

Range extensions and other notes on the birds and conservation of the Serranía de San Lucas, an isolated mountain range in northern Colombia

by Thomas M. Donegan

Received 3 August 2011

SUMMARY.—Bird inventories of the isolated Serranía de San Lucas, northern Colombia, yielded range extensions for several foothill or highland birds of the adjacent Central Andes: Pavonine Cuckoo *Dromococcyx pavoninus*, Lyre-tailed Nightjar *Uropsalis lyra*, White-tipped Sicklebill *Eutoxeres aquila*, Masked Trogon *Trogon personatus*, Golden-headed Quetzal *Pharomachrus auriceps*, Smoky-brown Woodpecker *Picoides fumigatus*, Crimson-mantled Woodpecker *Colaptes rivolii*, Red-faced Spinetail *Cranioleuca erythrops*, Western Woodhaunter *Hylocistes virgatus*, Buff-fronted Foliage-gleaner *Philydor rufum*, Spotted Woodcreeper *Xiphorhynchus erythropygius*, Slaty Antwren *Myrmotherula schisticolor*, White-crowned Tapaculo *Scytalopus atratus*, Rufous-browed Tyrannulet *Phylloscartes superciliaris*, Ornate Flycatcher *Myiobittacus ornatus*, White-winged Becard *Pachyramphus polychopterus*, Brown-capped Vireo *Vireo leucophrys*, Orange-billed Nightingale-Thrush *Catharus aurantirostris*, Black-billed Thrush *Turdus ignobilis*, Golden Tanager *Tangara arthus* and Yellow-throated Bush Tanager *Chlorospingus flavigularis*. *M. schisticolor* and *S. atratus* show small differences from Central Andes populations and require further research. Range extensions for lowland species (some based on older specimens) include Ornate Hawk-Eagle *Spizaetus ornatus*, Scaled Dove *Scardafella squammata*, Vermiculated Screech Owl *Megascops 'guatemalae' centralis*, Central American Pygmy Owl *Glaucidium griseiceps*, Spot-tailed Nightjar *Hydropsalis maculicaudus*, Green-and-rufous Kingfisher *Chloroceryle inda*, Sooty Grassquit *Tiaris fuliginosus* and Black-faced Grassquit *T. bicolor*. The threatened Chestnut-bellied Hummingbird *Amazilia castaneiventris* and Recurve-billed Bushbird *Clytoctantes alixii* (both last collected in the 1940s in the region) were recorded. Tens of new elevational records for typically lowland species were made. San Lucas woodnymphs are intermediate between *Thalurania fannyi* and *T. colombica*, raising questions as to whether two species are involved. Nominate Lineated Foliage-gleaner *Syndactyla subalaris* (of the West Andes) occurs in the northern Central Andes including San Lucas. Various highland species recorded at similar elevations in the Central Andes are apparently absent, perhaps due to lower humidity, island effects and ecological release of lowland species. The highest elevations of San Lucas remain unknown but occupy very small areas. Further work will doubtless yield additional new records, but is complicated by security issues and land-use conflicts. Anti-personnel landmines do not provide a viable 'defence' against deforestation in the long term due to habitat disturbance associated with their clearance.

For decades, the isolated Serranía de San Lucas has been one of the great enigmas of the northern Andes, a rare example of *tierra incognita*. The San Lucas range rises to c.2,300 m (Fig. 1) in southern dpto. Bolívar, to the north of Colombia's Central Andes, separated from the main range by a c.75-km foothill plateau with a mean elevation of 500 m. The range is also isolated by 65 km from the East Andes. Some collections of birds were made in the

lowlands surrounding the massif and in the foothills to premontane elevations in Santa Rosa del Sur municipality, most significantly by M. A. Carriker in April–May 1947 (Paynter 1997). Hilty & Brown (1986) mapped 58 bird species above 1,000 m in Serranía de San Lucas. With the exception of 13 species typical of high elevation recorded by Carriker, most were assumed to occur based on their broad distribution (Salaman *et al.* 2002a).

No further studies were made until 1999–2001, when Salaman *et al.* (2002a) visited primary lowland sites and disturbed habitats at higher elevations (to 1,400 m), reporting a host of avian range extensions. However, field workers were detained and prevented from accessing other areas due to the security situation, being able to study only forest edge habitats higher up (Salaman & Donegan 2001). As a result, the interior of highland forests and higher elevations remained unknown.

Study sites and Methods

In 2008–09, with the improving security situation, local authorities indicated that surveys of some habitats not previously studied were now feasible. In January 2010, a small team visited localities at higher elevations and primary lower montane forest for the first time. This led to the description of a new subspecies of Immaculate Antbird *Myrmeciza immaculata* (Donegan 2012), and a host of range extensions and other notes, detailed here.

Details of all sites studied by the author and other localities referred to based on historic collections appear in Table 1. Coordinates for historical localities are based on Paynter (1997), while those for highland localities in Salaman & Donegan (2001) contain errors so they were geo-referenced again in 2010. Localities in southern dpto. Bolívar between the ríos Cauca and Magdalena, south of the northernmost extension of the San Lucas foothills are included in this paper. Data from sites west of the río Cauca in the Achí region or north of Montecristo and Rioviejo are not generally included.

Our major highland study site at Santa Cecilia lies on a C-shaped ridge that includes c.18 km² of land above 1,500 m, rising to a peak marked on maps as ‘Troja’ at 1,664 m. The ridgetop is characterised by primary forest, although the agricultural frontier is close. Immediately to the north, the mountains rise again to the ‘Cerro de San Lucas’, known locally as the ‘Teta de San Lucas’ and on maps as ‘Dedal’ (2,270–2,310 m). This region includes c.60–80 km² of land above 1,500 m, mostly at 1,500–1,700 m, encompassing San Pedro Frío, Alto Quebrada La Fría and forest above sites visited by Salaman *et al.* (2002a). The Teta de San Lucas and highest elevations of the massif hold generally intact forest, but there are numerous gold mines and a notable increase in agriculture at foothill to premontane elevations since 2001.

At Santa Cecilia, field work followed rapid assessment protocols employed by previous EBA Project expeditions (e.g. Salaman *et al.* 2002a,b, Donegan *et al.* 2007). Twenty mist-nets were operated 12 hours per day and sound-recordings were made with a mini-disc and small microphone. We mist-netted on a ridge rising to the local peak, at c.1,500–1,600 m and made field observations in second growth down to c.1,350 m and to the top of the transect. At San Pedro Frío and Alto Quebrada La Fría, more degraded forest and nearby scrub was investigated, with sound-recordings and some photographs and videos taken. Mist-netted birds were photographed and measured (wing, tail, tarsus, culmen and mass; data are available from the author or ProAves) and a ProAves metal ring applied. Almost all birds were released, but a handful of selectively taken specimens and mist-net mortalities were deposited at the Instituto de Ciencias Naturales, Universidad Nacional, Bogotá (ICN), marked †. Skins, skeletons and tissue samples were preserved. Sound-recordings are archived at the British Library National Sound Archive, London, and www.xeno-canto.org (XC herein).

Table 1
Sites in Serranía de San Lucas studied by the author and others.

Study site	Elevation (m)	Slope	Coordinates	Municipality, Department	Study	Dates	Habitat
New study sites							
Río Magdalena (Gamarra, to Cerro de Burgos)	100 m	East	Broad area	Various, Bolívar and César	EBA 2010	2 Jan and 12 Jan 2010	Rivers, riparian scrub, disturbed habitats and marsh
Santa Rosa del Sur (urban and environs)	600–1,000 m	East	07°57'47"N, 74°03'08"W (coordinates of town centre)	Santa Rosa del Sur, Bolívar	EBA 2010; (also, M.A. Carriker, 1947)	2–3 Jan and 5 Jan 2010	Urban, scrub, farms, plantations
San Pedro Frío	1,550–1,650 m	East	08°09'22"N, 74°16'57"W	Santa Rosa del Sur, Bolívar	EBA 2010	3–4 Jan 2010	Lower montane forest border and scrub
Alto Quebrada La Fría	1,500 m	East	08°05'50"N, 74°11'12"W	Santa Rosa del Sur, Bolívar	EBA 2010	4 Jan 2010 (brief surveys in pm)	Lower montane forest border
Santa Cecilia	1,350–1,600 m (main transect at 1,550 m)	East	07°58'33"N, 74°12'55"W (entrance into forest)	Santa Rosa del Sur, Bolívar	EBA 2010	6–11 Jan 2010	Lower montane forest
Salaman <i>et al.</i> (2002a) localities							
San Pablo	50–250 m	East	07°59'00"N, 74°13'33"W	San Pablo, Bolívar	EBA 2001	5–6, 9–12 Mar 2001	Rivers, riparian scrub, disturbed habitats and marshland
La Punta	1,200–1,400 m	East	08°08'57"N, 74°13'09"W	Santa Rosa del Sur, Bolívar	EBA 2001	15–20 Mar 2001	Foothill forest border and scrub
'La Teta Resort'	1,280 m	East	08°08'45"N, 74°14'00"W	Santa Rosa del Sur, Bolívar	EBA 2001	22 Mar–3 Apr 2001	Foothill forest border and scrub
'Apollo 13'	300 m	West	07°21'14"N, 74°40'95"W	El Bagre / Puerto López, Antioquia	EBA 1999	3–8 Aug 1999	Disturbed lowland humid forest
Old collecting localities (Paynter (1997)							
Simití	85 m	East	07°58'N, 73°57'W	Simití, Bolívar	E. L. Kerr; M. A. Carriker	1909 (ELK); 2–8 Mar and 10–11 Apr 1947 (MAC)	Wetlands and lowland forest
Volador	750–1,150 m	East	07°58'N, 74°15'W	Santa Rosa del Sur, Bolívar	M. A. Carriker	5–10, 12–17, 19–20, 22–31 May, 1 Jun 1947	Foothill and premontane areas
Norosí	120 m	North	08°32'N, 74°02'W	Montecristo, Bolívar	M. A. Carriker	27–28 Feb, 1–15 Mar 1947	Wetlands and lowland forest
Río Viejo	100 m	North	08°35'N, 73°51'W	Montecristo, Bolívar	M. A. Carriker	16–24 Feb 1947	Wetlands and lowland forest

This paper details the most significant new distributional records from field work in San Lucas. Overlooked specimens now databased by Biomap Alliance Participants (2012) at the following museums are also discussed: United States National Museum (Smithsonian Institution), Washington DC (USNM), Museum of Comparative Zoology, Cambridge, MA (MCZ) and American Museum of Natural History, New York (AMNH), with all specimen identifications cited herein verified, unless specified otherwise.

Details of various observations are presented below. Numbers in parentheses refer to number of birds mist-netted, excluding re-captures. Taxonomy, order and nomenclature generally follow Salaman *et al.* (2010). Subspecies are only mentioned when identified to this level. Almost all records were mapped (and the elevational data included) in McMullan *et al.* (2010, 2011) but no details have previously been published.

Species accounts

Range extensions from the northern Central Andes to San Lucas.—All of the following species are considered or confirmed to occur in the Central Andes, including northern dpto. Antioquia (*vide* Hilty & Brown 1986, Salaman *et al.* 2002a, SAO 2003, Restall *et al.* 2006, Castaño & Pastiño 2007, Cuervo *et al.* 2008a,b, Donegan *et al.* 2009a, McMullan *et al.* 2010, 2011) but none has previously been recorded in San Lucas (Hilty & Brown 1986, Salaman & Donegan 2001, Salaman *et al.* 2002a). Each record represents a c.100–130 km northwards range extension. Further notes are presented only if there is additional significance to the record.

PAVONINE CUCKOO *Dromococcyx pavoninus*

Sound-recordings (XC99423, 99504, 99534, 104192, 104204–206, 104209–210, 104243) and field observations at Santa Cecilia. A pair held territory near the transect and was observed foraging on the ground at close quarters. All recordings probably relate to this pair. They moved between mid-level branches of trees and shrubs and the ground, sometimes overflying the mist-nets. Until recently, known in Colombia only from a Bogotá skin (BMNH 1887.12.19.482) and a 1941 Carriker specimen (USNM 368717) from Tierra Nueva, Perijá, with a series of recent records at various localities in the northern Central Andes of Antioquia (Alvarez *et al.* 2007, Cuervo *et al.* 2008a) and Serranía de los Yariguíes (Fundación ProAves 2008, Donegan *et al.* 2010, Freeman *et al.* 2012). East Andes and northern Central Andes sound-recordings are indistinguishable from those from San Lucas. The rare Pheasant Cuckoo *D. phasianellus* is known from just five specimens in Colombia (Biomap Alliance Participants 2012), one of them collected by Carriker at nearby Santa Rosa (610 m) (USNM 392054). Although the latter has not been reported more recently in the region, the two species may replace one another elevationally in San Lucas.

LYRE-TAILED NIGHTJAR *Uropsalis lyra*

The distinctive falling cadence of this species' song was heard once at night at Santa Cecilia, but not sound-recorded.

WHITE-TIPPED SICKLEBILL *Eutoxeres aquila*

Mist-netted and photographed at Santa Cecilia (2: Fig. 4). Most recent records in the Magdalena Valley (e.g. Donegan *et al.* 2010, Cuervo *et al.* 2008b) are from the foothills and there are recent high-elevation records elsewhere in Colombia (e.g. Donegan & Dávalos 1999). In contrast, field guides (e.g. Hilty & Brown 1986, Restall *et al.* 2006, McMullan *et al.* 2010, 2011) generally hold *E. aquila* to be widespread in Colombia's lowlands. Whilst

it occurs at low elevations in the Chocó, there are no specimen localities from the base (as opposed to the foothills) of the Magdalena Valley (Biomap Alliance Participants 2012).

MASKED TROGON *Trogon personatus*

Sound-recorded at Santa Cecilia (e.g. XC104321–323) and Alto Quebrada La Fria. Collared Trogon *T. collaris* (previously reported by Salaman *et al.* 2002a) was also present at Santa Cecilia (1).

GOLDEN-HEADED QUETZAL *Pharomachrus auriceps*

A single distant recording made at Santa Cecilia (XC99291), but not observed during field work.

SMOKY-BROWN WOODPECKER *Picoides fumigatus*

A pair trapped together at Santa Cecilia (2: Fig. 6), where observed several times in mixed-species flocks.

CRIMSON-MANTLED WOODPECKER *Colaptes rivolii*

Observed well in mixed-species flocks at Santa Cecilia.

RED-FACED SPINETAIL *Cranioleuca erythrops*

Trapped and photographed at Santa Cecilia (1: Fig. 7). Sound-recordings of a short and long version of the song (XC99537, 100016) are similar to those of other north Andean populations.

WESTERN WOODHAUNTER *Hylocistis virgatus*

Mist-netted and photographed at Santa Cecilia (2: Fig. 9) and observed in mixed flocks.

BUFF-FRONTED FOLIAGE-GLANER *Philydor rufum*

Trapped and photographed at Santa Cecilia (1: Fig. 10), where observed in mixed-species flocks, with foraging or contact calls (e.g. XC104264) and a presumed recording of its song (XC104475) sound-recorded. Occurs to unusually low elevations (800 m) near the plateau separating San Lucas from the northern Central Andes (Salaman & Donegan 2001) so these populations may be continuously distributed.

SPOTTED WOODCREEPER *Xiphorhynchus erythropygius*

Mist-netted and photographed at Santa Cecilia (1: Fig. 11); seemed similar in plumage to birds elsewhere in the north Colombian Andes, so presumably referable to *X. e. insolitus* of Panama to the foothills of the Magdalena and Cauca valleys (*cf.* Marantz *et al.* 2003).

Legend to figures on facing page

Figure 1. Teta de San Lucas peak, taken from San Pedro Frío, Colombia (Thomas M. Donegan)

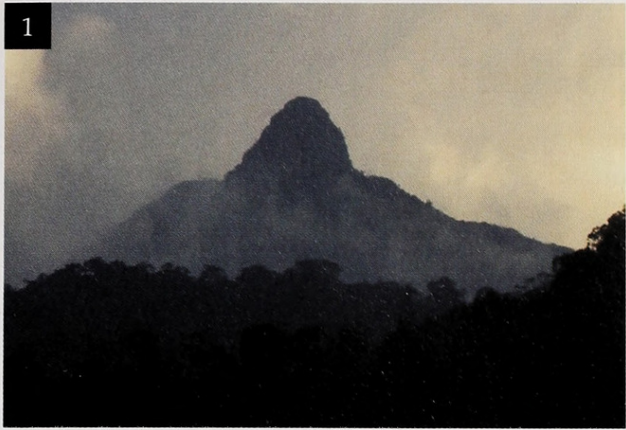
Figure 2. Wattled Guan *Aburria aburri*, San Pedro Frío, Colombia, January 2010 (© B. Huertas)

Figure 3. Rufous-fronted Wood Quail *Odontophorus erythrops*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)

Figure 4. White-tipped Sicklebill *Eutoxeres aquila*, Santa Cecilia, Colombia, January 2010 (Thomas M. Donegan)

Figure 5. Woodnymph *Thalurania* sp., Santa Cecilia, Colombia, January 2010; note both green and purple feathering in the crown (Thomas M. Donegan)

Figure 6. Male Smoky-brown Woodpecker *Picoides fumigatus*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)



SLATY ANTWREN *Myrmotherula schisticolor*

Two females, an immature male and adult male trapped at Santa Cecilia (4, 3+). Sound-recordings of call notes of birds in the hand and on release (XC93256, 104126, 104218, 104230) are similar to natural recordings of contact calls elsewhere in the Andes. The female specimen is essentially identical to those from Anorí, Antioquia, and elsewhere in the north Central Andes at ICN, which are generally considered to pertain to the wide-ranging nominate subspecies. However, the male has notably paler grey posterior underparts than most Central Andes specimens and more marked speckling on face and moustachial due to rather pale grey basal plumage (Fig. 12), and is closer to East Andes birds, which are generally considered as *M. s. sanctaemartae* or *interior*. Chapman (1914) diagnosed currently recognised Colombian subspecies based only on female plumages, due to individual variation in males. However, Zimmer & Isler (2003) noted that male *sanctaemartae* is paler grey than the nominate (as is *interior*). Other geographical variation exists in Colombia and further work is needed to determine subspecies limits. Southern West Andes birds (Nariño to Cauca) are on average shorter tailed ($30.8 \text{ mm} \pm 2.59$, $n = 5$ specimens; $29.5 \text{ mm} \pm 2.00$, $n = 9$ mist-net data from P. Salaman) than those in the Central Andes ($37.67 \text{ mm} \pm 0.58$; $n = 3$ specimens), San Lucas ($36.25 \text{ mm} \pm 3.40$; $n = 4$ mist-net data) and East Andes ($37.81 \text{ mm} \pm 0.98$, $n = 11$ specimens; $35.88 \text{ mm} \pm 1.72$; $n = 8$ mist-net data from Yariguíes). In contrast, there are few discernible differences in plumage between those on the east and west slopes of the East Andes, which have been treated as different subspecies (*interior* and *sanctaemartae*). The possibility that *sanctaemartae* is restricted to Santa Marta or that some other populations, e.g. San Lucas and southern / Ecuadorian west slope, may represent '75% rule' or better subspecies requires investigation. Moreover, differences between Andean and Central American populations (type locality of *M. s. schisticolor* is in Costa Rica) also require study. A detailed molecular and vocal study appears necessary, given molecular structure in other wide-ranging species occupying similar-elevation forests in Colombia (e.g. Chaves & Smith 2011, Gutiérrez-Pinto *et al.* 2012).

WHITE-CROWNED TAPACULO *Scytalopus atratus*

A '*Scytalopus (femoralis)* sp.' was reported by Salaman *et al.* (2002a) at La Teta Resort. At Santa Cecilia, sound-recordings (XC99283, 104290–291) of *S. atratus* were made. The species was also heard at Alto Quebrada La Fría. Recordings are marginally lower pitched than others from Colombia (loudest note peaking at $<2.5 \text{ kHz}$) but otherwise similar. A *S. atratus* was collected by Carriker at Boca del Monte, Volador, at 1,128 m (USNM 398730). Observed down to c.2–3 m distance at Santa Cecilia, on playback of Álvarez *et al.* (2007) recordings. *S. atratus* is a highly terrestrial tapaculo that passed below mist-nets both in response to playback and without. All those observed and the specimen had a clear white crown spot and limited white streaking on the lower belly, being more similar to specimens from Anorí (sometimes assigned to *S. a. confusus*) than the more extensively white-streaked birds in the East Andes at Serranía de los Yariguíes (Donegan *et al.* 2007).

Legend to figures on facing page

Figure 7. Red-faced Spinetail *Cranioleuca erythrops*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)

Figure 8. Lineated Foliage-gleaner *Syndactyla subalaris*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)

Figure 9. Western Woodhaunter *Hylocistes virgatus*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)

Figure 10. Buff-fronted Foliage-gleaner *Philydor rufum*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)

Figure 11. Spotted Woodcreeper *Xiphorhynchus erythropygius*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)

Figure 12. Male Slaty Antwren *Myrmotherula schisticolor*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)



RUFOUS-BROWED TYRANNULET *Phylloscartes superciliaris*

Very few records in Colombia. Trapped and photographed at Santa Cecilia (3: Fig. 13), including a pair mist-netted together.

ORNATE FLYCATCHER *Myiobatrachus ornatus*

Common at Santa Cecilia (1), particularly at our camp and forest borders where sound-recordings (XC99282, 99294–295, 99297–298) and many observations made. Given that it is such a common and conspicuous species, but neither Salaman *et al.* (2002a) nor Carriker recorded it, its elevational range in San Lucas probably starts at 1,400–1,500 m.

WHITE-WINGED BECARD *Pachyramphus polychopterus*

Sound-recorded at Santa Cecilia (XC104272).

BROWN-CAPPED VIREO *Vireo leucophrys*

Observed at San Pedro Frío and Alto Quebrada La Fría.

ORANGE-BILLED NIGHTINGALE-THRUSH *Catharus aurantiirostris*

Generally stated to occur only in the headwaters of the río Magdalena in dpto. Huila (Hilty & Brown 1986, Clement & Hathaway 2000), but there are also records from near Medellín, Antioquia (SAO 2003). One, similar in plumage to brown-headed birds from the east side of the Magdalena Valley and illustrated in SAO (2003), was trapped at Santa Cecilia (1).

BLACK-BILLED THRUSH *Turdus ignobilis*

Observed near Santa Rosa del Sur town, with a specimen, similar in plumage to Central Andes specimens from Antioquia, collected by Carriker at Volador (USNM 398755).

GOLDEN TANAGER *Tangara arthus*

Observed and a flight-call sound-recorded (XC104487) within a mixed-species flock at Santa Cecilia.

YELLOW-THROATED BUSH TANAGER *Chlorospingus flavigularis*

Observed in mixed-species flocks at Santa Cecilia and apparently this species also sound-recorded (XC104192, 104210, 104212, 104320). Given that the landbridge between Anorí and San Lucas encompasses suitable elevations for this species (Hilty & Brown 1986, Isler & Isler 1999), populations are presumably continuously distributed.

*Other new distributional records***JABIRU** *Jabiru mycteria*

Three overlooked Simití specimens collected by E. L. Kerr in 1909 (MCZ 67799, AMNH 102397–398). Only a handful of records from localities west of the Andes in Colombia, including at sites along the río Magdalena north and south of San Lucas (Hilty & Brown 1986), but the Simití records have been overlooked in the literature.

ORNATE HAWK-EAGLE *Spizaetus ornatus*

Generally not considered to occur in the Magdalena Valley or east of the Central Andes in Colombia (Hilty & Brown 1986), although once mapped east of San Lucas (Restall *et al.* 2006). There is an old Santa Rosa specimen (610 m) collected by Carriker (USNM 391867).

SCALED DOVE *Scardafella squammata*

Although not (yet) recorded west of the río Magdalena in the San Lucas region, *S. squammata* is now common below San Lucas in farmland in adjacent southern dpto. César, where seen at Ayacucho (08°37'N, 73°35'W), San Bernardo (08°41'N, 73°42'W) and La Tapia (08°42'N, 73°47'W) (Donegan *et al.* 2003a,b). At each, birds were observed in pairs but no documentation obtained. These are the first records for the Magdalena Valley and the southernmost west of the Andes. Known previously from arid scrub and disturbed areas on the north coast of Colombia and lowlands around Sierra Nevada de Santa Marta and the Guajira Peninsula (Hilty & Brown 1986). As noted by Estela *et al.* (2005), the wider distribution accorded this species by Baptista *et al.* (1997) was erroneous. Nonetheless, by 1997 at least, it had spread along the coast to Santa Lucía, Bolívar (de la Zerda & Rosselli 2003) and thereafter west to Sucre and Córdoba, and south to Mompox, Bolívar, in the Sinú lowlands, c.80 km northwest of the César records (Estela *et al.* 2005). A specimen (ICN 30802) was collected by H. Zuñiga in 1989 in La Jagua de Ibiricó municipality, César (09°37'N, 73°36'W), c.100 km north of the observations reported here. Older specimens were collected only as far south and west as Valledupar municipality and the Sierra Nevada de Santa Marta foothills (Hilty & Brown 1986), c.200 km north of recent records. This dove is widespread in Colombia's llanos and broadly east of the Andes (Hilty & Brown 1986, Baptista *et al.* 1997). Given that the La Jagua de Ibiricó and other records are all recent, and that Carriker's 1940s visits to San Lucas and southern César did not yield specimens, this dry-land specialist has probably spread south relatively recently in response to deforestation.

VERMICULATED SCREECH OWL *Megascops 'guatemalae' centralis*

Sound-recorded at Santa Cecilia (XC104127, 104129). Until recently, known in Colombia only in the Chocó region near the Ecuador and Panama borders (Hilty & Brown 1986), but recently sound-recorded in Serranía de las Quinchas by N. Athanas *et al.* (XC10835; Freeman *et al.* 2012) with unconfirmed records from the lowlands below Serranía de los Yariguíes (Donegan *et al.* 2010). The San Lucas sound-recording is the first for the Central Andes and the highest-elevation record in Colombia for the *guatemalae* group, which generally occurs below 1,000 m (Hilty & Brown 1986) (here at 1,550 m). The song is similar to populations in the Chocó of Colombia and Ecuador, generally treated as subspecies *centralis* (and sometimes split as Chocó Screech Owl, e.g., Restall *et al.* 2006). These range extensions and recordings could shed some light on the taxonomy of this difficult genus, which requires thorough revision (Remsen *et al.* 2012) and includes an undescribed species in Colombia (American Bird Conservancy 2007).

CENTRAL AMERICAN PYGMY OWL *Glaucidium griseiceps*

Sound-recorded at Santa Cecilia (1,550 m) (XC104318). As noted by Donegan *et al.* (2007), this was probably the same species identified by Salaman *et al.* (2002a) as '*G. (brasilianum) ridgwayi*' in the San Lucas lowlands and the *Glaucidium* at Anorí. In Ecuador, generally at 200–400 m (Ridgely & Greenfield 2001) and to 600 m in Colombia (Hilty & Brown 1986), with recent records to 1,000 m (Donegan *et al.* 2007) and 1,300 m (Restall *et al.* 2006). There is another high-elevation sound-recording from Agua de la Virgen, Ocaña, dpto. Norte de Santander, East Andes (08°13'N, 73°24'W; 1,600 m) (XC20548) and a specimen at the Los Angeles County Museum from the Magdalena Valley between San Lucas and Agua de la Virgen, at San Alberto, César, labelled '*G. hardyi minutissimum*' (LACM 58183, taken by Carriker in 1962, not verified). With other recent records (Donegan *et al.* 2007, Moreno-Palacios & Rodríguez-Ortíz 2008), the species appears to occur throughout the remnant foothill to premontane forests of the middle to lower Magdalena and lower Cauca valleys.

SPOT-TAILED NIGHTJAR *Hydropsalis (Caprimulgus) maculicaudus*

Apparently migrates between South and Central America (Cleere 2010) and small numbers probably occur across much of Colombia at appropriate seasons. However, it has only been recorded on the Caribbean coast and in the Cauca Valley (Hilty & Brown 1986, McMullan *et al.* 2010). A Volador specimen refers to a juvenile growing its tail that was previously misidentified as White-tailed Nightjar *Caprimulgus cayannensis albicauda* (USNM 392117). It was re-identified by N. Cleere in 2004, but the record's significance—apparently the only Magdalena Valley occurrence—seems to have been overlooked (e.g. Cleere 2010).

GREEN-AND-RUFOUS KINGFISHER *Chloroceryle inda*

Two specimens from Simití (USNM 392376–377, identified as *C. i. chocoensis*). Previously known only from coastal regions west of the Andes (Hilty & Brown 1986), c.250 km distant.

PALE-TIPPED TYRANNULET *Inezia caudata*

Zimmer & Whittaker (2000) considered that *I. caudata* does not occur south to the *ciénagas* bordering San Lucas, although others (e.g., Hilty & Brown 1986, McMullan *et al.* 2010) have mapped it there. Several specimens from below San Lucas and surrounding region collected by Carriker, including at Simití (2), Norosí (2) and río Viejo (3), with one sound-recorded (XC20533) and mist-netted at La Tapia, southern César, in forest abutting a *ciénaga* east of San Lucas (08°42'N, 73°47'W) (Donegan *et al.* 2003b). The supposed occurrence of Slender-billed Tyrannulet *I. tenuirostris* in *ciénagas* in dptos. Bolívar and César (Franco & Bravo 2005) appears to represent an erroneous transcription of these records.

SOOTY GRASSQUIT *Tiaris fuliginosus*

Rare in Colombia, with records from Santa Marta (Strewe & Navarro 2004) and two localities on the west slope of the East Andes in dpto. Santander, Cerro de la Paz and Portugal (Donegan *et al.* 2007). Several trapped at Santa Cecilia including a pair together (5: Fig. 14), apparently the first records for the Central Andes.

BLACK-FACED GRASSQUIT *Tiaris bicolor*

Widespread in the Magdalena Valley, mostly on the East Andes side and adjacent lowlands (Hilty & Brown 1986). Few records in the Central Andes north of the head of the Magdalena Valley, and not reported during recent surveys elsewhere (e.g. Verhelst *et al.* 2001, Cuervo *et al.* 2008b). Male observed singing in scrub was sound-recorded (XC97555, 97560, 97582–584) at San Pedro Frío, a range extension of c.400 km for the Central Andes population, or just a few tens of kilometres from the East Andes side of the lower Magdalena Valley.

Taxonomic notes**WOODNYMPHS** *Thalurania* sp.

Trapped previously by Salaman *et al.* (2002a) at La Punta (5) and La Teta Resort (12) and others mist-netted at Santa Cecilia (11, 2+) where sound-recorded in the hand or on release (XC99512–513, 104416–417) and while foraging (XC104452). All males at Santa Cecilia had a spot of purple feathers slightly behind the centre of the otherwise green crown (Fig. 5). In this feature, they are intermediate between Purple-crowned Woodnymph *T. colombica* of the East Andes and Green-crowned Woodnymph *T. fannyi hypochlora* of the West Andes and adjacent lowlands, which were previously treated together as 'Crowned Woodnymph'. ICN specimens collected at Anorí similarly possess a small purple forehead spot. Escalante-Pliego & Peterson (1992) noted that 'One to several violet feathers at the rear edge of the

forecrown are observed in most Panamanian specimens'. To this should now be added specimens from San Lucas and the northern Central Andes (F. G. Stiles *in* Remsen *et al.* 2012, proposal 137). *T. fannyi* and *T. colombica* were split largely on the basis of crown coloration in males (Escalante-Pliego & Peterson 1992). In the latter study, purple-crowned birds were considered restricted to the Santa Marta Mountains and Central Andes of Colombia, with green-crowned birds in the West Andes and adjacent lowlands. We now know that purple-crowned birds occur in the East Andes (Donegan *et al.* 2007), with green-crowned



Figure 13. Rufous-browed Tyrannulet *Phylloscartes superciliaris*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)

Figure 14. Male (right) and female Sooty Grassquits *Tiaris fuliginosus*, Santa Cecilia, Colombia, January 2010 (© B. Huertas)

birds in the West Andes and purple-and-green-crowned birds in the northern Central Andes and San Lucas. At río Samaná, Caldas (05°25'39"N, 75°01'07"W), purple-and-green-crowned males also occur, as do males with almost no purple in the crown (M. Slaymaker *in litt.* 2012). Green-and-purple-crowned males from Panama are generally assigned to *T. f. fannyi*, with pure green-crowned *hypochlora* in the Colombian Chocó and West Andes. Treatment of *T. colombica* and *T. fannyi* as separate species requires revision in light of the known distribution of morphotypes in Colombia, identical female plumages and similar vocalisations throughout the Colombian Andes.

RED-BILLED SCYTHERBILL *Campylorhamphus trochilirostris*

Observed in mixed-species flocks, mist-netted (1) and apparently sound-recorded (XC106503–504) at Santa Cecilia. The bird vocalising was not seen, meaning the recordings are unconfirmed, but they are broadly similar in note shape to other Colombian recordings, differing in their higher frequency and change in frequency. This vocally very variable 'species' requires further study.

LINEATED FOLIAGE-GLANER *Syndactyla subalaris*

Several mist-netted at Santa Cecilia (3: Fig. 8). Its song (XC104309, 104319) and in-the-hand vocalisations (XC104237, 104280) were sound-recorded. Specimen taken by Salaman *et al.* (2002a) at La Punta. In plumage, San Lucas birds resemble West Andes populations usually assigned to nominate *S. s. subalaris* in having a relatively rufous crown and indistinct, restricted belly streaking. Specimens with similar plumage from Anorí (ICN 33521, 33982, 34577) and Frijolera, Antioquia (AMNH 133576). Remsen (2003) incorrectly assigned San Lucas birds to *striolata*, citing Salaman *et al.* (2002a) among others, although the latter did not identify *S. subalaris* in San Lucas to subspecies. Dickinson (2003) also restricted *S. s. subalaris* to the West Andes. As others have noted (e.g. Meyer de Schauensee 1964, Hilty & Brown 1986, Fjeldså & Krabbe 1990, Salaman *et al.* 2001, 2008, 2010, Restall *et al.* 2006), the ranges of Lineated Foliage-gleaner subspecies in Colombia are rather unusual. *S. s. subalaris* (= '*striaticollis*') occurs in the West Andes and northern Central Andes, and western Ecuador. Disjunct populations of rufous-headed birds belonging to different subspecies also occur in Panama and north through Central America. Darker and more contrastingly streaked birds, generally assigned to *S. s. striolata* or *mentalis*, occur at the head of the Magdalena Valley and in the East Andes south to eastern Ecuador. Although Hilty & Brown (1986), Fjeldså & Krabbe (1990) and others map the species as widespread in the Central Andes, there are no specimen data from between dptos. Antioquia (*subalaris*) and Huila (*striolata*) in the Central Andes (Biomap Alliance Participants 2012). Verhelst *et al.* (2001) and Corpocaldas & Asociación Calidris (2010) reported the species in Caldas, but the subspecies concerned is unknown. Further research into the geographical limits in the Central Andes of these two subspecies is needed. The name '*striaticollis*', used by Meyer de Schauensee (1964), Hilty & Brown (1986) and other authors in place of *subalaris*, would appear to be a *nomen nudum*, arising perhaps due to confusion with *Anabacerthia* names.

SHARPBILL *Oxyruncus cristatus*

First recorded in Colombia in San Lucas by Salaman *et al.* (2002a) and subsequently collected in the adjacent northern Central Andes in Antioquia (Cuervo *et al.* 2008a). At Santa Cecilia (1+), observed twice in mixed-species flocks, acrobatically feeding in the subcanopy and making short, single-note contact calls. Sound-recordings of a bird in the hand prior to collection (XC104288, 104466) are similar to those, made in similar circumstances, in Álvarez *et al.* (2007). The adult male from San Lucas is similar to the female from Anorí,

except that it has a red (not orange) crown, perhaps due to sex-related variation (Kirwan & Green 2011). Cuervo *et al.* (2008a) considered that the whitish breast and belly of their specimen recalled eastern races such as *hypoglauca*. However, USNM specimens attributed to *brooksi* of Panama also have pale underparts, consistent with the tentative subspecific identification in Álvarez *et al.* (2007). Chapman (1931) and Kirwan & Green (2011) drew attention to the similarity of all northern populations of this species. A new subspecies is perhaps involved (Donegan *et al.* 2009b), but any assessment of subspecific limits requires natural sound-recordings from both Colombia and Venezuela and direct comparison of the Colombian specimens with a series from Venezuela and Panama.

Threatened species

WATTLED GUAN *Aburria aburri*

Previously recorded in San Lucas (Donegan *et al.* 2001, Salaman *et al.* 2002a), but because it is Near Threatened, additional localities are of note. A bird raised from a chick was in semi-captivity—free-ranging but periodically returning to a farm for food—at San Pedro Frío (Fig. 2). Sound-recorded at Santa Cecilia (XC99272), where much less abundant than at La Teta Resort or La Punta, perhaps due to hunting pressure.

CHESTNUT-BELLIED HUMMINGBIRD *Amazilia castaneiventris*

Observed at a large flowering bush below Santa Cecilia (c.1,400 m) on 6 January 2010. However, none was mist-netted at the nearby forest site. Collected by Carriker at Norosí (Collar *et al.* 1992: USNM 392313) but Salaman *et al.* (2002a) did not find the species and BirdLife International has recently excluded San Lucas from its range data used in conservation assessments. The preference of *A. castaneiventris* for flowering vegetation in modified habitats and its absence from primary forest is consistent with observations in Serranía de los Yariguíes (Donegan *et al.* 2007) and elsewhere (e.g. Chaves-Portilla & Cortés-Herrera 2006).

RECURVE-BILLED BUSHBIRD *Clytoctantes alixii*

One responded to playback of recordings of *C. alixii* in Álvarez *et al.* (2007) in bamboo-dominated growth below Santa Cecilia (c.1,400 m), but was not observed or sound-recorded. None was heard or recorded at our forest site, despite extensive playback. Like *A. castaneiventris*, there had been no records in San Lucas since specimens (USNM 392828–837) were collected at Santa Rosa in the 1940s (Collar *et al.* 1992), although other populations have recently been found in the northern Colombian Andes (Laverde & Stiles 2007, Colorado 2008, Donegan *et al.* 2010).

Unusual elevational records.—None of the records here is claimed as ‘new’ due to the sporadic publication of elevational records and the substantial grey literature. For each species, its currently recognised elevational range is summarised, followed by details of San Lucas records.

GREAT TINAMOU *Tinamus major*

Generally to 1,000 m, including in Colombia (Hilty & Brown 1986, Parker *et al.* 1996), but once to 1,350 m in Ecuador (Ridgely & Greenfield 2001) and rarely to 1,500 m in Venezuela (Hilty 2003, Restall *et al.* 2006). Sound-recorded at Santa Cecilia (XC104125) at 1,550 m.

CHESTNUT-WINGED CHACHALACA *Ortalis garrula*

Generally below 800 m (Parker *et al.* 1996). Sound-recorded distantly at Santa Cecilia (1,550 m) (XC99458) and observed below San Lucas at Apollo 13 and San Pablo (Salaman & Donegan 2001) and nearby La Tapia, César (*cf.* Scaled Dove, above) (XC20507–513).

RUFOS-FRONTED WOOD QUAIL *Odontophorus erythrops*

Generally in foothills to 1,100 m in Colombia (Hilty & Brown 1986), but to 1,600 m in Ecuador (Parker *et al.* 1996, G. M. Kirwan *in* Madge & McGowan 2002) and previously to 1,400 m in San Lucas (Salaman *et al.* 2002a). Heard, photographed (Fig. 3) and video-recorded at Santa Cecilia (1,550 m). Sang at dawn on several days, but not sound-recorded.

SCALED PIGEON *Patagioenas speciosa*

Generally to 1,000 m in Colombia; rarely to 1,300 m in Santa Marta (Hilty & Brown 1986). In Ecuador mainly below 1,200 m, with occasional records to 1,700 m there (Ridgely & Greenfield 2001) and 1,400 m in Venezuela (Hilty 2003). Sang from canopy of forest borders where sound-recorded (XC92157, 99276, 99453, 100031, 104411, 104115, 104118, 104223, 104226–229, 104292–293, 104325–326, 104328, 104404–405) and observed daily at Santa Cecilia (1,550 m).

BLUE-HEADED PARROT *Pionus menstruus*

Generally to 1,500 m (Rodríguez-Mahecha & Hernández-Camacho 2002) or 1,400 m (Ridgely & Greenfield 2001, Restall *et al.* 2006). In Venezuela mainly below 1,000 m, once to 1,500 m. Observed and sound-recorded (XC97537) at 1,600 m at San Pedro Frío.

MEALY PARROT *Amazona farinosa*

Generally to 1,100 m in Colombia (Rodríguez-Mahecha & Hernández-Camacho 2002) but below 500 m in Venezuela (Hilty 2003) or 700 m in Ecuador, with records rarely to 900 m (Ridgely & Greenfield 2001), but it has been recorded to 1,500 m (Restall *et al.* 2006). Observed well and dusk vocalisations sound-recorded at Santa Cecilia (XC99457, 100026, 100028–030, 104410, 104412, 104414, 104416–417, 104119–123) at 1,600 m. This is presumably the *Amazona* sp. reported by Salaman & Donegan (2001) in the San Lucas highlands.

BARRED PUFFBIRD *Nystalus radiatus*

Considered by Restall *et al.* (2006) to be found mainly below 900 m, although locally to 1,500 m in Ecuador (Ridgely & Greenfield 2001). Sound-recorded at Santa Cecilia at 1,550 m (XC104222–226).

WHITE-FRONTED NUNBIRD *Monasa morphoeus*

Considered by Restall *et al.* (2006) to be found mostly below 300 m, but to 1,350 m in Ecuador (Ridgely & Greenfield 2001, Restall *et al.* 2006) and to 1,100 m in Colombia (Hilty & Brown 1986). Observed at Santa Cecilia to 1,500 m.

BEAUTIFUL WOODPECKER *Melanerpes pulcher*

This Near Threatened country endemic was recently recorded at 1,350 m in the East Andes (Donegan *et al.* 2007). Observed in degraded habitat and forest borders at Santa Cecilia (1,350 and 1,550 m).

SLATY-WINGED FOLIAGE-GLEANER *Philydor fuscipenne*

Generally to 1,200 m (Hilty & Brown 1986, Ridgely & Tudor 1994, 2009, Remsen 2003, Restall *et al.* 2006) or 1,400 m (Parker *et al.* 1996), and to the latter elevation in San Lucas

(Salaman *et al.* 2002a). Mist-netted at 1,550 m Santa Cecilia (1), consistent with a recent record at 1,600 m in the East Andes (Donegan *et al.* 2007).

FASCIATED ANTSHRIKE *Cymbilaimus lineatus*

Generally below 900 m in Colombia (Hilty & Brown 1986), 1,000 m in Ecuador (Ridgely & Greenfield 2001), 1,300 m in Venezuela (Hilty 2003) but rarely to 1,600 m (Zimmer & Isler 2003, Restall *et al.* 2006) and previously to 1,400 m in San Lucas (Salaman *et al.* 2002a). To 1,550 m at Santa Cecilia, where sound-recorded (XC104325–326, 104328, 104409–412, 104414). Birds west of the Andes appear to differ slightly in speed and note shape of their loudsongs from those east of the Andes.

RUFOUS-WINGED ANTWREN *Herpsilochmus rufimarginatus*

Generally below 1,300 m (Hilty & Brown 1986) but sound-recorded near the top part of the transect at Santa Cecilia (at 1,600 m) (XC104477, 104558) and collected by Carriker near Santa Rosa del Sur (1).

BLACK-TAILED FLYCATCHER *Myiobius atricaudus*

Generally below 1,400 m (Hilty & Brown 1986, Restall *et al.* 2006). Ridgely & Tudor (1994) considered that the species attains its highest elevations (1,400 m) in dry valleys of Colombia, although found to 1,600 m on the humid Pacific slope in Cauca (Donegan & Dávalos 1999). Mist-netted at 1,550 m in Santa Cecilia (1).

RUFOUS PIHA *Lipaugus unirufus*

To 1,000 m in Colombia (Hilty & Brown 1986, Ridgely & Tudor 1994, Restall *et al.* 2006), but only to 700 m in Ecuador (Ridgely & Greenfield 2001). Observed and sound-recorded at 1,550 m at Santa Cecilia (XC99291, 99295, 104123, 104249, 104264, 104453–465). Notably, this is the same elevation as the type locality of the threatened Chestnut-capped Piha *L. weberi* in the adjacent northern Central Andes of Anorí, which does not occur at Santa Cecilia.

PURPLE-THROATED FRUITCROW *Querula purpurata*

To 1,200 m in western Colombia (Hilty & Brown 1986, Ridgely & Tudor 1994, Restall *et al.* 2006). Eastern populations in Ecuador and Venezuela mostly below 500 m with small numbers to 700 m in Ecuador (Ridgely & Greenfield 2001, Hilty 2003) and generally considered to occur below 500–700 m (Snow 2004, Kirwan & Green 2011). Found at 1,400 m below Santa Cecilia, where a small group was observed but not sound-recorded. It was absent from the higher elevation forest transect.

GOLDEN-HEADED MANAKIN *Pipra erythrocephala*

Previously considered to occur to 1,000 m in Colombia (Hilty & Brown 1986) or 1,100 m (Parker *et al.* 1996) and generally at lower elevations elsewhere (Restall *et al.* 2006). It has recently been recorded at higher elevations in the East Andes (1,400 m: Salaman *et al.* 2002b; 1,350 m: Donegan *et al.* 2007) and San Lucas (1,200 m: Salaman *et al.* 2002a) and to 2,000 m in Venezuela (Hilty 2003). A female was mist-netted at 1,550 m at Santa Cecilia (1).

SLENDER-BILLED SCHIFFORNIS *Schiffornis stenorhyncha*

Formerly part of the 'Thrush-like Schiffornis *S. turdina*' complex, this taxon is generally considered to occur to 1,400 m (Hilty & Brown 1986, Restall *et al.* 2006). Found at Santa Cecilia at 1,550 m (illustrated in Donegan *et al.* 2011), where sound-recorded (XC81205, 100022, 104205, 104212). These are apparently the first available sound-recordings from the Central Andes.

SCALY-BREASTED WREN *Microcerculus marginatus*

Previously recorded to 1,400 m in Colombia (Salaman *et al.* 2002a) but mist-netted at 1,550 m at Santa Cecilia (4) where also sound-recorded (XC104467).

WHITE-BREASTED WOOD WREN *Henicorhina leucosticta*

Previously recorded to 1,400 m in Colombia (Salaman *et al.* 2002a) but to 1,550 m at Santa Cecilia (4) and Alto Quebrada La Fría, where sound-recorded (XC98898, 99278–281, 99454–456, 104241).

SOOTY ANT TANAGER *Habia gutturalis*

Considered Near Threatened due to habitat loss in the Magdalena Valley and Caribbean Colombia. Generally found below 1,100 m (Hilty & Brown 1986, Parker *et al.* 1996, Restall *et al.* 2006, Ridgely & Tudor 2009), although previously to 1,400 m in San Lucas (Salaman *et al.* 2002a). Mist-netted and sound-recorded (XC99286, 99536) at 1,550 m at Santa Cecilia (2). The species was not recorded above 1,350 m at similar latitude on the more humid west slope of the East Andes (Donegan *et al.* 2010).

GREYISH SALTATOR *Saltator coerulescens*

Generally to 1,200 m (Hilty & Brown 1986, Ridgely & Tudor 2009) or 1,300 m (Restall *et al.* 2006) with small numbers to 1,600 m in Ecuador (Ridgely & Greenfield 2001) and generally below 850 m in Venezuela (Hilty 2003). Observed at 1,600 m at San Pedro Frío, where canopy frugivores in tall second growth included several *Saltator* spp.

CHESTNUT-HEADED OROPENDOLA *Psarocolius wagleri*

Generally below 1,000 m in Colombia (Hilty & Brown 1986, Restall *et al.* 2006) and to 700 m in Ecuador (Ridgely & Greenfield 2001), although it has been recorded to 1,200 m (Parker *et al.* 1996, Jaramillo & Burke 1999) and to 1,300 m in San Lucas (Salaman *et al.* 2002a). This rare species was observed and sound-recorded (XC100024, 104316) singing in the canopy at Santa Cecilia (1,550 m).

*Dubious records***COLOMBIAN CHACHALACA** *Ortalis columbiana*

Records by Salaman *et al.* (2002a), based on reports by local people, are doubtful in light of the high-elevation Chestnut-winged Chachalaca record, detailed above.

ASHY-TAILED SWIFT *Chaetura andrei*

Reported by Salaman & Donegan (2001) and Salaman *et al.* (2002a) for San Lucas, but the identification appears erroneous. Based on modern taxonomy (Marín 1997), the record was probably of Chapman's Swift *C. chapmani*.

Avian assemblage of the San Lucas highlands

My observations provide insight into the highland forest birds of the San Lucas range. At Santa Cecilia, forest was characterised by tall trees (c.25–30 m) with some moss and arboreal bromeliads, but overall relatively sparse epiphytes for this elevation in Colombia. A dense undergrowth including bamboo was noted, with selective logging in the lower part of the transect. Forest of similar physiognomy was observed at the other two localities, extending to at least 1,900 m on the eastern slope and main ridge.

Santa Cecilia is noteworthy for its highly diverse flocks involving 20–30 species dominated by Furnariidae / Dendrocolaptidae but also typically including 2–3 woodpeckers, various warblers, vireos, tyrant flycatchers, tanagers and Sharpbill. In some forest-dependent groups, especially Picidae, Furnariidae and Thamnophilidae, various expected lower montane bird species were confirmed in San Lucas, among them numerous range extensions. Birds in these groups generally show close affinities to populations in the Anorí region of the northern Central Andes, as did some other highland species recorded by Salaman *et al.* (2002a).

For several premontane to lower montane bird species, plumage and vocal data suggest that the range of low hills between San Lucas and the Central Andes may have facilitated relatively recent or ongoing contact. In other groups, different patterns are evident. For example, in Psittacidae, Columbidae, Troglodytidae and Icteridae, mostly lowland species have been recorded, many of them at unusually high elevations.

Salaman *et al.* (2002a) suggested that the avifauna of the higher part of San Lucas ‘undoubtedly will be more unique’, and anticipated ‘high levels of endemism’. In a recent study of Three-striped Warblers *Basileuterus tristriatus*, San Lucas specimens which Salaman *et al.* (2002a) considered to represent a new subspecies were found to be phylogenetically basal to most other northern Andean populations (Gutiérrez *et al.* 2012). The status of this species, which was also trapped and sound-recorded at Santa Cecilia, will be discussed separately (Donegan submitted). Molecular work is required to confirm the relations of some populations, especially *Thalurania* sp., *Syndactyla subalaris*, *Myrmotherula schisticolor*, *Scytalopus atratus*, *Oxyruncus cristatus* and *Henicorhina leucophrys*, all of which are represented by specimens.

The premontane forest birds of Santa Cecilia and other San Lucas localities can be compared with those of ProAves’ Reserva Natural de Aves (RNA) Arrierito Antioqueño, near Anorí, Antioquia (= ‘La Forzosa’), which was subject to a rapid assessment at the same elevation as Santa Cecilia (1,550 m) by Salaman *et al.* (1999), with further study by Cuervo *et al.* (2008a,b) and is the closest locality of similar elevation in the adjacent Central Andes. Santa Cecilia is notably less humid with fewer arboreal epiphytes than RNA Arrierito Antioqueño (as are San Pedro Frío and Alto Quebrada La Fría). Perhaps as a result of the differing climatic and ecological conditions, various highland species found at 1,550 m in RNA Arrierito Antioqueño are (apparently) absent from Santa Cecilia, including Highland Tinamou *Nothocercus bonapartei*, Colombian Chachalaca *Ortalis columbiana* (vs. Chestnut-winged Chachalaca *O. garrula*), Chestnut-capped Piha *Lipaugus weberi* (vs. Rufous Piha *L. unirufus*), Greenish Puffleg *Haplophaedia aureliae*, Booted Racket-tail *Ocreatus underwoodii*, Olive-backed Woodcreeper *Xiphorhynchus triangularis* (vs. *X. erythropygius*), Brown-billed Scythebill *Camphylorhynchus pusillus* (vs. Red-billed Scythebill *C. trochilirostris*), Azara’s Spinetail *Synallaxis azarae* (vs. Pale-breasted Spinetail *S. albescens*), Spotted Barbtail *Premnoplex brunnescens*, White-bellied Antpitta *Grallaria hypoleuca*, Uniform Antshrike *Thamnophilus unicolor*, Green Jay *Cyanocorax yncas*, Grey-breasted Wood Wren *Henicorhina leucophrys* (vs. *H. leucosticta*), Andean Solitaire *Myadestes ralloides* (vs. Orange-billed *Catharus aurantirostris* and Spotted Nightingale Thrushes *C. dryas*), Great *Turdus fuscater* and Glossy-black Thrushes *T. serranus* (vs. Pale-vented Thrush *T. obsoletus*), Beryl-spangled Tanager *Tangara nigroviridis*, Purplish-mantled Tanager *Iridosornis porphyrocephala*, White-winged Tanager *Piranga leucoptera*, Oleaginous Hemispingus *Hemispingus frontalis*, Yellow-throated Brush Finch *Atlapetes albinucha* and Red-bellied Grackle *Hypopyrrhus hypopyrogaster*. Some of these might occur in more humid, higher elevation habitats at San Lucas but many probably are absent. In contrast, several typically lower elevation species not found at

similar elevations in RNA Arrierito Antioqueño have been recorded above 1,500 m in San Lucas.

Two highland species collected by Carriker in the 1940s have not been found since, Chestnut-collared Swift *Streptoprocne rutila* and Grey-breasted Wood Wren *Henicorhina leucophrys*. Perhaps Carriker spent time at higher elevations at 'Volador' than is generally assumed (above 1,700 m) or climate change and deforestation have resulted in changes to elevational distributions. It is unusual for Carriker's specimens to bear incorrect locality data. The *H. leucophrys* specimen from San Lucas will be treated separately.

Forests at 1,600–2,300 m in the Andes would typically support several species not found lower down. The steep slopes of Teta de San Lucas, which we observed from San Pedro Frío, possess more stunted vegetation (Fig. 1) and frequent ground-level mist, so may support additional species. However, the land area at the highest elevations of San Lucas is very small (just 1 km² exceeds 2,000 m elevation and only c.8 km² is above 1,800 m). As a result, island effects could restrict the persistence of high-elevation species, which in turn might influence the unusual number of typically low-elevation species in lower montane forest found by this study and Salaman *et al.* (2002a). The number of unusually high-elevation records for lowland species could result from competitive release (at least up to 1,600 m on the east slope and ridgeline).

Conservation and anthropogenic issues

In the 1990s, the San Lucas range was reportedly subject to significant coca-related deforestation and harboured several armed groups (Dávalos 2001, Álvarez 2001, 2002). That decade and the start of the millennium witnessed intense armed conflict and coca fumigation with glyphosate (Dávalos 2001, Salaman & Donegan 2001). Dávalos *et al.* (2011) reported no sign of coca-driven deforestation in San Lucas during the period 2002–07 and we saw no evidence of this. However, there remain reports of armed groups deeper and higher in the mountains and in other municipalities, restricting opportunities for field work.

The recently improved security situation has led to noteworthy work on birds and other taxa (e.g. Krabbe *et al.* 2006, Donegan *et al.* 2007) and the development of birdwatching tourism in Colombia. However, various regions remain problematic (e.g. Regalado 2011), including parts of San Lucas. Great care, thorough research of security issues and the support of local communities are paramount when working in previously unstudied regions. Notably, it has taken c.10 years for a premontane forest locality in San Lucas (Santa Cecilia) to become accessible to scientists, although the highest elevations around the Teta de San Lucas were still inaccessible in 2010, with no immediate prospect of this changing. Communities in the highlands are concerned about two potentially conflicting government initiatives: (i) extraction concessions granted to multinationals over land presently occupied by artisanal gold-mining communities (largely unexploited to date due to security issues and property disputes); or (ii) the imposition of national protected areas. A more recent ornithological expedition to the San Lucas highlands was reportedly abandoned due to a security incident. Any research or conservation initiatives in the region must fully engage, and have the support of, local communities to succeed.

Some insights were made into the effects of anti-personnel landmines on conservation. Elsewhere in Colombia, it is rare to see forest so close to roads or settlements, and those who visited San Lucas in the 1990s to early 2000s remarked that forests may have been protected by landmining (Dávalos 2001, Salaman & Donegan 2001, Álvarez 2003). The same authors stressed the negative human and social consequences of this aspect of Colombia's conflict, although the press has sometimes drawn more controversial conclusions (e.g. Cooke 2010). Our study suggests instead that any positive conservation outcome of landmines

is temporary and that it can be negative for forest conservation over the longer term. The previously landmined forests along the road to La Punta studied by Salaman *et al.* (2002a) had been almost entirely cleared for agriculture by 2010, whilst unmined forests further from the road at La Teta Resort were intact. This is because de-mining machines (similar to large bulldozers able to withstand explosions) have been used in San Lucas in the intervening years, in combination with manual mine and vegetation clearance.

Acknowledgements

Thanks to 2010 EBA Project team members Blanca Huertas, John Jairo Arias and José Pinto for their collaboration, and to ProAves for supporting the project. Blanca Huertas took several photographs presented here. Corporación Autónoma Regional del Sur de Bolívar (CSB) provided the necessary permit (auto no. 231 del 10 de diciembre del 2008, including collecting permission). The mayor of Santa Rosa del Sur (José Melecio Cendales Moreno) and Colombian army garrison in Santa Rosa del Sur provided the permissions for field work and information on the region's security, facilitating our study. Federación Agrominera del Sur de Bolívar met us and allowed us to present the project. Jorge Fula and family assisted the field work. F. Gary Stiles (ICN), Tom Trombone and Paul Sweet (AMNH), Chris Milensky and Helen James (USNM) and Robert Prÿs-Jones, Mark Adams and Hein van Grouw (BMNH) permitted access to specimens. Paul Salaman provided biometric data. Thanks to www.xeno-canto.org and its contributing recordists, especially Sjoerd Mayer who identified the *H. rufimarginatus* recordings and Niels Krabbe and Curtis Marantz for comments on other recordings. Liliana Dávalos, Guy Kirwan, Neils Krabbe, Blanca Huertas and Paul Salaman commented on the manuscript.

References

- Álvarez, M. D. 2001. Could peace be worse than war for Colombia's forests? *Environmentalist* 21: 305–315.
- Álvarez, M. D. 2002. Illicit crops and bird conservation priorities in Colombia. *Conserv. Biol.* 16: 1086–1096.
- Álvarez, M. D. 2003. Forests in the time of violence: conservation implications of the Colombian war. *J. Sustainable Forestry* 16: 49–70.
- Álvarez, M., Caro, V., Laverde, O. & Cuervo, A. M. 2007. *Guía sonora de los Andes colombianos*. Instituto Alexander von Humboldt, Bogotá & Cornell Lab. of Orn., Ithaca, NY.
- American Bird Conservancy. 2007. On the wire. New owl species discovered in Colombia. *Bird Conserv.* Fall 2007: 4.
- Baptista, L. F., Trail, P. W. & Hornblit, H. M. 1997. Family Columbidae (pigeons and doves). Pp. 60–243 in del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 4. Lynx Edicions, Barcelona.
- Biomap Alliance Participants (Darwin Initiative, Natural History Museum, Instituto de Ciencias Naturales de la Universidad Nacional de Colombia, Conservation International & Conservación Internacional Colombia). 2012. Base de Datos Darwin: Proyecto BioMap base de datos de distribución de la avifauna Colombiana. www.biomap.net.
- Castaño-V., G. J. & Patiño-Z., J. C. 2007. Composición de la comunidad de aves en bosques fragmentados en la región de Santa Elena, Andes Centrales colombianos. *Bol. Cient. Centro Mus., Mus. Hist. Nat. (Univ. Caldas)* 11: 47–64.
- Chapman, F. M. 1914. Diagnoses of apparently new Colombian birds III. *Bull. Amer. Mus. Nat. Hist.* 33: 603–637.
- Chapman, F. M. 1924. Descriptions of proposed new birds from Colombia. *Amer. Mus. Novit.* 143: 1–16.
- Chapman, F. M. 1931. The upper zonal bird-life of Mts. Roraima and Duida. *Bull. Amer. Mus. Nat. Hist.* 63: 1–135.
- Chaves, J. A. & Smith, T. B. 2011. Evolutionary patterns of diversification in the Andean hummingbird genus *Adelomyia*. *Mol. Phyl. & Evol.* 60: 207–218.
- Chaves-Portilla, G. & Cortés-Herrera, O. 2006. Nueva localidad para la Quincha de Soatá (*Amazilia castaneiventris*) en el municipio de San Gil, Santander, Colombia. *Bol. Soc. Antioqueña Orn.* 16(1): 1–6.
- Cleere, N. 2010. *Nightjars, potoos, frogmouths, oilbird and owlet-nightjars of the world*. Princeton Univ. Press.
- Clement, P. & Hathaway, R. 2000. *Thrushes*. Christopher Helm, London.
- Collar, N. J., Gonzaga, L. P., Krabbe, N., Madroño Nieto, A., Naranjo, L. G., Parker, T. A. & Wege, D. C. 1992. *Threatened birds of the Americas: the ICBP/IUCN Red Data book*. International Council for Bird Preservation, Cambridge, UK.
- Colorado, G. J. 2008. Rediscovery of the Recurve-billed Bushbird for the Cordillera Central of Colombia. *Orn. Neotrop.* 19: 467–471.
- Cooke, L. 2010. In search of the lost frog of Colombia. *Daily Telegraph* 18 November 2010: www.telegraph.co.uk/earth/wildlife/8140419/In-search-of-the-lost-frog-of-Colombia.html.
- Corpocaldas & Asociación Calidris. 2010. *Estado de conocimiento de las aves en el departamento de Caldas: prioridades de conservación y vacíos de información*. Corporación Autónoma Regional de Caldas, Manizales.

- Cuervo, A. M., Pulgarín, P. & Calderón, D. 2008a. New distribution bird data from the Cordillera Central of the Colombian Andes, with implications for the biogeography of northwestern South America. *Condor* 110: 526–537.
- Cuervo, A. M., Pulgarín, P. C., Calderón, D., Ochoa-Quintero, J. M., Delgado-V., C. A., Palacio, A., Botero, J., & Múnera, W. 2008b. Avifauna of the northern Cordillera Central of the Andes, Colombia. *Orn. Neotrop.* 19: 495–515.
- Dávalos, L. M. 2001. The San Lucas mountain range in Colombia: how much conservation is owed to the violence? *Biodiver. & Conserv.* 10: 69–78.
- Dávalos, L. M., Bejarano, A. C., Hall, M. A., Correa, H. L., Corthals, A. P. & Espejo, O. J. 2011. Forests and drugs: coca-driven deforestation in global biodiversity hotspots. *Environ. Sci. & Tech.* 45: 1219–1227.
- Dickinson, E. C. (ed.) 2003. *The Howard and Moore complete checklist of the birds of the world*. Third edn. Christopher Helm, London.
- Donegan, T. M. 2012. Geographical variation in Immaculate Antbird *Myrmeciza immaculata*, with a new subspecies from the Central Andes of Colombia. *Bull. Brit. Orn. Cl.* 132: 3–40.
- Donegan, T. M. submitted. Geographical variation in morphology and voice of Three-striped Warbler *Basileuterus tristriatus*. *Bull. Brit. Orn. Cl.*
- Donegan, T. M. & Dávalos, L. M. 1999. Ornithological observations from Reserva Natural Tambito, Cauca, south-west Colombia. *Cotinga* 12: 48–55.
- Donegan, T. M., Salaman, P. G. W. & Cuervo, A. M. 2001. Wattled Guan *Aburria aburri* in Serranía de San Lucas, northern Colombia. *Bull. Cracid Specialist Group* 13: 11–14.
- Donegan T. M., Huertas, B. C. & Briceño, E. R. 2003a. Status of the Magdalena Tinamou *Crypturellus saltuarius* in the type locality and surrounding lower Magdalena Valley. *Cotinga* 19: 34–39.
- Donegan, T. M., Huertas, B. C., Briceño, E. R., Arias, J. J. & González, C. E. 2003b. Search for the Magdalena Tinamou: project report. *Colombian EBA Proj. Rep. Ser.* 4: www.proaves.org.
- Donegan, T. M., Avendaño, J. E., Briceño, E. R. & Huertas, B. C. 2007. Bird range extensions with taxonomic and ecological notes from Serranía de los Yariguíes, Colombia's new national park. *Bull. Brit. Orn. Cl.* 127: 172–213.
- Donegan, T. M., Avendaño-C., J. E., Huertas, B. & Flórez, P. 2009a. Avifauna de San Pedro de los Milagros, Antioquia: una comparación entre colecciones antiguas y evaluaciones rápidas. *Bol. Cient. Centro Mus., Mus. Hist. Nat. (Univ. Caldas)* 13: 63–72.
- Donegan T. M., Salaman P. & Caro, D. 2009b. Revision of the status of various bird species occurring or reported in Colombia. *Conserv. Colombiana* 8: 80–86.
- Donegan, T. M., Avendaño, J. E., Briceño-L., E. R., Luna, J. C., Roa, C., Parra, R., Turner, C., Sharp, M. & Huertas, B. 2010. Aves de la Serranía de los Yariguíes y tierras bajas circundantes, Santander, Colombia. *Cotinga* 32: 72–89.
- Donegan, T., Quevedo, A., McMullan, M. & Salaman, P. 2011. Revision of the status of bird species occurring or reported in Colombia 2011. *Conserv. Colombiana* 15: 4–21.
- Escalante-Pliego, P. & Peterson, A. T. 1992. Geographic variation and species limits in Middle American woodnymphs (*Thalurania*). *Wilson Bull.* 104: 205–219.
- Estela, F. A., Jaramillo, J. G. & Mejía-Tobón, A. 2005. Ampliación de distribución de la Tortolita Escamada (*Columbina squammata*) en el Caribe colombiano. *Bol. Soc. Antioqueña Orn.* 15: 105–111.
- Fjeldså, J. & Krabbe, N. 1990. *Birds of the high Andes*. Zool. Mus., Univ. of Copenhagen & Apollo Books, Svendborg.
- Franco A. M. & Bravo, G. (2005) Áreas importantes para la conservación de las aves en Colombia. Pp. 117–281 in Boyla, K. & Estrada, A. (eds.) *Áreas importantes para la conservación de las aves en los Andes tropicales: sitios prioritarios para la conservación de la biodiversidad*. BirdLife International & Conservation International, Quito.
- Freeman, B. G., Hilty, S. L., Calderón-F., D., Ellery, T. & Urueña, L. E. 2012. New and noteworthy bird records from central and northern Colombia. *Cotinga* 34: 33–42.
- Fundación ProAves. 2008. Rediscovery of the Pavonine Cuckoo in Colombia. *Aleteo* 42.
- Gutiérrez-Pinto, N., Cuervo, A. M., Miranda, J., Pérez-Emán, J. L., Brumfield, R. T. & Cadena, C. D. 2012. Non-monophyly and deep genetic differentiation across low-elevation barriers in a Neotropical montane bird (*Basileuterus tristriatus*; Aves: Parulidae). *Mol. Phyl. & Evol.* 64: 156–165.
- Hilty, S. L. 2003. *Birds of Venezuela*. Princeton Univ. Press.
- Hilty, S. L. & Brown, W. L. 1986. *A guide to the birds of Colombia*. Princeton Univ. Press.
- Isler, M. & Isler, P. R. 1999. *Tanagers*. Christopher Helm, London.
- Jaramillo, A. & Burke, P. 1999. *New World blackbirds*. Princeton Univ. Press.
- Kirwan, G. M. & Green, G. 2011. *Cotingas and manakins*. Princeton Univ. Press.
- Krabbe, N., Flórez, P., Suárez, G., Castaño, J., Arango, J. D. & Duque, A. 2006. The birds of Páramo Frontino, West Andes of Colombia. *Orn. Colombiana* 4: 39–50.
- Laverde-R., O. & Stiles, F. G. 2007. Apuntes sobre el hormiguero pico de hacha (Thamnophilidae: *Clytoctantes alixii*) y su relación con un bambú en un bosque secundario de Colombia. *Orn. Colombiana* 5: 83–90.

- Madge, S. & McGowan, P. 2002. *Pheasants, partridges and grouse including buttonquails, sandgrouse and allies*. Christopher Helm, London.
- Marantz, C. A., Aleixo, A., Bevier, L. R. & Patten, M. A. 2003. Family Dendrocolaptidae (woodcreepers). Pp. 358–447 in del Hoyo, J., Elliott, A. & Christie D. A. (eds.) *Handbook of the birds of the world*, vol. 8. Lynx Editions, Barcelona.
- Marín, M. 1997. Species limits and distribution of some New World spine-tailed swifts (*Chaetura* spp.). Pp. 431–443 in Remsen, J. V. (ed.) *Studies in Neotropical ornithology honoring Ted Parker*. Orn. Monogr. 48. American Ornithologists' Union, Washington DC.
- McMullan, M., Donegan, T. M. & Quevedo, A. 2010. *Field guide to the birds of Colombia*. Fundación ProAves, Bogotá.
- McMullan, M., Quevedo, A. & Donegan, T. M. 2011. *Guía de campo de las aves de Colombia*. Fundación ProAves, Bogotá.
- Meyer de Schauensee, R. 1964. *The birds of Colombia and adjacent areas of South and Central America*. Acad. Nat. Sci., Philadelphia.
- Moreno-Palacios, M. & Rodríguez-Ortiz, E. 2008. Nuevo registro del Mochuelo Cabecigris (*Glaucidium griseiceps*) en el valle medio del río Magdalena, Colombia. *Orn. Colombiana* 6: 92–95.
- Parker, T. A., Stotz, D. F. & Fitzpatrick, J. W. 1996. Ecological and distributional databases. Pp. 131–292 in Stotz, D. F., Fitzpatrick, J. W., Parker, T. A. & Moskovits, D. K. (1996) *Neotropical birds: ecology and conservation*. Univ. of Chicago Press.
- Paynter, R. A. 1997. *Ornithological gazetteer of Colombia*. Second edn. Mus. Comp. Zool., Cambridge, MA.
- Regalado, A. 2011. Students' deaths in Colombia cast a pall over research. *Science Insider* online news report, 12 January 2011.
- Remsen, J. V. 2003. Family Furnariidae (ovenbirds). Pp. 162–357 in del Hoyo, J., Elliott, A. & Christie D. A. (eds.) *Handbook of the birds of the world*, vol. 8. Lynx Edicions, Barcelona.
- Remsen, J. V., Cadena, C. D., Jaramillo, A., Nores, M., Pacheco, J. F., Pérez-Eman, J., Robbins, M. B., Stiles, F. G., Stotz, D. F. & Zimmer, K. J. 2012. A classification of the bird species of South America (version 23 June 2012). www.museum.lsu.edu/~Remsen/SACCBaseline.html.
- Restall, R., Rodner, C. & Lentino, M. 2006. *Birds of northern South America*. Christopher Helm, London.
- Ridgely, R. S. & Greenfield, P. J. 2001. *The birds of Ecuador*. Cornell Univ. Press, Ithaca, NY.
- Ridgely, R. S. & Tudor, G. 1994. *The birds of South America*, vol. 2. Oxford Univ. Press.
- Ridgely, R. S. & Tudor, G. 2009. *The birds of South America, passerines*. Christopher Helm, London.
- Rodríguez-Mahecha, J. V. & Hernández-Camacho, J. I. 2002. *Loros de Colombia*. Conservación Internacional Colombia, Bogotá.
- Salaman, P. G. W. & Donegan, T. M. (eds.) 2001. Presenting the first biological assessment of Serranía de San Lucas, 1999–2001. *Colombian EBA Project Rep. Ser. 3*: www.proaves.org.
- Salaman, P., Cuadros, T., Jaramillo, J. G. & Weber, W. H. 2001. *Lista de chequeo de las aves de Colombia*. Soc. Antioqueña Orn., Medellín.
- Salaman, P. G. W., Donegan, T. M. & Cuervo, A. M. 2002a. New distributional bird records from Serranía de San Lucas and adjacent Central Cordillera of Colombia. *Bull. Brit. Orn. Cl.* 122: 285–304.
- Salaman, P. G. W., Stiles, F. G., Bohórquez, C. I., Álvarez, M., Umaña, A. M., Donegan, T. M. & Cuervo, A. M. 2002b. New and noteworthy records from the east slope of the Andes of Colombia. *Caldasia* 24: 157–189.
- Salaman, P., Donegan, T. M. & Caro, D. 2008. Listado de avifauna colombiana 2008. *Conserv. Colombiana* 5: 1–79.
- Salaman, P., Donegan, T. M. & Caro, D. 2010. *Checklist of the birds of Colombia*. Fundación ProAves, Bogotá.
- Snow, D. W. 2004. Family Cotingidae (cotingas). Pp. 110–168 in del Hoyo, J., Elliott, A. & Christie D. A. (eds.) *Handbook of the birds of the world*, vol. 9. Lynx Edicions, Barcelona.
- Sociedad Antioqueña de Ornitología (SAO). 2003. *Aves del valle de Aburrá*. Second edn. SAO, Medellín.
- Stiles, F. G., Rosselli, L. & Bohórquez, C. I. 1999. New and noteworthy records of birds from the middle Magdalena Valley of Colombia. *Bull. Brit. Orn. Cl.* 119: 113–128.
- Strewe, R. & Navarro, C. 2004. New and noteworthy records of birds from the Sierra Nevada de Santa Marta region, north-eastern Colombia. *Bull. Brit. Orn. Cl.* 124: 38–51.
- Verhelst, J. C., Rodríguez, J. C., Orrego, O., Botero, J. E., López, J. A., Franco, V. M. & Pfeifer, A. M. 2007. Aves del municipio de Manizales-Caldas, Colombia. *Biota Colombiana* 2: 265–284.
- de la Zerda, S. & Rosselli, L. 2003. Mitigación de colisión de aves contra líneas de transmisión eléctrica con marcaje del cable de guarda. *Orn. Colombiana* 1: 42–62.
- Zimmer, K. J. & Isler, M. L. 2003. Family Thamnophilidae (typical antbirds). Pp. 448–681 in del Hoyo, J., Elliott, A. & Christie D. A. (eds.) *Handbook of the birds of the world*, vol. 8. Lynx Edicions, Barcelona.
- Zimmer, K. J. & Whittaker, A. 2000. Species limits in Pale-tipped Tyrannulets (*Inezia*: Tyrannidae). *Wilson Bull.* 112: 51–66.

Address: ProAves Foundation, c/o Southmead, The Vale, London N14 6HN, UK, e-mail: tdonegan@proaves.org



Donegan, Thomas M. 2012. "Range extensions and other notes on the birds and conservation of the Serrania de San Lucas, an isolated mountain range in northern Colombia." *Bulletin of the British Ornithologists' Club* 132(3), 140–161.

View This Item Online: <https://www.biodiversitylibrary.org/item/229127>

Permalink: <https://www.biodiversitylibrary.org/partpdf/272432>

Holding Institution

Natural History Museum Library, London

Sponsored by

Natural History Museum Library, London

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

Rights Holder: British Ornithologists' Club

License: <http://creativecommons.org/licenses/by-nc-sa/4.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.