central Andes (Carrizosa 1990)). It is described by hunters as extremely rare in most areas. Although noted as present by hunters in the highlands, we did not locate the species until **SS7** where one male was heard and tape recorded at dusk along the transect. The presence of at least three species of Curassows (Black Curassow *Crax alector*; Nocturnal Curassow *Nothocrax urumutu*; Salvin's Curassow *Mitu salvini*), Common Piping-Guan *Pipile pipile*, *O. hyperythrus* and Sickle-winged Guan *Chamaepetes goudotii* highlights the Serranía de los Churumbelos as an important area for Cracid and Galliform conservation (Salaman *et al* 2000, 2001, 2004).

**Military Macaw *Ara militaris*** **Status: Vulnerable**
Although formerly widespread through the western Neotropics from Mexico south to Argentina, this species has declined greatly with deforestation of its preferred forest habitat and unsustainable capture for the pet trade. It now occupies only a fraction of its former range (Howell and Webb 1995). A flock of up to 12 birds was observed daily at **SS3** and **SS4**. This flock appeared to be based largely around the limestone cliffs of Alto Cagadero, but was observed foraging widely throughout the forested valleys down from 1600 m to *ca*.600 m elevation. Its wide-ranging habits may be a factor towards the species' demise, as few expansive areas of Andean forest survive today. The conservation of large forest fragments such as Serranía de los Churumbelos, including those with a wide altitudinal span, as well as clampdowns on illegal trade are critical for the conservation of this species.

**Pink-throated Brilliant *Heliodoxa gularis*** **Status: Near-Threatened**
This Near-Threatened foothill species is endemic to the Ecuador-Peru East Andes EBA, known from 900-1 050 m elevation (Stattersfield *et al.* 1998). It was previously known in Colombia from a single specimen collected in 1971 at Estación de Bombeo Guamués, Dpto Putumayo (Fitzpatrick & Willard 1982). Three individuals were caught at **SS2**, showing sympatry with *H. schreibersii*. These represent an important 70 km northwards range extension for the species and an altitudinal extension downwards to 700 m. *H. gularis* appears to be primarily a subcanopy species. It was caught only in the top rung of the mist-nets at **SS2** where a ridgetop and associated low canopy facilitated captures.

**Ecuadorian Piedtail *Phlogophilus hemileucurus*** **Status: Near-Threatened**
This little known Near-Threatened species (BirdLife International 2000) was previously known only in Colombia from three specimens in Dpto Putumayo (Fitzpatrick & Willard 1982). We captured three individuals at **SS3**, representing the second Colombian locality and a 70 km northerly range extension for the species. It was caught in both primary and mature secondary growth. *P. hemileucurus* has subsequently also been recorded south of Serranía de los Churumbelos in the east slope of Dpto. Nariño (Salaman *et al* in press).

**Hooded Antpitta *Grallaricula cucullata*** **Status: Vulnerable**
This species is known from just a handful of localities in all three Colombian Andean ranges, including nearby PNN Cueva de los Guácharos, where it was considered "common" by P. Gertler between 1,800 and 2,100m (Hilty and Brown, 1986). Collar *et al*. (1992) consider its habitat seriously threatened in Colombia, and that priorities for this species include surveys of "other likely areas in order to determine the overall status of the bird and with the aim of facilitating the protection of those areas". Two individuals of this species were captured at **SS5**, although we were unable to make field observations. With much primary forest within the species' very narrow elevational range, Serranía de los Churumbelos is a very important new location for this species.

**Fiery-throated Fruiteater** *Pipreola chlorolepidota* **Status: Near-Threatened**
A sight record near Florencia led to the classification of this foothill species as "hypothetical" in Colombia (Hilty & Brown 1986), known mostly from 600-1,300 m elsewhere (Ridgely and Tudor 1994). Individuals and pairs in multi-species foraging flocks or alone fed on small fruits of shrubs and herbaceous plants (1-5 m) on forest borders with Orange-bellied Euphonia *Euphonia xanthogaster* and other species at **SS3-4**. One male was observed very low in secondary growth near a clearing and calling a high-pitched "*pitch*" ("*stiek*" in Willis 1988) at **SS3** (8 August 1998). Also observed at **SS4** (17 August by DD) *ca.* 5 m up in bushes on the edge of a

landslide gap at the base of Alto Cagadero (1,500 m). One individual was observed at Rio Rumiyaco, Nariño (*ca.* 900 m by M. Alvarez: Salaman *et al* 2002). Willis (1988) reports the species at El Paraíso, Dpto Huila in 1962 in multi-species foraging flocks in the understorey. Further recent records confirm the species' presence in Colombia, with detailed observations by PS on five occasions beside the Río Guamués, 3 km west of Estación de Bombeo Guamués, Dpto Putumayo (0°38'N 77°02'W, 800 m) from 23-29 August 1993. The species' presence on the east slope of Colombia is now well established, although not officially confirmed by photographic or specimen evidence.

**Dusky-headed Brush-Finch** *Atlapetes fuscoolivaceus* **Status: Near-Threatened**
Observed twice briefly at **SS7** in secondary growth below the Telecom Tower in multi-species foraging flocks also including White-sided Flower-piercer *Diglossa albilatera* and the confusingly similar race of Common Bush-Tanager *Chlorospingus ophthalmicus* found at the site. This Near-Threatened species is endemic to the head of the Magdalena Valley in Colombia. This presents the southernmost record to date, and a small range extension to *c*. 100 m over the head of the Magdalena Valley to the Andean East slope.

**Restricted-Range Bird Species**
In recent years, the biological importance and uniqueness of centres of endemism has been recognised, particularly through the Endemic Bird Area (EBA) programme of BirdLife International (Stattersfield *et al*. 1998). The Churumbelos lie at the confluence of up to 5 different Endemic Bird Areas, with influences from the Central Cordillera, the Eastern Cordillera, Amazonia, the eastern slope of the Andes and the Magdalena valley.

Nine range-restricted species were recorded; Napo Sabrewing *Campylopterus villaviscensio* (**SS3**) (EBA 044; Ecuador-Peru East Andes); Ecuadorian Piedtail *Phlogophilus hemileucurus* (**SS3**) (EBA 044); Pink-throated Brilliant *Heliodoxa gularis* (044) (**SS2**); Rufous-vented Whitetip *Urosticte ruficrissa* (**SS4, SS7**) (044, EBA 040; Colombian inter-Andean slopes); Golden-winged Tody-Flycatcher *Todirostrum calopterum* (**SS3**) (066; Upper Amazon-Napo lowlands); White-streaked Antvireo *Dysithamnus leucostictus* (**SS3, SS4**) (044); Chestnut Wood-Quail *Odontophorus hyperythrus* (**SS4, SS5, SS6, SS7**) (040); Hooded Antpitta *Grallaricula cucullata* (**SS5**) (040); and Dusky-headed Brush-Finch *Atlapetes fuscoolivaceus* (**SS7**) (040). Black Tinamou *Tinamus osgoodi*, noted as present by local hunters at SS5, is also an EBA 040 endemic.

Five endemics originated from the Ecuador–Peru East Andes EBA (044), and four endemics (one shared) from the Colombian Inter-Andean Slopes EBA (040). The five EBA 044 species represent a significant northerly range-extension of EBA 044's zone of influence. Perhaps not surprisingly, EBA 044 characterises sites in the premontane elevations from **SS2-SS4** (650–1,450 m). However, the higher elevations of the Serranía (**SS5–7** from 1800–2,500 m) were characterised by EBA 040, possibly due to some Magdalena Valley specialists including a small range on the east slope. The botanical assessment (above) confirms the strong affinities of SS5-7 to high elevation forest of the Magdalena Valley. A small southerly range extension is thus presented for EBA 040. The coincidence of two subtropical Endemic Bird Areas characterising the same massif is of interest and highlights the conservation importance of the Churumbelos for range-restricted species.

## *Discussion*

**Evaluation of sites**
Justifying the designation of study sites as protected areas requires accurate evaluations to be made. Traditionally the evaluation of sites has been based on species richness. However, the distinctive character of fauna within centres of endemism is of greater importance than total species-richness *per se* (Terborgh and Winter 1983, Stattersfield *et al.* 1998). Diamond (1988) considered that centres of endemism correlate well with high species richness. However, for the following reasons, species richness alone has not been used in our analyses of avaian diversity and conservation assessment:

i) Species richness estimates depend greatly on the time in the field and other factors such as time of year, weather, and competence of observers. Any evaluation becomes particularly biased by varying amounts of field effort for each site and the type of habitat surveyed, e.g. many species are seen within a short period in deforested areas, whilst forests require much more effort.
ii) Species richness does not accurately reflect the conservation priority of areas, but merely reflects biodiversity (see Salaman 1994). An endemic or threatened species is of no more value than a widespread and common species when this method is used.
iii) Species richness is highest in areas that have been subject to a certain degree of intermediate human disturbance creating a mosaic of habitats. Many forest-based as well as widespread opportunistic species encountered in disturbed habitats require low or minimal conservation effort. Furthermore, the number of restricted range species is often low in disturbed habitats where species richness is highest.

To form an accurate picture from which conservation priorities may be drawn, a scoring system has been used, based on Salaman (1994), which takes threatened, endemic and specialised species into account. The scores reflect the priority of a study site by calculating the average species score. By dividing the total score by species richness for each site, a value for that bird population is given. The criteria for scoring shown below follows Salaman (1994) with the score assigned for each species shown in **Appendix I**. Whilst there is much overlap between score evaluations, and the system is somewhat arbitrary, the aim is to provide a basic indication of conservation value versus species richness *per se*, i.e. to distinguish between forest-dependent species, threatened species, those of little conservation interest.

**Score Evaluation**

**0** Widespread or common species adapted to degraded forest or wide range of habitats.
**1** Species at terminal links in the food chain (e.g. raptors, large frugivores) or forest dependant.
**2** Species at risk because of specific habitat requirements or directly threatened by man (e.g. hunted).
**3** Endemic species as defined by Stattersfield *et al.* (1998) or exceptionally poorly known species.
**4** Threatened and near-threatened species (according to BirdLife International 2000).

**Table 5**: Summary of scoring system and species-richness for each study site.

| Study site (metres) | Scores 0 | 1 | 2 | 3 | 4 | Total score | Species richness | Average sp score |
|---|---|---|---|---|---|---|---|---|
| **SS1 - 350 m** | 118 | 74 | 25 | 3 | 1 | 137 | 221 | **0.62** |
| **SS2 – 700 m** | 72 | 41 | 17 | 3 | 2 | 92 | 135 | **0.68** |
| **SS3 – 1,100 m** | 59 | 33 | 9 | 11 | 3 | 96 | 115 | **0.83** |
| **SS4 – 1,400 m** | 61 | 26 | 7 | 7 | 3 | 73 | 104 | **0.70** |
| **SS5 – 1,900 m** | 60 | 32 | 12 | 3 | 3 | 75 | 109 | **0.69** |
| **SS6 – 2,200 m** | 37 | 15 | 7 | 1 | 1 | 36 | 61 | **0.59** |
| **SS7 – 2,450 m** | 63 | 31 | 10 | 2 | 3 | 69 | 109 | **0.63** |
| | **470** | **252** | **87** | **30** | **16** | **578** | **854** | **0.68** |

**Figure 3**: Species-richness within each score of the five categories assigned.

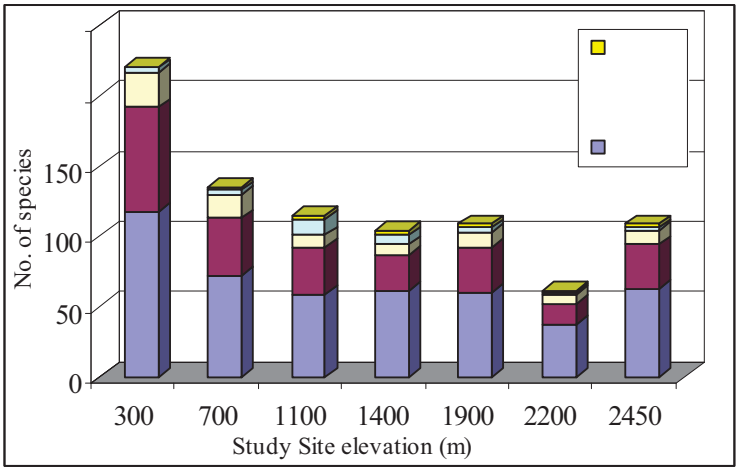


**Figure 4**: Weighting distribution of scores from each category (e.g. 3 spp. at SS1 assigned score "3" = 9)

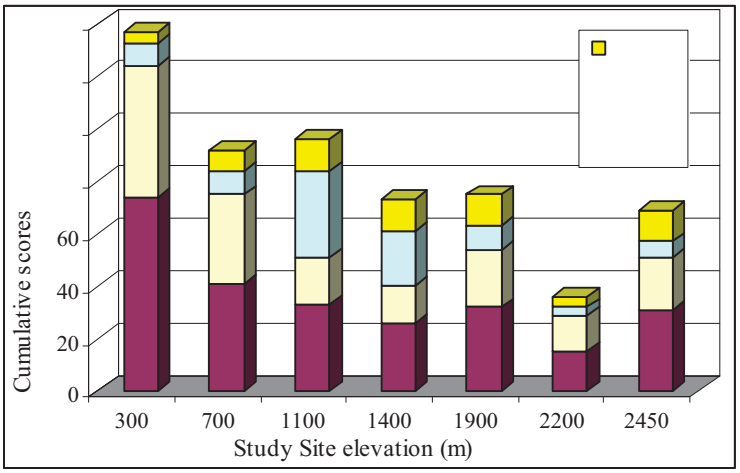
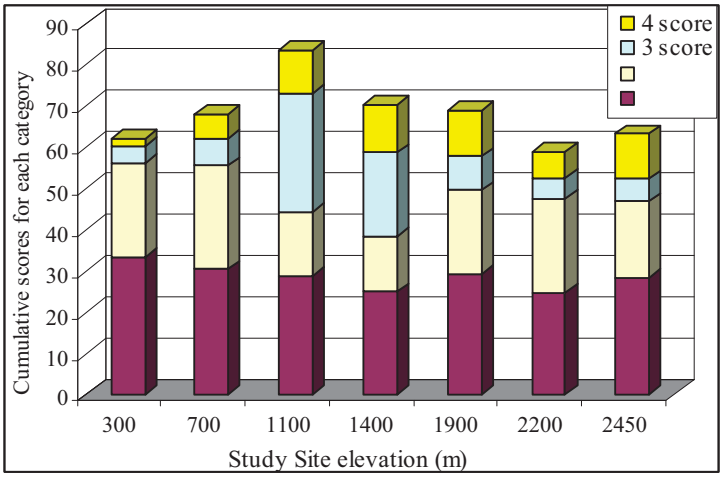



**Figure 5**: The frequency proportion of species within each category for each study site (e.g. 74 of 221 spp. at SS1 is 33.48% x score 1 = 33.48), marginally compensating for different levels of fieldwork intensity.




The distribution of species scores is relatively similar across all sites (**Figure 4**), with a broad base of species of little value to conservation (scores 0 =105 species, shown as more in Figure 4 due to repetition of widespread species at multiple sites), but over 77% (355) of species were of greater conservation value (score 1-4), dominated by 241 (52%) forest dependant species. 114 species at greatest risk (score 2-4) composed a significant proportion of species of value to conservation. However, there are fewer endemic and threatened species occurring on the eastern slope of the Andes than, for example, in the Chocó region (see Salaman 1994).

In **Figure 4**, the weighted scoring distribution excludes species of lower conservation value (those scoring 0) and amplifies species with increased weighting. Interestingly, the cumulative scoring pattern for sites in **Figure 4** is relatively similar to the pattern of cumulative species-richness shown in **Figure 3**, with a general decline in both species and conservation attributed to individual species from **SS1** to **SS7**. **SS3,** at 1,100 m, has the largest proportion of high scoring species, highlighting the conservation importance of premontane forest. This evaluation may also be distorted by variations in field effort (e.g. 124 mist-net hours at **SS1** (highest) vs. 40 mist-net hours at **SS6** (lowest)).

Controlling for species richness for each site (and to a lesser extent person days field effort), the proportion of species within each score category is weighted and illustrated in **Figure 5**. This procedure adds greater weight for species of conservation value that might be diluted by high species richness in sites encompassing various habitats, e.g. forest and non-forest areas as in **SS1**. A consistent pattern emerges from study sites with relatively high values for all sites indicating conservation importance across the entire slope of the Churumbelos, although values increase from the lowlands and peak in premontane forest (**SS3**), then decline marginally across montane sites. This analysis is given credence as the premontane sites also contain the highest concentrations of endemic

(score 3) and threatened species (score 4) in the region.

Overall, the species richness of each site largely reflects field effort and influences weighting distribution. However, the proportion of species within each category for each site is decisive in permitting a comparative assessment of indicator species and a more accurate comparison between sites.

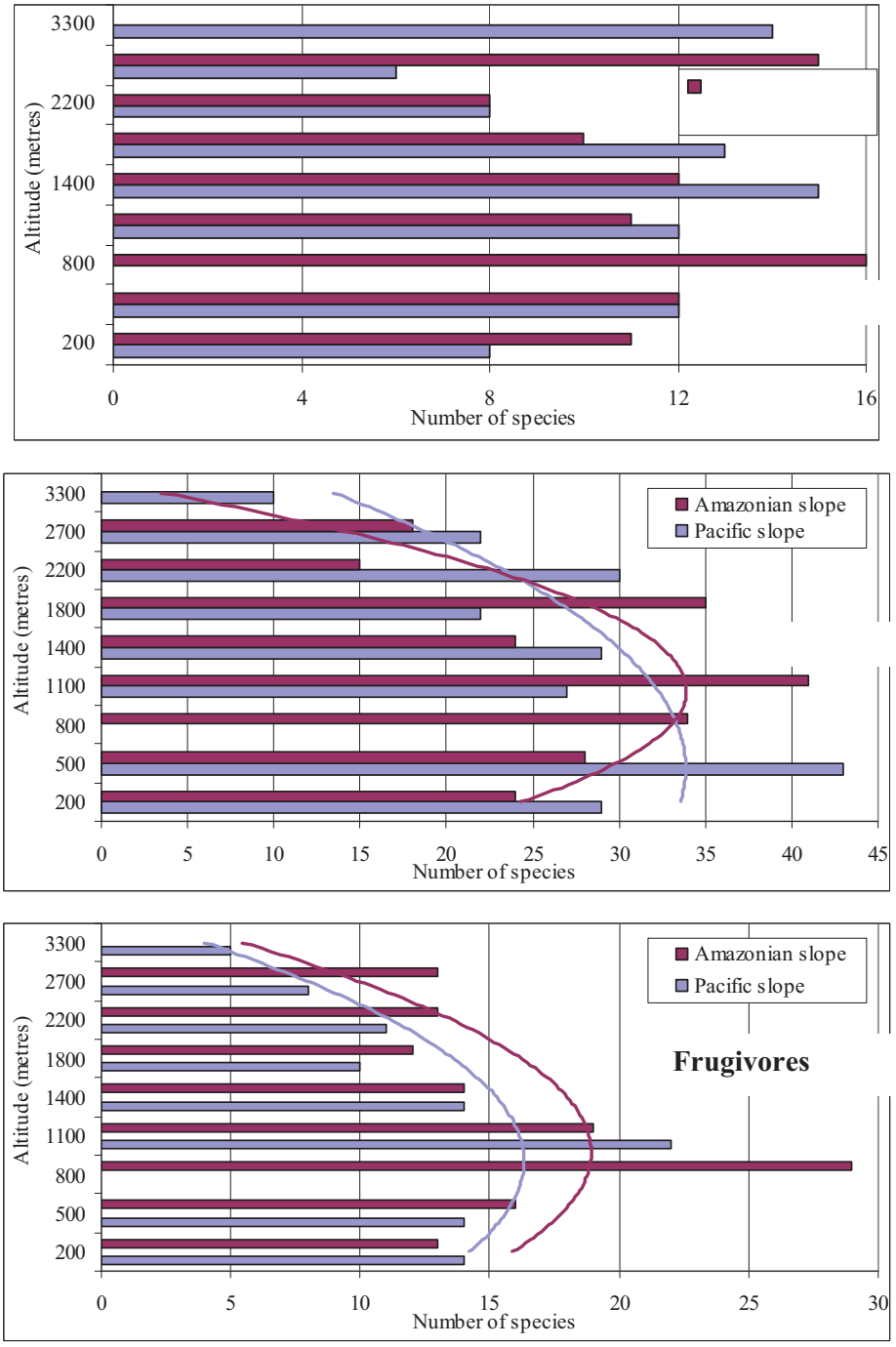
**A comparison of altitudinal distribution of avifauna across the Andes of southern Colombia**
A similar series of rapid ornithological assessment surveys were conducted at *ca.*400m elevational steps along an altitudinal transect on the Pacific slope of the Andes in southern Colombia, during the early 1990s (Salaman 1994, 2001). Strong similarities between the fieldwork techniques (both studies involved PS), altitudes sampled (lowlands to montane forest), and latitude (both studies between 1°N and 2°N) make ideal comparison. At each elevational step, study sites received approximately 7-14 days field effort.

Each slope of the Andes has a unique avifauna assemblage with remarkably little overlap at species level, although many genera are found in both localities. A trophic guild comparison of nectarivores, insectivores and frugivores across the Andes is illustrated in **Figure 6**. The west and east slopes averaged 11.0 (s.d. 3.2) and 11.8 (s.d. 2.7) nectarivore species per site, respectively. A clear pattern of hummingbird altitudinal distribution emerges, with a "mid-elevation hump" appears on both slopes, as hummingbird diversity peaked in the upper foothill and premontane elevations (800 m- east slope and 1,400 m- west slope). The high diversity at the uppermost altitude (>2,700 m) on both Andean slopes is due to the presence of both upper montane forest and páramo or elfin forest specialists, with two distinct hummingbird communities represented together.

The diversity of insectivores on the west and east slopes averaged 26.5 (*s.d.*10.0) and 27.3 (*s.d.*9.5) species per site, respectively. Two patterns emerge of understorey insectivore species richness across an altitudinal gradient: diversity is greatest in the foothill and premontane elevations (800 m-east slope and 500 m- west slope), and lowest in the montane life-zone (>2000 m). A polynomial trendline fitted to **Figure 6** highlights a mid-elevational hump on the Amazonian slope ($r^2 = 0.568$) and to a lesser extent on the Pacific slope ($r^2 = 0.634$). The wetter and cooler climate on the Pacific slope accounted for a lower abundance of ants at premontane elevations (see Insects section) and this in turn probably contributed to the lack of ant-swarming insectivores. It is surprising that so few insectivores were represented in the Amazonian lowlands, although proportionally many more insectivorous species were seen than caught in the tall lowland canopy forests. Conversely, the considerably lower canopy of higher elevation forest undoubtedly led to a greater proportion of understorey species being captured and a more comprehensive survey of upper strata foraging species, which may have contributed to higher species richness totals at higher elevation sites.

The west and east slopes averaged 11.0 (*s.d.* 3.2) and 11.8 (*s.d.* 2.7) frugivore species per site, respectively. Frugivore diversity is lowest in lowland and mid-montane forest, and peaks in the upper foothill and premontane elevations (800 m-east slope and 1,400 m- west slope). Frugivore diversity is lowest in the upper montane to páramo life-zone.

**Figure 6**: Understorey species richness of the three principal trophic guilds (with polynomial trendline) across an elevational gradient on both slopes of the Northern Andes in southern Colombia, from comparative effort mist-net surveys (Salaman 1994, 2001). Note: no survey conducted at 800 m on the Pacific slope. Based on mist-net capture and observation.




**A comparison of the understorey avifauna in lower premontane forest on both slopes of the Andes**
A comparison is made below between a premontane site studied on the Andean West slope (Salaman 2001) at identical altitudes (1,100-1,450 m) and similar latitude (1°14'N; just 175 km south) to **SS3** and **SS4** in Serranía de los Churumbelos (Andean "East" slope). Selected species are those which make up >0.9% of the mist-net sample or with 5+ captures.

A comparison of selected captures (**Table 6**) shows that the Andean East slope sample has stronger affinities to the Andean west slope than to lowland Amazonian sites in trophic guild composition and the distribution of captures amongst trophic guilds (see Salaman 2001). This is principally due to increased population dominance of nectarivores and a converse reduction in insectivore dominance in the Amazonian lowlands (although the Andean West slope has a 100% greater population proportion of nectarivore captures). The understorey frugivore population composition is similar, especially in biomass, on both slopes of the Andes. Insectivore diversity and species abundance patterns are very similar between Andean slopes. However, on the West slope, three hummingbird species dominate mist-net captures, whereas on the East slope, more nectarivore species were recorded.

**Table 6:** A frequency (percentage) distribution comparison of two selected understorey populations from each slope of the Northern Andes at latitude 1°14' N (Eastern = SS4: Villa Iguana; Western = Río Ñambí from Salaman 2001).

| | Captures | | Species | | Biomass | |
|---|---|---|---|---|---|---|
| | **East slope** | **West slope** | **East slope** | **West slope** | **East slope** | **West slope** |
| **Frugivores** | 35.7 | 30.5 | 28.2 | 20.0 | 43.9 | 39.2 |
| **Insectivores** | 45.9 | 32.2 | 51.3 | 48.5 | 51.0 | 40.8 |
| **Nectarivores** | 18.4 | 37.3 | 20.5 | 31.4 | 5.1 | 20.1 |

## Conclusions

These three expeditions have provided the first comprehensive analysis of altitudinal distribution patterns of birds on the eastern slope of the Andes in southern Colombia from 300 m to 2,450 m. Our analysis reveals:

- The Serranía de los Churumbelos is a global avian "hotspot"– extremely important for bird diversity, with 462 species recorded and an estimated total bird species inventory of around 550 species.
- The region contains an interesting assemblage of avian taxa; including some of Colombia's most poorly known species, which highlights the need for conservation attention and further study.
- The vast majority of species recorded (77%) are forest-dependant and of conservation importance, with 11 species globally threatened, thus if the Serranía remained unprotected and becmae subject to habitat loss or degradation, the habitat of at least 355 bird species would be destroyed.
- Ornithological results have already resulted in Serranía de los Churumbelos being declared an Important Bird Area (IBA / AICA) and justify the legal and practical protection of the region.
- Changes in species compositions and shifts in community structure with increasing altitude revealed by this rapid study emphasise various interesting trends that warrant further scientific investigation.

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## Appendix I: Inventory of birds of Serranía de los Churumbelos

Bird species inventory from seven study sites in Serranía de los Churumbelos from July-August 1998-2000. Taxonomy and nomenclature follow Salaman *et al.* (2007)

**Key: Species observed / caught at each site:**
1 Study Site 1; Puerto Bello, 300 m; 1a=1998; 1b=2000
2 Study Site 2; Río Nabueno, 700 m
3 Study Site 3; Alto Río Hornoyaco, 1,100 m
4 Study Site 4; Villa Iguana, 1,450 m
5 Study Site 5; Nabú, 1,900 m
6 Study Site 6; Tatauí, 2,200 m
7 Study Site 7; El Dorón, 2,500 m

**Relative abundance key for each study site:**
**Number** - indicates the number of individuals of this species captured at each site (including retraps)
**A** = Abundant: observed or caught several times daily.
**C** = Common: observed or caught once daily
**F** = Fairly common: observed or caught on *ca.*50% of full field days (on 3-4 days)
**U** = Uncommon/rare: observed or caught on <25% of full field days (on 1-2 days)
**Blank** = indicated that the species was not registered at that site

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Grey Tinamou** *Tinamus tao* | 2 | | | | | U | | | |
| **Great Tinamou** *Tinamus major* | 1 | F | | | | | | | |
| **Little Tinamou** *Crypturellus soui* | 1 | C | C | F | | | | | |
| **Undulated Tinamou** *Crypturellus undulatus* | 2 | F | U | | | | | | |
| **Snowy Egret** *Egretta thula* | 0 | | | U | | | | | |
| **Striated Heron** *Butorides striatus* | 0 | | x | | | | | | |
| **Turkey Vulture** *Cathartes aura* | 0 | F | F | F | | | | | |
| **Greater Yellow-headed Vulture** *Cathartes malambrotus* | 0 | | U | U | U | U | | | |
| **Black Vulture** *Coragyps atratus* | 0 | A | A | F | U | | C | C | A |
| **Osprey** *Pandion haliaetus* | 1 | U | | | | | | | |
| **American Swallow-tailed Kite** *Elanoides forficatus* | 0 | U | U | | F | F | U | | |
| **Pearl Kite** *Gampsonyx swainsonii* | 1 | | U | | | | | | |
| **White-tailed Kite** *Elanus leucurus* | 1 | U | | | | | | | |
| **Double-toothed Kite** *Harpagus bidentatus* | 1 | | U | | | | | | |
| **Plumbeous Kite** *Ictinia plumbea* | 1 | F | F | | | U | | F | F |
| **Sharp-shinned Hawk** *Accipiter striatus* | 1 | | | | | | 1F | F | |
| **Tiny Hawk** *Accipiter superciliosus* | 2 | | | 1U | | | | | |
| **Roadside Hawk** *Buteo magnirostris* | 1 | C | C | | U | | U | U | U |
| **Crested Eage** *Morphnus guianensis* | 4 | | U | | | | | | |
| **Black Hawk-Eagle** *Spizaetus tyrannus* | 2 | | | U | | | | | |
| **Black-and-Chestnut Eagle** *Spizaetus isidorei* | 4 | | | | | | | U | |
| **Black Caracara** *Daptrius ater* | 1 | | | | U | | | | |
| **Laughing Falcon** *Herpetotheres cachinnans* | 1 | F | F | F | | | | | F |
| **Barred Forest-Falcon** *Micrastur ruficollis* | 1 | | | | 1C | C | | | |
| **Lined Forest-Falcon** *Micrastur gilvicollis* | 2 | C | | 1C | | | | | |
| **Collared Forest-Falcon** *Micrastur semitorquatus* | 2 | | | F | | | | | |
| **American Kestrel** *Falco sparverius* | 1 | | | | | | | F | |
| **Speckled Chachalaca** *Ortalis guttata* | 1 | U | | | | | | | |
| **Common Piping-Guan** *Pipile pipile* | 3 | | F | | | | | | |
| **Wattled Guan** *Aburria aburri* | 4 | | | | | | | | C |
| **Sickle-winged Guan** *Chamapetes goudotii* | 2 | | | | | | | | 1F |
| **Salvin's Curassow** *Mitu salvini* | 3 | | U | | | | | | |
| **Marbled Wood-Quail** *Odontophorus gujanensis* | 2 | F | F | 2F | | | | | |
| **Chestnut Wood-Quail** *Odontophorus hyperythrus* | 4 | | | | | F | C | F | C |
| **Gray-necked Wood-Rail** *Aramides cajanea* | 1 | F | F | | | | | | F |
| **Purple Gallinule** *Porphyrio martinica* | 0 | F | | | | | | | |

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Wattled Jacana** *Jacana jacana* | 0 | C | C | | | | | | |
| **Southern Lapwing** *Vanellus chilensis* | 0 | | F | | | | | | |
| **Band-tailed Pigeon** *Patagioenas fasciata* | 1 | | | | | | | F | F |
| **Scaled Pigeon** *Patagioenas speciosa* | 1 | | C | | | | | | |
| **Pale-vented Pigeon** *Patagioenas cayennensis* | 1 | | | F | | | | | |
| **Ruddy Pigeon** *Patagioenas subvinacea* | 1 | | C | | | C | C | | F |
| **Plumbeous Pigeon** *Patagioenas plumbea* | | | C | | | | | | |
| **Ruddy Ground-Dove** *Columbina talpacoti* | 0 | A | A | | | | | | |
| **Plain-breasted Ground-Dove** *Columbina minuta* | 0 | U | | | | | | | |
| **Ruddy Quail-Dove** *Geotrygon montana* | 1 | 1U | 2U | 6F | | | | | |
| **White-throated Quail-Dove** *Geotrygon frenata* | 2 | | | | 4C | | F | | |
| **Military Macaw** *Ara militaris* | 4 | | | | C | C | | | |
| **Dusky-headed Parakeet** *Aratinga wedellii* | 1 | C | C | | | | | | |
| **Maroon-tailed Parakeet** *Pyrrhura melanura* | 2 | A | A | C | | | C | | |
| **Barred Parakeet** *Bolborhynchus lineola* | 2 | | | | | | | C | U |
| **Blue-headed Parrot** *Pionus menstruus* | 1 | C | C | | | | | | |
| **Red-billed Parrot** *Pionus sordidus* | 2 | | | | | | C | C | C |
| **Scaly-naped Parrot** *Amazona mercenaria* | 1 | | | | | | | C | C |
| **Mealy Parrot** *Amazona farinosa* | 1 | F | | | F | | | | |
| **Squirrel Cuckoo** *Piaya cayana* | 0 | C | C | C | C | | C | | C |
| **Black-bellied Cuckoo** *Piaya melanogaster* | 1 | | F | F | | | | | |
| **Smooth-billed Ani** *Crotophaga ani* | 0 | A | A | | | | | | |
| **Striped Cuckoo** *Tapera naevia* | 0 | | | | | | | | U |
| **Tropical Screech-Owl** *Otus choliba* | 1 | | F | | | | | | |
| **Great Horned Owl** *Bubo virginianus* | 1 | | | | | | F | | |
| **Spectacled Owl** *Pulsatrix perspicillata* | 1 | U | | | | | | | |
| **Band-bellied Owl** *Pulsatrix melanota* | 3 | | | 1C | C | | | | |
| **Andean Pygmy-Owl** *Glaucidium jardinii* | 1 | | | | | | F | | |
| **Stygian Owl** *Asio stygius* | 2 | | | | | | | | C |
| **Common Potoo** *Nyctibius griseus* | 1 | | | | | | C | | C |
| **Pauraque** *Nyctidromus albicollis* | 0 | C | C | | | | | | |
| **Band-winged Nightjar** *Caprimulgus longirostris* | 1 | | | | | | F | | F |
| **Lyre-tailed Nightjar** *Uropsalis lyra* | 2 | | | | | U | | | U |
| **White-collared Swift** *Streptoprocne zonaris* | 0 | C | C | C | | F | F | | C |
| **Chestnut-collared Swift** *Cypseloides rutilus* | 0 | | | | | | | | F |
| **Chapman's Swift** *Chaetura chapmani* | 1 | | F | F | | F | | | |
| **Gray-rumped Swift** *Chaetura cinereiventris* | 0 | | F | F | | F | | | |
| **Ashy-tailed Swift** *Chaetura andrei* | 1 | | | | | | | | F |
| **Short-tailed Swift** *Chaetura brachyura* | 1 | F | | F | | | | | |
| **White-tipped Swift** *Aeronautes montivagus* | 2 | | | | | C | | | |
| **Rufous-breasted Hermit** *Glaucis hirsuta* | 1 | 10F | 1U | 1U | | | | | |
| **Pale-tailed Barbthroat** *Threnetes leucurus* | 1 | 11F | 9F | 49C | 1U | | | | |
| **Green Hermit** *Phaethornis guy* | 1 | | | 3U | 9F | 2U | | | |
| **Tawny-bellied Hermit** *Phaethornis syrmpatophorus* | 1 | | | | | 9F | 20C | | 3U |
| **Long-tailed Hermit** *Phaethornis (superciliosus) longirostris* | 1 | 28C | 16C | 39C | 4U | | | | |
| **White-bearded Hermit** *Phaethornis hispidus* | 1 | 1U | | | | | | | |
| **Straight-billed Hermit** *Phaethornis bourcieri* | 1 | 10F | 18F | 14F | | | | | |
| **Reddish Hermit** *Phaethornis ruber* | 1 | | 1U | | | | | | |
| **White-tipped Sicklebill** *Eutoxeres aquila* | 1 | | | 6F | 5F | 3U | 4U | | |
| **Buff-tailed Sicklebill** *Eutoxeres condamini* | 2 | 9F | 6U | 18F | 3U | | | | |
| **Blue-fronted Lancebill** *Doryfera johannae* | 1 | 3U | | 12F | 5U | 1U | | | |
| **Green-fronted Lancebill** *Doryfera ludoviciae* | 1 | | | | | | | | 7F |
| **Gray-breasted Sabrewing** *Campylopterus largipennis* | 2 | 7F | 4U | 2U | | | | | |
| **Napo Sabrewing** *Campylopterus villaviscensio* | 3 | | | | 9F | 6U | | | |
| **White-necked Jacobin** *Florisuga mellivora* | 0 | | 1U | 2U | | | | | |
| **Brown Violetear** *Colibri delphinae* | 1 | | | 2U | | | | | |
| **Black-throated Mango** *Anthracothorax nigricollis* | 0 | xF | | | | | | | |
| **Violet-headed Hummingbird** *Klais guimeti* | 3 | | | | 2U | | | | |

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Fork-tailed Woodnymph** *Thalurania furcata* | 0 | 6F | 4F | 14C | | | | | |
| **Golden-tailed Sapphire** *Chrysuronia oenone* | 1 | | | 14C | U | 1U | | | |
| **Speckled Hummingbird** *Adelomyia melanogenys* | 0 | | | | | 11F | 24C | 28C | 46A |
| **Rufous-vented Whitetip** *Urosticte ruficrissa* | 3 | | | | | 7F | | | 8F |
| **Ecuadorian Piedtail** *Phlogophilus hemileucurus* | 4 | | | | 3U | | | | |
| **Gould's Jewelfront** *Heliodoxa aurescens* | 2 | 1U | | 6F | | | | | |
| **Fawn-breasted Brilliant** *Heliodoxa rubinoides* | 1 | | | | | | 5F | | 1U |
| **Violet-fronted Brilliant** *Heliodoxa leadbeateri* | 2 | | | | | 7F | 6F | | |
| **Black-throated Brilliant** *Heliodoxa schreibersii* | 3 | | | 4F | 2F | | | | |
| **Pink-throated Brilliant** *Heliodoxa gularis* | 4 | | | 3F | | | | | |
| **Bronzy Inca** *Coeligena coeligena* | 1 | | | | | 3U | 18C | 7F | 3F |
| **Collared Inca** *Coeligena torquata* | 0 | | | | | | 1U | | 66A |
| **Buff-tailed Coronet** *Boissonneaua flavescens* | 1 | | | | | | | | 20C |
| **Tourmaline Sunangel** *Heliangelus exortis* | 1 | | | | | | | | 21C |
| **Emerald-bellied Puffleg** *Eriocnemis alinae* | 2 | | | | | | | 19C | 41A |
| **Greenish Puffleg** *Haplophaedia aureliae* | 1 | | | | | | 14C | 14C | 26C |
| **Booted Racket-tail** *Ocreatus underwoodii addae* | 1 | | | | | xU | | 1U | |
| **Tyrian Metaltail** *Metallura tyrianthina* | 0 | | | | | | | | 6F |
| **Blue-throated Sylph** *Aglaiocercus kingi* | 1 | | | | | xF | 2F | 5C | 13C |
| **Wedge-billed Hummingbird** *Schistes geoffroyi* | 2 | | | | | | 1U | | |
| **Black-eared Fairy** *Heliothryx aurita* | 0 | | U | | | | | | |
| **Gorgeted Woodstar** *Acestrura heliodor* | 2 | | | | | | | | 1U |
| **Golden-headed Quetzal** *Pharomachrus auriceps* | 1 | | | | xU | | xF | | |
| **Pavonine Quetzal** *Pharomachrus pavoninus* | 1 | U | | U | | | | | |
| **White-tailed Trogon** *Trogon viridis* | 1 | U | U | U | | | | | |
| **Masked Trogon** *Trogon personatus* | 1 | | | | | | 2F | | |
| **Black-throated Trogon** *Trogon rufus* | 1 | 1F | | 3F | | | | | |
| **Blue-crowned Trogon** *Trogon curucui* | 1 | | F | | F | | | | |
| **Violaceous Trogon** *Trogon violaceus* | 1 | | | F | | | | | |
| **Ringed Kingfisher** *Megaceryle torquata* | 0 | U | | F | | | | | |
| **Amazon Kingfisher** *Chloroceryle amazona* | 0 | U | | F | | | | | |
| **Green-and-rufous Kingfisher** *Chloroceryle inda* | 2 | 1U | 1U | | | | | | |
| **Pygmy Kingfisher** *Chlorocerlye aenea* | 1 | | | U | | | | | |
| **Rufous Motmot** *Baryphthengus martii* | 1 | 10C | U | 1F | 1U | | | | |
| **Brown Jacamar** *Brachygalba lugubris* | 2 | U | | | | | | | |
| **Yellow-billed Jacamar** *Galbula albirostris* | 2 | | 1U | | | | | | |
| **Great Jacamar** *Jacamerops aurea* | 2 | 2U | | | | | | | |
| **Pied Puffbird** *Notharchus tectus* | 1 | U | | | | | | | |
| **Collared Puffbird** *Bucco capensis* | 1 | | 1U | | | | | | |
| **White-chested Puffbird** *Malacoptila fusca* | 1 | | 5F | | | | | | |
| **Black-streaked Puffbird** *Malacoptila fulvogularis* | 3 | | | | 1U | | | | |
| **Lanceolated Monklet** *Micromonacha lanceolata* | 4 | | | 2U | | | | | |
| **Black-fronted Nunbird** *Monasa nigrifrons* | 1 | F | F | | | | | | |
| **White-fronted Nunbird** *Monasa morphoeus* | 1 | F | F | U | | | | | |
| **Yellow-billed Nunbird** *Monasa flavirostris* | 2 | U | | | | | | | |
| **Swallow-wing** *Chelidoptera tenebrosa* | 1 | C | C | | | | | | |
| **Black-spotted Barbet** *Capito niger* | 0 | 1C | 1C | 10C | | | | | |
| **Lemon-throated Barbet** *Eubucco richardsoni* | 1 | | | | F | | | | |
| **Red-headed Barbet** *Eubucco bourcierii* | 1 | | | | F | | | | |
| **Crimson-rumped Toucanet** *Aulacorhynchus haematopygus* | 1 | | | | | 1F | F | | |
| **Chestnut-eared Araçari** *Pteroglossus castanotis* | 1 | F | | | | | | | |
| **Many-banded Araçari** *Pteroglossus pluricinctus* | 1 | F | F | | | | | | |
| **Lettered Araçari** *Pteroglossus inscriptus* | 1 | U | | | | | | | |
| **Ivory-billed Araçari** *Pteroglossus azara* | 1 | F | 1C | U | | | | | |
| **Golden-collared Toucanet** *Selenidera reinwardtii* | 2 | 2F | 1F | 4F | | | | | |
| **Black-billed Mountain-Toucan** *Andigena nigrirostris* | 4 | | | | | | 1U | | F |
| **Yellow-ridged Toucan** *Ramphastos culminatus* | 1 | | | 1U | | | | | |
| **Black-mandibled Toucan** *Ramphastos ambiguus* | 3 | | U | C | C | C | U | | |

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Cuvier's Toucan** *Ramphastos cuvieri* | 1 | C | C | F | | | | | |
| **Scaled Piculet** *Picumnus squamulatus* | 1 | | | | 1U | | | | |
| **Lafesnaye's Piculet** *Picumnus lafresnayi* | 2 | | | | U | | | | |
| **Spot-breasted Woodpecker** *Colaptes punctigula* | 0 | U | U | | | | | | |
| **Crimson-mantled Woodpecker** *Colaptes rivolii* | 1 | | | | | | U | U | F |
| **Golden-olive Woodpecker** *Colaptes rubiginosus* | 1 | | | | | 2F | U | | |
| **Yellow-throated Woodpecker** *Piculus flavigula* | 2 | | F | F | | | | | |
| **White-throated Woodpecker** *Piculus leucolaemus* | 3 | | | | U | | | | |
| **Chestnut Woodpecker** *Celeus elegans* | 1 | 1C | 1C | | | | | | |
| **Acorn Woodpecker** *Melanerpes formicivorous* | 1 | | | | | | F | | C |
| **Yellow-tufted Woodpecker** *Melanerpes cruentatus* | 0 | F | | | | | | | |
| **Little Woodpecker** *Veniliornis passerinus* | 1 | | U | | | | | | |
| **Yellow-vented Woodpecker** *Veniliornis dignus* | 1 | | | | | F | F | | |
| **Crimson-crested Woodpecker** *Campephilus melanoleucos* | 1 | C | C | | | | | | |
| **Red-necked Woodpecker** *Campephilus rubricollis* | 2 | F | | U | | | | | |
| **Powerful Woodpecker** *Campephilus pollens* | 1 | | | | | | C | | C |
| **Tyrannine Woodcreeper** *Dendrocincla tyrannina* | 2 | | | | | | 2U | 1U | 3U |
| **Plain-brown Woodcreeper** *Dendrocincla fuliginosa* | 1 | 7C | 2C | 1U | 6F | xU | | | |
| **Wedge-billed Woodcreeper** *Glyphorhynchus spirurus* | 1 | 66A | 39A | 46A | 4F | 19C | | | |
| **Rusty-breasted Woodcreeper** *Xiphocolaptes orenocensis* | 1 | U | U | | | | | | |
| **Strong-billed Woodcreeper** *X. promeropirhynchus* | 1 | | | | | | U | | |
| **Southern Barred-Woodcreeper** *Dendrocolaptes certhia* | 1 | 1U | | 2U | | | | | |
| **Black-banded Woodcreeper** *Dendrocolaptes picumnus* | 1 | 2U | | 1U | U | | | | |
| **Straight-billed Woodcreeper** *Xiphorhynchus picus* | 1 | | U | | | | | | |
| **Ocellated Woodcreeper** *Xiphorhynchus ocellatus* | 1 | 5C | 4C | 17C | 1U | | | | |
| **Buff-throated Woodcreeper** *Xiphorhynchus guttatus* | 1 | 1U | 1U | | | | | | |
| **Olive-backed Woodcreeper** *Xiphorhynchus triangularis* | 1 | | | | 4C | 7C | 4C | | Fx |
| **Spot-crowned Woodcreeper** *Lepidocolaptes affinis* | 1 | | | | | | 2U | | |
| **Brown-billed Scythebill** *Campylorhamphus pusillus* | 1 | | | | | 1U | 1U | | |
| **Azara's Spinetail** *Synallaxis azarae elegantior* | 0 | | | | | 1U | C | | C |
| **Dusky Spinetail** *Synallaxis moesta* | 1 | | | | 5F | | | | |
| **Rufous Spinetail** *Synallaxis unirufa* | 0 | | | | | | | | 1C |
| **Ash-browed Spinetail** *Cranioleuca curtata* | 1 | | | | | | 1U | | |
| **Spectacled Prickletail** *Siptornis striaticollis* | 3 | | | | | | 1U | | |
| **Orange-fronted Plushcrown** *Metopothrix aurantiaacus* | 2 | | U | | | | | | |
| **Pearled Treerunner** *Margarornis squamiger* | 1 | | | | | | U | 1U | 3F |
| **Rusty-winged Barbtail** *Premnornis guttuligera* | 2 | | | | | | 9F | | |
| **Spotted Barbtail** *Premnoplex brunnescens* | 1 | | | | 11F | 10F | 4F | | |
| **Streaked Tuftedcheek** *Pseudocolaptes boissonneautii* | 1 | | | | | | 1U | 2F | F |
| **Chestnut-winged Hookbill** *Ancistrops strigilatus* | 2 | U | F | | | | | | |
| **Lineated Foliage-gleaner** *Syndactyla subalaris* | 1 | | | | | 3F | 4F | | |
| **Buff-throated Foliage-gleaner** *Automolus ochrolaemus* | 1 | 4F | | 2U | | | | | |
| **Flammulated Treehunter** *Thripadectes flammulatus* | 2 | | | | | | | 1U | |
| **Striped Treehunter** *Thripadectes holosticus* | 1 | | | 3U | | | | | |
| **Black-billed Treehunter** *Thripadectes melanorhynchus* | 3 | | | | 1U | 5F | 1U | | |
| **Plain Xenops** *Xenops minutus* | 0 | | | 1U | 2U | | F | | |
| **Gray-throated Leaftosser** *Sclerurus albigularis* | 2 | | | | 1U | | | | |
| **Tawny-throated Leaftosser** *Sclerurus mexicanus* | 1 | | | | 1U | U | | | |
| **Short-billed Leaftosser** *Sclerurus rufigularis* | 2 | 6F | | | | | | | |
| **Black-tailed Leaftosser** *Sclerurus caudacutus* | 1 | 3F | F | 1U | | | | | |
| **Sharp-tailed Streamcreeper** *Lochmias nematura* | 3 | | | | | 1U | | | |
| **Fasciated Antshrike** *Cymbilaimus lineatus* | 1 | | 1U | | | | | | |
| **Undulated Antshrike** *Frederickena unduligera* | 0 | U | | 1U | | | | | |
| **Black-capped Antshrike** *Thamnophilus schistaceus* | 1 | | | 3U | | | | | |
| **Northern Slaty Antshrike** *Thamnophilus punctatus* | 1 | | U | | | | | | |
| **White-shouldered Antshrike** *Thamnophilus aethiops* | 1 | 2U | 1U | | | | | | |
| **Uniform Antshrike** *Thamnophilus unicolor* | 1 | | | | | 5F | 5F | | F |
| **Russet Antshrike** *Thamnistes anabatinus* | 1 | | | | 2U | | | | |

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Plain Antvireo** *Dysithamnus mentalis* | 1 | | | | 5F | | | | |
| **White-streaked Antvireo** *Dysithamnus leucostictus* | 3 | | | | 1U | U | | | |
| **Dusky-throated Antshrike** *Thamnomanes ardesiacus* | 1 | 12C | 1U | | | | | | |
| **Antshrike** *Thamnomanes sp* | 2 | | 1U | | | | | | |
| **Plain-throated Antwren** *Myrmotherula hauxwelli* | 1 | 1U | | | | | | | |
| **Stipple-throated Antwren** *Epinecrophylla haematonota* | 2 | | 1U | 2U | 1U | | | | |
| **Foothill Antwren** *Epinecrophylla spodionota* | 3 | | | | 10C | | | | |
| **Ornate Antwren** *Myrmotherula ornata* | 1 | | | | 2U | | | | |
| **White-flanked Antwren** *Myrmotherula axillaris* | 0 | 16C | 5F | 14C | | | | | |
| **Slaty Antwren** *Myrmotherula schisticolor* | 1 | | | | | 4F | | | |
| **Banded Antbird** *Dichrozona cincta* | 1 | 4F | 2U | | | | | | |
| **Long-tailed Antbird** *Drymophila caudata* | 1 | | | | | | | | U |
| **Dusky Antbird** *Cercomacra tyrannina* | 1 | | 2U | 1U | 2U | | | | |
| **White-backed Fire-eye** *Pyriglena castanoptera* | 2 | | | | 7F | 6F | 2U | | |
| **Black-faced Antbird** *Myrmoborus myotherinus* | 1 | 13C | 2U | 9F | | | | | |
| **Spot-winged Antbird** *Schistocichla leucostigma* | 1 | 2U | 5F | U | 2U | | | | |
| **Sooty Antbird** *Myrmeciza fortis* | 2 | 1U | | | | | | | |
| **White-plumed Antbird** *Pithys albifrons* | 1 | 30C | 15C | 12C | 7F | | | | |
| **White-cheeked Antbird** *Gymnopithys leucaspis* | 1 | 8F | 9F | | | | | | |
| **Hairy-crested Antbird** *Rhegmatorhina melanosticta* | 2 | | | 1U | | | | | |
| **Spot-backed Antbird** *Hylophylax naevia* | 1 | | 1U | 1U | 3U | | | | |
| **Scale-backed Antbird** *Hylophylax poecilinota* | 2 | 3U | 3U | | 1U | | | | |
| **Short-tailed Antthrush** *Chamaeza campanisona* | 3 | | | | 5F | 6F | | | |
| **Schwarz's Antthrush** *Chamaeza turdina* | 2 | | | | | | 1U | | |
| **Rufous-capped Antthrush** *Formicarius colma* | 2 | | 1U | | | | | | |
| **Chestnut-crowned Antpitta** *Grallaria ruficapilla* | 1 | | | | | | | | F |
| **White-bellied Antpitta** *Grallaria hypoleuca* | 1 | | | | | C | C | | C |
| **Thrush-like Antpitta** *Myrmothera campanisona* | 1 | | F | | F | | | | |
| **Ochre-breasted Antpitta** *Grallaricula flavirostris* | 2 | | | | | 5F | | | |
| **Hooded Antpitta** *Grallaricula cucullata* | 4 | | | | | | 2U | | |
| **Slate-crowned Antpitta** *Grallaricula nana* | 2 | | | | | | | R | |
| **Northern White-crowned Tapaculo** *Scytalopus atratus* | 1 | | | | U | F | | | |
| **Long-tailed Tapaculo** *Scytalopus micropterus* | 1 | | | | | 2U | | | |
| **Blackish Tapaculo** *Scytalopus latrans.* | 1 | | | | | | U | 1U | 1U |
| **Ocellated Tapaculo** *Acropternis orthonyx* | 1 | | | | | | | | U |
| **Golden-headed Manakin** *Pipra erythrocephala* | 1 | 22C | 13C | 14C | | 1U | | | |
| **White-crowned Manakin** *Pipra pipra* | 0 | 5F | | 6F | 11F | | | | |
| **Blue-rumped Manakin** *Pipra isidorei* | 2 | 1U | | 6F | 20C | | | | |
| **Blue-crowned Manakin** *Pipra coronata* | 0 | 62A | 49A | 74A | 1U | | | | |
| **Blue-backed Manakin** *Chiroxiphia pareola* | 2 | | 1U | | | | | | |
| **Golden-winged Manakin** *Masius chrysopterus* | 2 | | | 1U | 3U | 10F | 14C | 3U | 1U |
| **White-bearded Manakin** *Manacus manacus* | 0 | U | 3F | | | | | | |
| **Striped Manakin** *Machaeropterus regulus* | 1 | 3U | 9F | 1U | 1U | | | | |
| **Green Manakin** *Chloropipo holochlora* | 1 | 4F | 10F | 7F | 1U | | | | |
| **Wing-barred Piprites** *Piprites chloris* | 2 | | | 2U | | | | | |
| **Fiery-throated Fruiteater** *Pipreola chlorolepidota* | 4 | | | | F | F | | | |
| **Green-and-black Fruiteater** *Pipreola rieferii* | 2 | | | | | | 5F | 3F | 5F |
| **Scaled Fruiteater** *Ampelioides tschudii* | 4 | | | | | 1U | | | |
| **Dusky Piha** *Lipaugus fuscocinereus* | 2 | | | | | | | 1F | 1F |
| **Screaming Piha** *Lipaugus vociferans* | 1 | 1C | C | | | | | | |
| **Gray-tailed Piha** *Snowornis subalaris* | 3 | | | 4F | | | | | |
| **Plum-throated Cotinga** *Cotinga maynana* | 2 | | | U | | | | | |
| **Purple-throated Fruitcrow** *Querula purpurata* | 1 | F | F | | | | | | |
| **Red-ruffed Fruitcrow** *Pyroderus scutatus* | 3 | | | | | | F | | |
| **Amazonian Umbrellabird** *Cephalopterus ornatus* | 2 | | U | U | | | | | |
| **Andean Cock-of-the-rock** *Rupicola peruviana* | 2 | | | 4F | 1F | 4C | F | | F |
| **Black-capped Tyrannulet** *Phyllomyias nigrocapillus* | 1 | | | | | | 1U | 5C | 2F |
| **Ashy-headed Tyrranulet** *Phyllomyias cinereiceps* | 1 | | | | | | 1U | | |

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Golden-faced Tyrannulet** *Zimmerius chrysops* | 1 | | | | 2F | 1F | F | | |
| **White-throated Tyrannulet** *Mecocerculus leucophrys* | 0 | | | | | U | | | |
| **Sulphur-bellied Tyrannulet** *Mecocerculus minor* | 3 | | | | 1U | | 4F | 1U | 6F |
| **Streak-necked Flycatcher** *Mionectes striaticollis* | 0 | | | | | 8F | 73A | 29A | 72A |
| **Olive-striped Flycatcher** *Mionectes olivaceus* | 0 | 136A | 15C | 63A | 28C | 2U | | | |
| **Ochre-bellied Flycatcher** *Mionectes oleagineus* | 0 | 42A | 25C | 23C | | | | | |
| **Slaty-capped Flycatcher** *Leptopogon superciliaris* | 1 | | | | 1U | U | | | |
| **Rufous-breasted Flycatcher** *Leptopogon rufipectus* | 1 | | | | | | 1F | | |
| **Spectacled Bristle-Tyrant** *Pogonotriccus orbitalis* | 1 | | | | | | 1U | | |
| **Ecuadorian Bristle-Tyrant** ***Phylloscartes*** *gualaquizae* | 2 | | | 1U | | | U | | |
| **Variegated Bristle-Tyrant** *Pogonotriccus poecilotis* | 1 | | | | | | 3F | | |
| **Bronze-olive Pygmy-Tyrant** *Pseudotriccus pelzelni* | 1 | | | | C | 4C | | | |
| **Rufous-headed Pygmy-Tyrant** *Pseudotriccus ruficeps* | 1 | | | | | | 3F | 1U | 7F |
| **Scale-crested Pygmy-Tyrant** *Lophotriccus pileatus* | 0 | | | | 4F | U | U | | |
| **Rufous-crowned Tody-Tyrant** *Poecilotriccus ruficeps* | 1 | | | | | | 1F | | F |
| **Black-throated Tody-Tyrant** *Hemitriccus granadensis* | 1 | | | | | | 5C | 12C | 4C |
| **White-eyed Tody-Tyrant** *Hemitriccus zosterops* | 1 | 1F | | 6C | | | | | |
| **Golden-winged Tody-Flycatcher** *Todirostrum calopterum* | 3 | | | | 1U | | | | |
| **Brownish Twistwing** *Cnipodectes subbrunneus* | 2 | | 1U | | | | | | |
| **Olivaceous Flatbill** *Rhynchocyclus olivaceus* | 1 | 3F | 4F | 3F | | | | | |
| **Gray-crowned Flycatcher** *Tolmomyias poliocephalus* | 1 | | | 1U | | | | | |
| **Yellow-olive Flycatcher** *Tolmomyias sulphurescens* | 1 | 1U | U | | 1U | | | | |
| **Yellow-margined Flycatcher** *Tolmomyias assimilis* | 1 | | 1U | U | | | | | |
| **White-throated Spadebill** *Platyrinchus mystaceus* | 0 | | | | | 13C | | | |
| **Ornate Flycatcher** *Myiotriccus ornatus* | 0 | | | U | 3F | 2F | | | |
| **Ruddy-tailed Flycatcher** *Terenotriccus erythrurus* | 0 | | | 2U | | | | | |
| **Cinnamon Manakin-Tyrant** *Neopipo cinnamomea* | 1 | 1U | | | | | | | |
| **Tawny-breasted Flycatcher** *Myiobius villosus* | 1 | | | | 4F | | | | |
| **Flavescent Flycathcer** *Myiophobus flavicans* | 1 | | | | | | 3F | | 3F |
| **Orange-crested Flycatcher** *Myiophobus phoenicomitra* | 3 | | | | 1U | 1U | | | |
| **Handsome Flycatcher** *Myiophobus pulcher bellus* | 2 | | | | | | F | | F |
| **Cinnamon Flycatcher** *Pyrrhomyias cinnamomea* | 1 | | | | | F | 2A | 1C | 3C |
| **Smoke-colored Pewee** *Contopus fumigatus* | 1 | | | | | U | F | | F |
| **Vermilion Flycatcher** *Pyrocephalus rubinus* | 0 | F | | | | | | | |
| **Yellow-bellied Chat-Tyrant** *Ochthoeca diadema* | 1 | | | | | | | 4F | 4F |
| **Smoky Bush-Tyrant** *Myiotheretes fumigatus* | 1 | | | | | | U | U | 1U |
| **Rufous-tailed Tyrant** *Knipolegus poecilurus* | 1 | | | | | F | | | |
| **Long-tailed Tyrant** *Colonia colonus* | 1 | | | | F | | | | |
| **Cliff Flycatcher** *Hirundinea ferruginea* | 2 | | | | U | U | | | |
| **Bright-rumped Attila** *Attila spadiceus* | 1 | | | 1U | | | | | |
| **Grayish Mourner** *Rhytipterna simplex* | 1 | | | 5F | | | | | |
| **Cinereus Mourner** *Laniocera hypopyrrha* | 1 | | 1U | | | | | | |
| **Short-crested Flycatcher** *Myiarchus ferox* | 1 | U | | | | | | | |
| **Pale-edged Flycatcher** *Myiarchus cephalotes* | 1 | | | | U | C | | | |
| **Swainson's Flycatcher** *Myiarchus swainsoni* | 1 | F | F | | | | | | |
| **Dusky-capped Flycatcher** *Myiarchus tuberculifer* | 1 | | | 1F | 1F | F | | | |
| **Great Kiskadee** *Pitangus sulphuratus* | 0 | C | C | | | | | | |
| **Boat-billed Flycatcher** *Megarynchus pitangua* | 0 | F | | | | | | | |
| **Rusty-margined Flycatcher** *Myiozetetes cayanensis* | 0 | | F | | | | | | |
| **Social Flycatcher** *Myiozetetes similis* | 0 | | | U | | | | | |
| **Dusky-chested Flycatcher** *Myiozetetes luteiventris* | 0 | F | | | | | | | |
| **Golden-crowned Flycatcher** *Myiodynastes chrysocephalus* | 1 | | | | | F | | | |
| **Piratic Flycatcher** *Legatus leucophaius* | 0 | F | | | | | | | |
| **Variegated Flycatcher** *Empidonomus varius* | 1 | F | | | | | | | |
| **Sulphury Flycatcher** *Tyrannopsis sulphurea* | 1 | F | | | | | | | |
| **Tropical Kingbird** *Tyrannus melancholicus* | 0 | F | F | | | | | | F |
| **Chestnut-crowned Becard** *Pachyramphus castaneus* | 1 | | U | | | | | | |
| **Barred Becard** *Pachyramphus versicolor* | 0 | | | | U | U | U | | |

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Black-and-white Becard** *Pachyramphus albogriseus* | 1 | | | U | | | | | |
| **Pink-throated Becard** *Pachyramphus minor* | 2 | U | U | U | | | | | |
| **Black-tailed Tityra** *Tityra cayana* | 0 | F | F | | | U | | | |
| **White-winged Swallow** *Tachycineta albiventer* | 0 | C | C | | | | | | |
| **Blue-and-white Swallow** *Notiochelidon cyanoleuca* | 0 | A | A | | | U | U | | U |
| **White-banded Swallow** *Atticora fasciata* | 0 | U | U | | | | | | |
| **White-thighed Swallow** *Neochelidon tibialis* | 0 | | U | | F | | | | |
| **South. Rough-winged Swallow** *Stelgidopteryx ruficollis* | 0 | C | C | C | | U | | | |
| **Collared Jay** *Cyanocorax viridicyana* | | | | | | | U | | F |
| **Violaceous Jay** *Cyanocorax violaceus* | 0 | C | C | F | U | | | | |
| **Green Jay** *Cyanocorax yncas* | 1 | | | | | | | | U |
| **Rufous Wren** *Cinnycerthia unirufa* | 1 | | | | | | | U | |
| **Sepia-brown Wren** *Cinnycerthia olivascens* | 1 | | | | | | 3F | 3F | 10C |
| **Thrush-like Wren** *Campylorhynchus turdinus* | 0 | | | | U | | | | |
| **Southern House Wren** *Troglodytes aedon musculus* | 0 | C | C | | | | | | |
| **Mountain Wren** *Troglodytes solstitialis* | 1 | | | | | | 1F | | 2F |
| **White-breasted Wood-Wren** *Henicorhina leucosticta* | 0 | 7C | 2C | 2F | 9F | | | | |
| **Gray-breasted Wood-Wren** *Henicorhina leucophrys* | 0 | | | | | 1C | 12C | | F |
| **Southern Nightingale-Wren** *Microcerculus marginatus* | 0 | 11C | 6F | U | U | | | | |
| **Musician Wren** *Cyphorhinus aradus* | 1 | | U | 7F | 1U | | | | |
| **Andean Solitaire** *Myadestes ralloides* | 1 | 3U | | U | 2F | 8F | 30C | 11C | 10C |
| **Spotted Nightingale-Thrush** *Catharus dryas* | 2 | | | | 6F | 5F | | | |
| **Pale-eyed Thrush** *Turdus leucops* | 1 | | | 2U | | | | | |
| **Great Thrush** *Turdus fuscater* | 0 | | | | | | | U | U |
| **Glossy-black Thrush** *Turdus serranus* | 0 | | | | | | | 4F | 3F |
| **Chestnut-bellied Thrush** *Turdus fulviventris* | 2 | | | | | 2U | 5C | 2U | |
| **Black-billed Thrush** *Turdus ignobilis* | 0 | | U | | | | | | F |
| **White-necked Thrush** *Turdus albicollis* | 0 | 5F | 3F | 6F | | | | | U |
| **Collared Gnatwren** *Microbates collaris* | 1 | 3F | 3U | 3F | | | | | |
| **Half-collared Gnatwren** *Microbates cinereiventris* | 1 | 5F | 2U | 2U | 3U | | | | |
| **White-browed Gnatcatcher** *Polioptila bilineata* | 1 | F | F | F | F | | | | |
| **Rufous-browed Peppershrike** *Cyclarhis gujanensis* | 1 | C | U | C | C | C | | | |
| **Black-billed Peppershrike** *Cyclarhis nigrirostris* | 1 | | | | | | F | F | F |
| **Brown-capped Vireo** *Vireo leucophrys* | 0 | | | | | F | 2F | | |
| **Tawny-crowned Greenlet** *Hylophilus ochraceiceps* | 1 | | | 3F | | | | | |
| **Crested Oropendola** *Psarocolius decumanus* | 1 | C | C | C | | | | | |
| **Black-billed Oropendola** *Psarocolius angustifrons* | 1 | | | | | C | C | | C |
| **Russet-backed Oropendola** *Psarocolius alfredi* | 1 | C | C | 3C | 2C | | | | |
| **Olive Oropendola** *Gymnostinops yuracares* | 1 | F | F | | | | | | |
| **Yellow-rumped Cacique** *Cacicus cela* | 1 | A | A | 3F | | | | | |
| **Red-rumped Cacique** *Cacicus haemorrhous* | 1 | U | U | | | | | | |
| **Subtropical Cacique** *Cacicus uropygialis* | 2 | | | | | | | | U |
| **Mountain Cacique** *Cacicus leucoramphus* | 2 | | | | | | F | | F |
| **Solitary Black Cacique** *Cacicus solitarius* | 1 | | F | | | | | | |
| **Velvet-fronted Grackle** *Lampropsar tanagrinus* | 1 | U | | | | | | | |
| **Moriche Oriole** *Icterus chrysocephalus* | 1 | | | | U | | | | |
| **Oriole Blackbird** *Gymnomystax mexicanus* | 0 | U | | | | | | | |
| **Red-breasted Blackbird** *Sturnella militaris* | 0 | C | C | | | | | | |
| **Slate-throated Whitestart** *Myioborus miniatus* | 0 | | | | | 1C | 6C | | |
| **Golden-fronted Whitestart** *Myioborus ornatus* | 1 | | | | | | | 1F | 1U |
| **Citrine Warbler** *Basileuterus luteoviridis* | 1 | | | | | | | 1F | 4F |
| **Russet-crowned Warbler** *Basileuterus coronatus* | 1 | | | | | | 14C | | 4F |
| **Three-striped Warbler** *Basileuterus tristriatus* | 0 | | | | | U | 14C | | |
| **Buff-rumped Warbler** *Basileuterus fulvicauda* | 0 | U | | | | | | | |
| **Capped Conebill** *Conirostrum albifrons* | 1 | | | | | | | | F |
| **Bananaquit** *Coereba flaveola* | 0 | | | | 4F | | F | | |
| **Bluish Flower-Piercer** *Diglossa caerulescens* | 1 | | | | | F | | 19A | 3F |
| **Masked Flower-Piercer** *Diglossa cyanea* | 0 | | | | | F | | 3C | 11F |

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Deep-blue Flower-Piercer** *Diglossa glauca* | 3 | | | | | F | 4F | 1F | |
| **White-sided Flower-Piercer** *Diglossa albilatera* | 1 | | | | | | | 2F | 9C |
| **Purple Honeycreeper** *Cyanerpes caeruleus* | 0 | F | F | 26C | | U | | U | |
| **Red-legged Honeycreeper** *Cyanerpes cyaneus* | 0 | U | | | | | | | |
| **Green Honeycreeper** *Cyanerpes spiza* | 0 | F | F | | | | | | |
| **Blue Dacnis** *Dacnis cayana* | 1 | U | | U | | | | | |
| **Golden-collared Honeycreeper** *Iridophanes pulcherrima* | 3 | | | | F | F | | | |
| **Black-faced Dacnis** *Dacnis lineata* | 1 | | | U | | | | | |
| **Yellow-bellied Dacnis** *Dacnis flaviventer* | 1 | U | | | | | | | |
| **Swallow Tanager** *Tersina viridis* | 1 | C | | | | | | | |
| **Orange-bellied Euphonia** *Euphonia xanthogaster* | 0 | 12C | 6C | 3F | 14C | 5C | 15C | 3C | 3C |
| **Thick-billed Euphonia** *Euphonia laniirostris* | 0 | U | | U | | 5F | | | |
| **Rufous-bellied Euphonia** *Euphonia rufiventris* | 2 | 1U | | | | | | | |
| **Orange-eared Tanager** *Chlorochrysa calliparaea* | 3 | | | | 4F | 3F | F | | |
| **Opal-rumped Tanager** *Tangara velia* | 1 | F | | | | | | | |
| **Opal-crowned Tanager** *Tangara callophrys* | 1 | | F | | | | | | |
| **Paradise Tanager** *Tangara chilensis* | 1 | F | F | U | U | | | | |
| **Green-and-gold Tanager** *Tangara schrankii* | 1 | | | 2U | | | | | |
| **Speckled Tanager** *Tangara guttata* | 1 | | | 1U | | | | | |
| **Yellow-bellied Tanager** *Tangara xanthogastra* | 1 | | | 4F | | | | | |
| **Golden Tanager** *Tangara arthus* | 1 | | | | 3F | F | | | |
| **Saffron-crowned Tanager** *Tangara xanthocephala* | 1 | | | | | F | F | | F |
| **Golden-eared Tanager** *Tangara chrysotis* | 1 | | | | 1F | F | | | |
| **Flame-faced Tanager** *Tangara parzudakii* | 1 | | | | | F | F | | |
| **Metallic-green Tanager** *Tangara labradorides* | 1 | | | | | | U | | |
| **Blue-necked Tanager** *Tangara cyanicollis* | 0 | | | | 1U | F | | | |
| **Masked Tanager** *Tangara nigrocincta* | 1 | | | | | | U | | |
| **Golden-naped Tanager** *Tangara ruficervix* | 1 | | | | | U | | | |
| **Bay-headed Tanager** *Tangara gyrola* | 0 | | | 1U | U | | | | |
| **Scrub Tanager** *Tangara vitriolina* | 0 | | | | U | | | | |
| **Beryl-spangled Tanager** *Tangara nigroviridis* | 1 | | | | | F | 1C | 1F | 1C |
| **Blue-and-black Tanager** *Tangara vassorii* | 0 | | | | | | | | F |
| **Yellow-throated Tanager** *Iridosornis analis* | 3 | | | | | F | | | |
| **Golden-crowned Tanager** *Iridosornis rufivertex* | 3 | | | | | | | 5C | 3F |
| **Blue-winged Mountain-Tanager** *Anisognathus flavinucha* | 1 | | | | | F | 1F | | F |
| **Hooded Mountain-Tanager** *Buthraupis montana* | 1 | | | | | | | 2C | 2C |
| **Blue-gray Tanager** *Thraupis episcopus* | 0 | A | A | | U | | | | |
| **Palm Tanager** *Thraupis palmarum* | 0 | U | U | | | | | | |
| **Silver-beaked Tanager** *Ramphocelus carbo* | 0 | C | C | | 6C | | | | |
| **Masked Crimson Tanager** *Ramphocelus nigrogularis* | 1 | U | U | | | | | | |
| **Vermilion Tanager** *Calochaetes coccineus* | 2 | F | U | | U | F | | | |
| **White-winged Tanager** *Piranga leucoptera* | 1 | | | | U | | | | |
| **Red-hooded Tanager** *Piranga rubriceps* | 2 | | | | | | | | F |
| **Olive Tanager** *Chlorothraupis carmioli* | 3 | | | 10F | 3F | | | | |
| **Fulvous Shrike-Tanager** *Lanio fulvus* | 1 | | F | 3F | 2F | | | | |
| **White-lined Tanager** *Tachyphonus rufus* | 0 | C | C | | | | | | |
| **Flame-crested Tanager** *Tachyphonus cristatus* | 1 | | U | U | | | | | |
| **Fulvous-crested Tanager** *Tachyphonus surinamus* | 1 | C | 3C | 4F | | | | | |
| **White-shouldered Tanager** *Tachyphonus luctuosus* | 1 | | F | | | | | | |
| **Rufous-crested Tanager** *Creurgops verticalis* | 2 | | | | | U | 1U | | |
| **Yellow-backed Tanager** *Hemithraupis flavicollis* | 1 | F | | F | | | | | |
| **White-capped Tanager** *Sericossypha albocristata* | 2 | | | | | | C | C | C |
| **Common Bush-Tanager** *Chlorospingus ophthalmicus* | 1 | | | | | | 2C | 1C | 6A |
| **Yellow-throated Bush-Tanager** *C. flavigularis* | 1 | | | | 8F | F | U | | |
| **Grey-hooded Bush-Tanager** *Cnemoscopus rubrirostris* | 2 | | | | | | | U | F |
| **Grass-green Tanager** *Chlorornis riefferii* | 1 | | | | | | | 3C | 3C |
| **Magpie Tanager** *Cissopis leveriana* | 1 | C | C | U | | | | | |
| **Oleaginous Hemispingus** *Hemispingus frontalis* | 2 | | | | | | 12C | | |

| Species | score | 1a | 1b | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| **Red-capped Cardinal** *Paroaria gularis* | 0 | F | | | | | | | |
| **Slate-colored Grosbeak** *Pitylus grossus* | 1 | F | 1F | 3F | | | | | |
| **Buff-throated Saltator** *Saltator maximus* | 0 | U | | 5F | 2U | | | | |
| **Blue-black Grosbeak** *Cyanocompsa cyanoides* | 0 | 6F | 2U | 5F | | | | | |
| **Yellow-browed Sparrow** *Ammodramus aurifrons* | 0 | C | C | | | | | | |
| **Blue-black Grassquit** *Volatinia jacarina* | 0 | C | C | | | | | | |
| **Caquetá Seedeater** *Sporophila americana murallae* | 0 | F | | | | | | | |
| **Yellow-bellied Seedeater** *Sporophila nigricollis* | 0 | | F | | | | | | U |
| **Chestnut-bellied Seedeater** *Sporophila castaneiventris* | 0 | U | | | | | | | |
| **Slaty Finch** *Haplospiza rustica* | 2 | | | | | | 2U | 4F | |
| **Rufous-collared Sparrow** *Zonotrichia capensis* | 0 | | | | | | | | A |
| **Chestnut-bellied Seed-finch** *Oryzoborus angolensis* | 1 | U | | | | | | | |
| **Orange-billed Sparrow** *Arremon aurantiirostris* | 1 | | | | 2F | | | | |
| **Dusky-headed Brush-Finch** *Atlapetes fuscoolivaceus* | 4 | | | | | | | | U |
| **Slaty Brush-Finch** *Atlapetes schistaceus* | 1 | | | | | | | U | |
| **Chestnut-capped Brush-Finch** *Atlapetes brunneinucha* | 1 | | | | | 3F | 6F | | 2F |
| **Olive Finch** *Lysurus castaneiceps* | 2 | | | | 5F | U | | | |

# Appendix II: Noteworthy bird records

## Introduction

Ornithological fieldwork, in conjunction with other rapid fauna and flora studies, was conducted during rapid conservation assessment expeditions between 1998 and 2000 at selected primary forest study sites at *ca*. 300 m elevational steps from 350 m to 2 450 m in Serranía de los Churumbelos. Ornithological research used mist-nets, sound-recording and direct observation along transects at each site with the objectives of: (a) collecting standardized and replicable data rapidly; (b) documenting species compositions and biological variation; and (c) evaluating conservation priorities across the region. This appendix contains notes of small (<100 km distance or <400 m elevation) range extensions. Details of more significant range extensions from the Serranía de los Churumbelos expeditions are presented in Salaman *et al.* (2002).

## Species accounts

A brief description of each species' distribution and status in Colombia from Hilty & Brown (1986), with additional recent information is provided. The maximum or minimum elevational limits for species follow values from Hilty & Brown (1986), Fjledsa & Krabbe (1990), Ridgely & Tudor (1989, 1994), and (Parker *et al.* 1996). Specific localities, when first mentioned are given latitude and longitude co-ordinates, where available. We follow this with our own information at each site and then summarise the significance of our records. All regions and localities mentioned are situated within Colombia unless otherwise stated. Two specific geographical regions are referred to in the article, the "Cordillera Oriental" (01-07°N) as defined in Section 9 above, and the "Andean East slope" includes the eastern slope of the Cordillera Oriental from Dpto Norte de Santander, 1 000 km southwards down the main Andean range of Dpto Nariño and Putumayo in Colombia. The number of birds captured for each species is given in parentheses, e.g. **SS2** (16) means that 16 birds were caught at Study Site 2. For birds observed in the field, collaborative observations by at least two of the authors were sought and where possible vocalisations were tape-recorded. Where two or fewer of the authors recorded species, their initials are used. Sound recordings by PS and AC have been deposited at the National Sound Archive, Wildlife Section, British Library and Texas A&M University. All mist-netted birds were weighed and measured and were photographed. Photographs have been catalogued with VIREO, Philadelphia, specimens (†) from Serranía de los Churumbelos have been catalogued at ICN. Previously known species ranges in Colombia are based on Hilty & Brown (1986), unless otherwise stated. Noteworthy observations and distributional records are presented. An article is being published in Caldasia (Salaman *et al.* 2002), containing significant range extensions from Serranía de los Churumbelos and other sites on the eastern Andes. Below follow some less significant but nonetheless noteworthy range extensions which will not be published in that article.

**Highland Tinamou** *Nothocercus bonapartei*
This species was identified by a local hunter as occurring at **SS5**. A Tinamou seen briefly by TMD at this site had features consistent with this species, but was not seen well enough to confirm identification. Little known

from the Andean East slope, with previous records from Dpto Cundinamarca and the head of the Magdalena valley, Dpto Huila.

**Lyre-tailed Nightjar** *Uropsalis lyra*
A confiding female roosting on a limestone cliff edge was observed during the day (PS) at SS4 on 8 August 1998. Local over the Cordillera Central to the head of the Magdalena valley and along the Cordillera Oriental.

**Amazonian Swift** *Chaetura viridipennis*
A recent taxonomic study elevated this former subspecies of *C. chapmani*, which is known from only one specimen in Colombia. It is confirmed from the lower Río Cauca valley (Marín 1997). Prolonged observations of mixed swift flocks at close quarters (from cliff and ridge tops) and in ideal conditions were undertaken at **SS2** and **SS4**. At **SS2**, *ca.* 40 individuals of *C. viridipennis* were tentatively identified amongst two other *Chaetura* swifts; Short-tailed *C. brachyura* and Grey-rumped *C. cinereiventris*, over steep foothill forested valleys. A further *ca.*60 *C. viridipennis* were seen displaying about limestone cliffs at **SS4** (16 August 1998). These records represent the first records for the Andean East slope (of either *C. viridipennis* or *C. chapmani*), but specimen or photographic confirmation is required.

**Blue-fronted Lancebill** *Doryfera johannae*
Birds were caught at **SS1** (3), **SS2** (12), **SS3** (5) and **SS4** (1). **SS1** (350 m) represents a small elevation level decrease. Spottily distributed along the Andean East slope from 400-1600 m (Hilty & Brown 1986).

**Violet-headed Hummingbird** *Klais guimeti*
Two males were caught on 7-8 August 1998 at **SS3** in young secondary forest. Rare and local from scattered localities in Colombia, including several localities on the Andean East slope (Hilty & Brown 1986).

**Brown Violetear** *Colibri delphinae*
Caught at **SS2** (2) and **SS4** (1†, 1 050 m). Rare to locally common, and spottily distributed (4 localities), north from Dpto Caquetá (1°N), on the Cordillera Oriental. These records represent a southwards range extension for the Cordillera Oriental in Colombia, and a link to populations in Ecuador.

**Violet-fronted Brilliant** *Heliodoxa leadbeateri*
Seven individuals caught in primary forest at **SS4** are the southernmost Colombian records. Uncommon and local in highland forest in the Cordillera Central and on the Andean East slope north of Serranía Macarena (Hilty & Brown 1986).

**Tourmaline Sunangel** *Heliangelus exortis*
Observed at **SS6** and captured at **SS7** (21, pair†). Known from the Andean East slope of Dptos Nariño and Putumayo and Cordillera Central. Previously unrecorded on the eastern slope of the Cordillera Oriental and appears to replace *H. amethisticollis* in Serranía de los Churumbelos.

**Black-throated Trogon** *Trogon rufus*
Many individuals were observed and four individuals caught at **SS1** (1) and **SS2** (3). This is the second location for this species on the Andean East slope. Only four localities are known for this species east of the Andes in Colombia (Hilty & Brown 1986, Willis 1988) including records from CIEM, PNN Tinigua (Alvarez *et al.* 1993) and Estación Biológica Caparú, Amazonas (Bennett-Defler 1994).

**Blue-crowned Trogon** *Trogon curucui*
Solitary males were observed at **SS1** and **SS3** which represent an altitude extension to 1100 m, although the species is known to 1600 m elsewhere in South America (Parker *et al.* 1996). Uncommon in the Colombian Amazon, known from five localities (Hilty & Brown 1986, Willis 1988), most recently from CIEM, PNN Tinigua (Alvarez *et al.* 1993).

**Brown Jacamar** *Brachygalba lugubris*
One individual was observed hawking for insects on the banks of the Río Caquetá by the Miraflor ferry crossing on July 9 1998 prior to fieldwork. A local species, known previously from a handful of scattered localities east of the Andes in Colombia, the closest in Dpto. Putumayo (Hilty & Brown 1986).

**Lafresnaye's Piculet** *Picumnus lafresnayi*

One bird was observed hammering on a thin branch in secondary forest and pasture border at **SS3** on 6 August 1998. Not well known in Colombia with scattered localities throughout the Amazon to 500 m (Hilty & Brown 1986) to 1,400 m (Parker *et al.* 1996).

**Black-banded Woodcreeper** *Dendrocolaptes picumnus*
Caught at **SS2** (1; 27 July 1998). Rare throughout the Colombian Andes (1 300-2 800 m) with the race *D. p. validus* present along the eastern base of the Andes and in lowland Amazonia (Hilty & Brown 1986).

**Pearled Treerunner** *Margarornis squamiger*
Observed commonly and tape-recorded at **SS6** (1) and **SS7** (3) and usually associated with multi-species foraging flocks. Previously unrecorded on the eastern slope of the Cordillera Oriental south of Cundinamarca.

**Russet Antshrike** *Thamnistes anabatinus*
The species was frequently seen in multi-species foraging flocks and caught at **SS3** (2). Uncommon with the Andean East slope subspecies (*aequatorialis*) known from five records; Dpto. Caquetá and Dpto. Meta (Hilty & Brown 1986); above Cubarral (F.G. Stiles in litt.); and specimens at FMNH from Estación de Bombeo Guamués and El Carmen (*ca*. 0°40'N 77°10'W, 1,500 m), Dpto. Putumayo.

**White-shouldered Antshrike** *Thamnophilus aethiops*
Individuals were captured at **SS1** (2) in primary forest. Known from three localities along the Andean East slope and to eastern Ecuador (Hilty & Brown 1986).

**Spot-winged Antbird** *Schistocichla leucostigma*
Individuals of the subspecies *subplumbea* were observed at **SS2**, and caught at **SS1** (3, 1† +4) and **SS3** (2). **SS3** (1100 m) is an elevational maximum in Colombia. An immature of previously undescribed plumage (1†) was captured at SS1, with features intermediate betwewen the adult male and female plumages. Previously known to 500 m (Hilty & Brown 1986), to 1500 m in Venezuela (Ridgely & Tudor 1994), although as high as 1828 m in Peru (M. Isler *in litt.* 1999).

**White-plumed Antbird** *Pithys albifrons*
This was one of the most common understorey species in the study, with captures at **SS1** (30+16), **SS2** (12) and **SS3** (7). Known to 500 m (Hilty & Brown 1986) or to 1100 m (Ridgely & Tudor 1994). In Peru mostly occurring at 700-1100 m with a record to 1360 m (Ridgely & Tudor 1994).

**Scale-backed Antbird** *Hylophylax poecilinota*
Birds were caught at **SS1** (3+3) and **SS3** (1), the latter representing the highest known record of the species in Colombia. Previously known to 500 m (Hilty & Brown 1986) or to 1100 m (Ridgely & Tudor 1994), although with various records up to 1350 m in Peru (M. Isler *in litt.* 1999).

**Stipple-throated Antwren** *Epinecrophylla haematonota*
Birds caught at **SS2** (2), **SS3** (1). Uncommon and known from eight Colombian localities scattered throughout Amazonia (Dpto Vaupés, Guainía, Caquetá), with two Andean East slope record from Caquetá (Hilty & Brown 1986) and Estación de Bombeo Guamués (FMNH). One recent record from Serranía de Naquen, Dpto Guainía (2°08'N 68°13'W) (Kingston *et al*. 1992) with further individuals recorded at CIEM, PNN Tinigua (Alvarez *et al.* 1993) and Estación Biológica Caparú, Amazonas (Bennett-Defler 1994). Our records represent the second locality for the Cordillera Oriental.

**Short-tailed Antthrush** *Chamaeza campanisona*
*C. campanisona* was regularly heard and active at dusk (corresponding to 70% of captures), from **SS3** (5) and **SS4** (6) in primary forest. Although suspected to occur along the entire eastern slope of the Andes, this species is known only from a few localities (Hilty & Brown 1986, Willis 1988).

**Ochre-breasted Antpitta** *Grallaricula flavirostris*
Individuals were caught at **SS4** (5) where several were seen perched on elevated branches 0.5 to 1 m above the ground in dense mossy forest. On the Andean East slope uncommon in southernmost Colombia and adjacent Ecuador, with specimens from El Carmen [FMNH] and Río San Miguel, Dpto Putumayo [ANSP] (M. Isler *in litt.* 1999), and the northernmost record in Dpto Meta (Hilty & Brown 1986).

**Long-tailed Tapaculo** *Scytalopus micropterus*
Tape-recorded and caught at **SS4** (2 male†). Encountered in swampy areas in primary forest, and replaced on

steep slopes at **SS4** by Northern White-crowned Tapaculo *S. atratus*. Following taxonomic revisions and information by Krabbe and Schulenberg (1997), this species has not been confirmed north of southeastern Dpto Nariño (0°25'N).

**Golden-headed Manakin** *Pipra erythrocephala*
Captures at **SS1** (22+13), **SS2** (14), and **SS4** (1 male) at 1450 m. Previously known to 500 m in Colombia (Hilty & Brown 1986) and to 1100 m, rarely higher elsewhere in South America (Ridgely & Tudor 1994). Also recently recorded at 1300 m in Serranía de San Lucas (Salaman et al. 2002b)

**Golden-winged Manakin** *Masius chrysopterus*
Birds were caught at **SS2** (1), **SS3** (3) and **SS4** (10). Known from 1200 -2300 m, although as low as 600 m on the Pacific slope (Ridgely & Tudor 1994). **SS2** at 700 m is the lowest altitude on the Andean East slope.

**Plum-throated Cotinga** *Cotinga maynana*
A pair was observed on two occasions perched high in the canopy at **SS2**, which represents an increase to 700 m in Colombia. This uncommon Amazonian species is reported previously to 500 m (Hilty & Brown 1986) or exceptionally to 1200 m in Ecuador (Ridgely & Tudor 1994).

**Sulphur-bellied Tyrannulet** *Mecocerculus minor*
One bird was captured at **SS3** at 1,100 m with other captures at **SS5** (4), **SS6** (1) and **SS7** (6). This montane flycatcher was previously known from 1600 to 2700 m (Ridgely & Tudor 1994).

**Vermilion Flycatcher** *Pyrocephalus rubinus*
A small number of individuals observed at **SS1** were considered probably to be of the austral migrant subspecies *P. r. rubinus*. Although a common bird of open areas, *P. rubinus* is known from only a few scattered records east of the Andes in Colombia, the closest from Dpto Caquetá (Hilty & Brown 1986).

**Swainson's Flycatcher** *Myiarchus swainsoni*
One was observed for prolonged periods in the canopy of primary forest at **SS1** and was repeatedly calling "*pweeeep*". An uncommon austral migrant recorded from only three scattered Colombian localities in Dpto Amazonas, Bogotá and Dpto Caquetá (Hilty & Brown 1986). This represents the fourth locality in Colombia, the third for the Cordillera Oriental.

**Smoky Bush-Tyrant** *Myiotheretes fumigatus*
Observed and tape recorded at **SS5** and **SS6** and captured at **SS7** (1). Previously known from the Andean East slope in Dpto Putumayo, but unrecorded south of Dpto Cundinamarca on the Cordillera Oriental.

**Bright-rumped Attila** *Attila spadiceus*
One bird was caught at **SS2**, which represents the second location on the Andean East slope of Colombia. Fairly common and widespread in the lowlands, although with few scattered records east of the Andes (Hilty & Brown 1986).

**Collared Jay** *Cyanolyca viridicyana*
Observed at **SS5** and **SS7** in large multi-species foraging flocks with other Corvidae and Icteridae. Unrecorded in the Cordillera Oriental south of Dpto Cundinamarca, although known on the Andean East slope to Dpto Putumayo.

**Rufous Wren** *Cinnycerthia unirufa*
Observed at **SS6** where it is sympatric with Sepia-brown Wren *Cinnycerthia peruana*. Known on the Andean East slope north to Dpto Putumayo, although in the Cordillera Oriental only south to Dpto Cundinamarca.

**Musician Wren** *Cyphorhinus aradus*
One family party was caught at **SS2** (7) and one further bird caught at **SS3**. **SS3** is at the species' upper elevation limit, although recently recorded as high as 1200-1300 m in Ecuador (P. Coopmans *in litt.* 1999). A lowland species, known to 500m (Hilty & Brown 1986) in Colombia and locally to 1000 m (Ridgely & Tudor 1994).

**Half-collared Gnatwren** *Microbates cinereiventris*
12 individuals were caught at **SS1** (5+2), **SS2** (2) and **SS3** (3) in secondary and primary forest. The paucity of records for this widespread and relatively common species well illustrates the lack of ornithological data for the

Andean East slope. This lowland species was known from only three localities east of the Andes, in Dptos. Cundinamarca, Putumayo and Nariño (Hilty & Brown 1986).

**Velvet-fronted Grackle** *Lampropsar tanagrinus*
This uncommon Amazonian *várzea* forest species is known from four eastern Colombian records (Jaramillo and Burke 1999). Individuals observed around **SS1** represent the fifth Colombian locality.

**Rufous-browed Peppershrike** *Cyclarhis gujanensis*
The species was regularly observed and heard, though never caught, at **SS1, SS2, SS3**, and **SS4**. Seen and tape-recorded at El Mirador in January 1999 (Mauricio Alvarez *in litt*.). Widespread and fairly common, although only three localities known on the Amazonian slope (Hilty & Brown 1986, Bennett-Defler 1994).

**Pale-eyed Thrush** *Platycichla leucops*
Two individuals caught at **SS2** represent a 200 m downward altitudinal extension for this species. Local and uncommon on the Cordillera Occidental and Oriental from 900-2000 m (Ridgely & Tudor 1994).

**Buff-rumped Warbler** *Basileuterus fulvicauda*
Individuals and pairs were observed at **SS1** along muddy paths and streams within primary forest. Widespread in the western and northern lowlands of Colombia, but only four records east of the Andes (Hilty & Brown 1986, Bennett-Defler 1994) and recently recorded at CIEM, PNN Tinigua (Alvarez *et al.* 1993) and PNN Sierra del Chiribiquete (F.G. Stiles in litt.). Additional recent records come from about the town of Mitú, Dpto. Vaupés in October 1997 (PS) and it is common in PNN Amacayacu (PS).

**Fulvous-crested Tanager** *Tachyphonus surinamus*
Birds were observed at **SS1** (3 captured in 2000) and **SS2** (4), representing a 100 m elevation increase in Colombia. An Amazonian species previously known to range to 500 m (Hilty & Brown 1986, Ridgely & Tudor 1994) and to 600 m (Parker *et al.* 1996), and recently to 900 m in immediately adjacent Ecuador, Sucumbíos (R. Ridgely *in litt*.).

**Vermilion Tanager** *Calochaetes coccineus*
This species was recorded fairly commonly at **SS1**, **SS3** and **SS4**, often perched in the topmost canopy branches of primary forest, although once seen feeding on low roadside vegetation at **SS1**. One sighting at Km 62 on the Pitalito to Mocoa road, Dpto Cauca (1°31'N 76°26'W, *ca.* 900 m), on 12 October 1998 by Louise Augustine. Previously known from two localities in Colombia, in Dptos Caquetá and Nariño.

**Olive Tanager** *Chlorothraupis carmioli*
Several members of family parties, including newly fledged juveniles, were caught at **SS2** (10, 1†) and **SS3** (3), and many noisy family parties were observed foraging in the understorey of primary forest. Additionally, a pair was observed by PS, between 1-5 m above the ground feeding in a forest border beside the Río Guamués, Dpto Putumayo at 800 m on 26 August 1993. Poorly known in Colombia, with records from two localities on the Andean East slope on the Dpto Nariño / Putumayo boundary and in Florencia, Dpto Caquetá.

Additional altitudinal range extensions from Hilty & Brown (1986), although with greater elevation values outside Colombia in the Neotropics [shown in square brackets] according to Parker, *et al.* (1996), Ridgely & Tudor (1991, 1994) are as follows:
Black Caracara *Daptrius ater* (to 500 m; observed in the region of **SS3** in August 2000; increase to 1100 m)
Gray-breasted Sabrewing *Campylopterus largipennis* (to 400 m; **SS2** (2) increase to 700 m [900 m]);
Golden-collared Toucanet *Selenidera reinwardtii* (to 500 m; **SS2** (4) increase to 700 m [1100 m]);
Yellow-ridged Toucan *Ramphastos culminatus* (to 500 m; **SS2** (1) increase to 700 m [1250 m]);
Yellow-throated Woodpecker *Piculus flavigula* (to 500m; observed at **SS2** increase to 700m [700 m]);
Red-necked Woodpecker *Campephilus rubricollis* (to 600 m; observed at **SS2** increase to 700 m [1250 m]);
Undulated Antshrike *Frederickena unduligera* (to 500 m; **SS2** (1) increase to 700 m [1050 m]);
Plain-winged Antshrike *Thamnophilus schistaceus* (to 500 m; **SS2** (3) increase to 700m [1300 m]);
Black-faced Antbird *Myrmoborus myotherinus* (to 600 m; **SS2** (9) increase to 700 m [1200 m]);
Spot-backed Antbird *Hylophylax naevia* (to 500m; **SS3** (3) increase to 1100 m [1100 m]);
Olivaceous Flatbill *Rhynchocyclus olivaceus* (to 600 m; **SS2** (3) increase to 700 m [1000 m]);
Grayish Mourner *Rhytipterna simplex* (to 500 m; **SS2** (5) increase to 700 m [1300 m]);
Green-and-gold Tanager *Tangara schranki* (to 500 m; **SS2** (2) increase to 700 m [900 m]);
Flame-crested Tanager *Tachyphonus cristatus* (to 500 m; observed at **SS2** increase to 700 m [800 m]); and
Rufous-crested Tanager *Creurgops verticalis* (above 1500 m; **SS4** decrease to 1400m [above 1150 m]).