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Bird Reserve, Colombia /**

Revision of the status of bird species in Colombia

***Una nueva especie de tororoi de la Reserva Natural
de las Aves Colibrí del Sol, Colombia /
Revisión del estatus de especies de aves en Colombia***

A new species of Antpitta (family Grallariidae) from the Colibrí del Sol Bird Reserve, Colombia

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Abstract

A new species of Antpitta *Grallaria* (family Grallariidae) is described from the Colibrí del Sol Bird Reserve situated on the southeastern slope of the Páramo del Sol massif on the northern end of the Western Andes of Colombia. Fenwick's Antpitta *Grallaria fenwickorum* sp. nov. most closely resembles Brown-banded Antpitta *G. milleri*, which is endemic to the Central Andes of Colombia, but it has a slate grey breast, lacking the brown breast band and flanks of *G. milleri*. The song of the new species involves three notes of increasing length and acoustic frequency. The individual notes are shorter, lower and of a different note shape compared to *G. milleri*. In addition, the new species' call is shorter and lower pitched. Fenwick's Antpitta is restricted to upper montane cloud forest (2,600-3,300 m) where territories are largely restricted to *Chusquea* bamboo thickets. Its habitat has undergone extensive clearance for pasturelands. The known population is of 24 territories with an estimated extent of occurrence of 5.8 km², giving a cautious global population estimate of 57-156 territories. We propose that the IUCN treat the new species as Critically Endangered. Although protected in the Colibrí del Sol reserve, it is in need of further conservation actions.

Resumen

Una nueva especie de Tororoi *Grallaria* (familia Grallariidae) se describe en la Reserva Natural de las Aves Colibrí del Sol, situada en la vertiente sur-oriental del macizo del Páramo del Sol en el extremo norte de la Cordillera Occidental de Colombia. El Tororoi de Urrao *Grallaria fenwickorum* sp. nov., se parece más a *G. milleri*, la cual es endémica de la Cordillera Central, pero tiene el pecho gris y carece de una banda morena en el pecho como existe en *milleri*. El canto de la nueva especie, se constituye de tres notas, que se incrementan en longitud y frecuencia acústica. El canto posee notas que son más cortas, bajas y de una diferente forma con respecto a *G. milleri*. Adicionalmente, el llamado de la nueva especie es más corto y bajo. *G. fenwickorum* y está restringido a bosque de niebla montano (2.600-3.300 m), en donde sus territorios son restringidos a matorrales de bambú *Chusquea*. Su hábitat ha sido sujeto a deforestación extensiva, especialmente para obtención de pastizales. La población conocida es de 24 territorios con una estimativa del área de ocupación de 5,8 km² y una estimativa de población mundial entre 57-156 territorios. Se propone que la IUCN pueda categorizar la nueva especie como en estado Crítico. Aunque la especie se encuentra protegida dentro la reserva Colibrí del Sol, es necesario llevar a cabo adicionales acciones de conservación.

Introduction

The municipality of Urrao in southwestern Antioquia department includes the 175 km² Páramo del Sol massif, also known as Páramo Frontino, that is the highest and largest massif of the 750 km long Western Andes. The massif is a

partially eroded caldera complex with high-level, volcanic-hosted heavy metal mineralization from Upper Tertiary intrusions, including dense high-grade gold, zinc and copper deposits that have attracted the attention of mining companies. The

massif also holds over 2,700 ha of relatively intact páramo and *Polylepis* woodland that represents an area greater than all the other páramos in the Western Andes, combined.

Despite the unique geological and environmental characteristics and its location 55 km west of Colombia's second largest city, Medellín, the massif only received brief previous ornithological exploration in December 1951 when Melbourne A. Carriker, Jr. visited the páramo and discovered a new hummingbird species later described as Dusky Starfrontlet *Coeligena orina* (Wetmore 1953). For over 50 years thereafter, the site remained unexplored, largely due to security concerns, until Fundación ProAves launched an expedition to survey the massif (Florez *et al.* 2004, Krabbe *et al.* 2006). This expedition resulted in the rediscovery of *Coeligena orina* on 9 August 2004 (Florez *et al.* 2004, Krabbe *et al.* 2005) and the first sound recordings of *Scytalopus canus* (Krabbe & Cadena 2010) as well as a host of range extensions (Krabbe *et al.* 2006).

In addition to scientific findings, it became clear that the Páramo del Sol is a key area for threatened birds requiring protection from the expansion of mining and pasturelands on the massif's mineral-rich and fertile soils. In 2005, thanks to the personal support of the Fenwick family through American Bird Conservancy, Fundación ProAves acquired and protected over 731 has of the montane forest and páramo. This established the Colibrí del Sol Bird Reserve, named after the Critically Endangered Dusky Starfrontlet *Coeligena orina*.

With the continuing support of American Bird Conservancy and USFWS Neotropical Migratory Bird Conservation Act, ProAves implemented a series of research and monitoring stations across the reserve, primarily with banding transects. During banding sessions on February 21 and March 30 2008, ProAves researcher Diego Carantón-Ayala (DCA) and reserve manager Luis

Rubelio Garcia (LRG) caught a mystery *Grallaria* antpitta. This *Grallaria* was also tape-recorded in late 2008 by Alonso Quevedo. The population was considered to be a new species and was discussed as such in the recent description of *Grallaria milleri gilesi* (Salaman *et al.* 2009a). It was added to the Colombian checklist as "*Grallaria sp.*" (Donegan *et al.* 2009, Salaman *et al.* 2009b) and photographs have been published online (e.g. Fundación ProAves 2009). Since 2008 to date, the authors along with many ornithologists and birders have seen, photographed, tape-recorded and studied the distinct new antpitta at Colibrí del Sol Bird Reserve. A family party is seen daily feeding at a worm-feeding station beside the reserve lodge alongside Chestnut-naped Antpitta *G. nuchalis*.

Based on plumage characteristics and differences in vocalizations, the *Grallaria* at Colibrí del Sol Bird reserve represents a new taxon, which meets the requirements for species status under the Biological Species Concept (Johnson *et al.* 1999, Helbig *et al.* 2002), which we hereby name:

***Grallaria fenwickorum* sp. nov.**
Fenwick's Antpitta
Tororoi de Urrao

Holotype

The holotype is constituted solely by:

- a) Feather samples (total of 14 feathers from the wing, tail and body) deposited at the Museo de Historia Natural Jose Celestino Mutis, Facultad de Ciencias de la Universidad de Pamplona, tissue collection No.699 (**Figure 1**).
- b) For purposes of Article 74.1.4 of the International Code for Zoological Nomenclature, to the extent applicable, the individual depicted in Figure 1 and the Cover of this edition of Conservación Colombiana.

These materials are based on an adult tape-recorded, captured and banded (with ProAves ring no. D001108), from which feather samples

were taken, and plumage description was taken using Munsell (1977). These steps were taken in the field and the bird was photographed before being released alive on 11 January 2010 by LFB and LRG. The individual was captured within the Colibrí del Sol Bird Reserve, Vereda El Chuscal, Municipality of Urrao, Department of Antioquia (06°25'53.1"N 76°04'57.9"W). Elevation 3,130 meters asl.

An extensive further series of photos of the individual on which the holotype is based can be downloaded at: <http://www.flickr.com/photos/proaves/sets/72157623898966996/>. Tape-recordings of the individual on which the

holotype is based can be downloaded at: <http://www.xeno-canto.org/48114>

Measurements of individual on which the holotype is based, taken in the field are set out in Table 1. No notable subcutaneous fat in the sternum area and limited body moult were noted.

Although two full specimens of the new species are available at ICN (see "other specimens" below), we do not consider it appropriate to designate these as type specimens given the circumstances in which they were collected (see Comité Editorial de Conservación Colombiana 2010 for further details).

Figure 1: Feather sampled from the holotype of Fenwick's Antpitta (*Grallaria fenwickorum*) from the Colibrí del Sol Bird Reserve, Colombia, including a combination of wing, tail and mostly body feathers.



Feather samples constitute a 'part of' an 'example of animal' for purposes of the definition of 'specimen' in the ICZN Code. The term 'specimen', as so defined, is referred to in the

definition of the term 'holotype' in the ICZN Code. Consequentially, the feather samples taken in this instance constitute a valid holotype on any interpretation of the Code (Donegan 2008b). A

similar procedure of the designation of feather samples as a holotype was recently applied by Athreya (2006).

There have been various recent concerns expressed about the validity of descriptions where the holotype is designated as an individual depicted in a published photograph, as opposed to a specimen or sample (e.g. Timm et al. 2005, Dubois & Nemésio 2007). Although such criticisms have been debunked by members of the Commission's secretariat (e.g. Wakeham-Dawson et al. 2002, Polaszek et al. 2005), we recognize that there are controversies surrounding the use of illustrated individuals as holotypes and our designation of the individual illustrated in Figure 1 as also forming part of the holotype is therefore qualified accordingly.

Diagnosis

Referred to *Grallaria* Vieillot, 1816 (type: Variegated Antpitta *G. varia*) due to: its medium to large size; long tarsus; culmen very indistinctly (if at all) ridged and gradually but strongly curved from the base; scutellate tarsus; rictal bristles distinct but slender; and chin and upper-throat feathers with long, slender terminal setae (Lowery & O'Neill 1969).

G. fenwickorum is typical member of the plain-coloured group (proposed subgenus *Oropezus* Ridgway 1909), due to its relatively small wing (75–103 mm); fairly uniform upperparts and underparts (considered separately) without strong streaks, squamations or bars; tail more than half as long as wing (tail / wing ratio 0.54–0.60); inner edge of tarsus distinctly convolute; and presence of 12 rectrices (Lowery & O'Neill, 1969).

G. fenwickorum is considered probably most closely related to Brown-banded Antpitta *G. milleri* due to similarities in voice and biometrics and generally non-descript plumage. There are two described subspecies of *G. milleri*: *G. m. milleri* occurs 165 km southeast in the Central Andes, and the larger *G. m. gilesi* occurs 70 km

east in the northern sector of the Central Andes. *G. fenwickorum* can be easily diagnosed from both taxa by the complete lack of a brown breast band (with the breast instead being uniform slate grey) and lighter brown dorsal plumage. Its vocalizations are also distinct (see below).

Based on published values for *G. milleri* from Salaman *et al.* (2009a) and Kattan & Beltrán (1999), *G. fenwickorum* appears to average longer wing, tail, bill and tarsus than *G. m. milleri* (Table 1), being more similar to *G. m. gilesi* (as noted in Salaman *et al.* 2009a). It also appears larger bodied than *G. m. milleri*.

Description of the holotype

The following is based on Munsell Color (1977) codes. *Face*: Head overall uniform Olive Brown (5Y 5/6), with light gray lores and thin eye-ring (5Y 7/2) with black feather tips. Ear-coverts, malar, and nape warmer cinnamon-brown (10YR 3/6). *Upperparts*: Entire upperparts, from the forecrown to the uppertail-coverts and shoulders, uniform Olive Brown (5Y 5/6). Tail darker brown (7.5YR 4/2). *Wings*: upperwing coverts and flight feathers uniform Olive Brown (7.5YR 7/10) with underwing coverts warm cinnamon-brown (2.5Y 6/4). *Underparts*: Throat light gray (5Y 7/2) with darker olive brown tips to the feathers. Lower underparts and flanks to undertail-coverts pale grey (2.5Y 8/2) with paler gray feather tips and slight olive gray (5Y 6/2) tinge to feathers on the side of the chest and being paler whitish gray on the abdomen. Thighs pale grayish olive-brown (5Y 5/4). *Soft parts* Tarsi and feet bluish-gray. Iris dark brown. Mandible bluish-horn with paler tip and black maxilla.

Other specimens

There are two specimens of *G. fenwickorum* that were collected without the necessary permit within the Colibrí del Sol Bird Reserve by Diego Carantón-Ayala. There is an on-going investigation by the regional environmental authority as to the incident. These specimens are not designated as type material given the

circumstances in which they were collected and the possibility that they could be confiscated by the authorities or decommissioned from the relevant collection. Although we considered Donegan (2008b)'s recommendation that 'If a specimen based on a dead organism exists, then it is better to use it for a type specimen, whatever the circumstances in which it was procured', we have decided against such an approach in this instance and instead designated a different holotype for which the relevant permit was available. However, the two specimens mentioned are currently available to be inspected and studied and therefore support the rationale for the description. These specimens are illustrated in **Figure 2**. Details of the specimens are as follows:

1. Adult male (80% skull ossification), catalogue no. 36689, held in the ornithological collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia (ICN-MHN), Bogotá. Collected on 30 March 2008 by DCA in the Colibrí del Sol Bird Reserve, Vereda El Chuscal, Municipality of Urrao, Department of Antioquia (6°25'38.9"N, 76°05'13.1"W). Elevation 2,850 meters asl. Well developed testes, no subcutaneous fat. Stomach contents included insects (mainly coleopteran remains).

2. Immature male (30% skull ossification), catalogue no. 36688 held in ICN-MHN. Collected on 20 February 2008 by DCA at the same locality as the adult specimen but 2,820 meters asl. Enlarged testes, no subcutaneous fat. Stomach contents included insect remains.

Should the status of these specimens become resolved, then the authors would encourage, or be willing, to designate the adult male as the neotype. Less stringent conditions should apply to neotype designations where a type specimen other than a full specimen is used (Donegan 2008b).

Additional individuals

At least 10 territories are known within the Colibrí del Sol Bird Reserve and one territory just outside the reserve in an isolated 1 ha fragment of forest. We obtained many detailed field sightings of *G. fenwickorum*, especially at the worm-feeding station where prolonged views in good light and close quarters are obtained daily. There is no noticeable variation between individuals and pairs, suggesting that the species is sexually monomorphic as in other *Grallaria*.

Table 1: Comparison of morphometrics of *G. fenwickorum* with *G. m. gilesi*, *G. m. milleri* (specimens unless otherwise stated) published by Salaman *et al.* (2009a). The mean is given, followed by the standard deviation and then the range, with Kattan & Beltrán (1999) data also presented for comparison. There is expected to be small differences between data as a result of different measuring techniques.

	Flat wing chord (mm)	Tail length (mm)	Tarsus length (mm)	Maxilla (mm)*	Body mass (g)	Tail / tarsus ratio	Wing / tarsus ratio
<i>G. fenwickorum</i> (holotype)	99	57	49.9	22.9	53.5	1.14	1.98
<i>G. fenwickorum</i> (ICN 36689)	95	63	46.5	23.5	56.4	1.35	2.04
<i>G. fenwickorum</i> (ICN 36688)	96	63	44.5	22.4	57.4	1.41	2.15
<i>G. m. gilesi</i> (holotype)	97	55.8	40.8	18.8	N/A	1.37	2.38
<i>G. m. milleri</i> (n=10)	88.6 ± 2.9 (85.0–94.5)	49.0 ± 2.9 (43.6–53.0)	44.5 ± 0.6 (43.4–45.5)	21.0 ± 1.9 (19.3–24.7)	N/A	1.10 ± 0.06 (0.98–1.19)	1.99 ± 0.08 (1.88–2.13)
<i>G. m. milleri</i> (Kattan & Beltrán 1999; n=18 live individuals & specimens)	89.6 ± 3.5	N/A	46.6 ± 2.4	17.1 ± 1.5	52±3.2	N/A	Based on means: 1.92

Figure 2: Above *G. m. milleri* ICN 35692 (Caldas, Manizales, Río Blanco, 15/11/2005); Middle: *G. fenwickorum* ICN 36689; Bottom: *G. fenwickorum* ICN 36688.



Figure 3: *Grallaria fenwickorum* pullus (c. 18 days old) covered with down on June 12 2008.



One pullus (just fledged) covered with down and only moderate unsheathing of flight feathers was captured, photographed (**Figure 3**) and released on June 12 2008 by DCA and LRG. Additional photos are online at: <http://www.flickr.com/photos/proaves/sets/72157623898966996/>). The mandible and commissures were conspicuous bright orange, while the tarsi and feet were dark pink. The entire upperparts, head and chest were black above with broad rufous-brown tips to give a barred appearance, while the lower underparts (lower breast to undertail coverts) were creamy-buff colored. The flight feathers were partially grown and sheathed.

Etymology

The epithet honors the Fenwick family; George, Rita, Cyrus, Sarah and Rachael Fenwick of The Plains, Virginia, USA. George Fenwick is the President of American Bird Conservancy (ABC)

and Rita Fenwick is the Development Director of ABC – two amazing individuals that have been a force for conservation in the USA and across Latin America, especially Colombia. Importantly, the Fenwick family dedicated their own personal resources to support Fundación ProAves buy and save the 731 ha of Páramo del Sol, establish the Colibrí del Sol Bird Reserve and fund the research which led to this discovery. This commitment to bird conservation has saved many bird species, and now, one more - *Grallaria fenwickorum*. To the Fenwick family – thank you and long live bird conservation. The Spanish name represents the municipality of Urrao where the species may be restricted and where it is hoped that the local community will rally to help save the species. The name *fenwickorum* is not known to be used for any other Grallariidae or suboscine passerine.

Notes on authors of the new species for purposes of the Code

Fundación ProAves de Colombia (commonly known as ‘Fundación ProAves’) funded research and conservation work which led to this description. It is not unusual for an institution to be named as an author of a scientific publication (see e.g. Timm et al. 2005 cited above). However, in this instance, the authors and Fundación ProAves de Colombia have agreed that it would not be appropriate for Fundación ProAves de Colombia to be treated as an author of the name *fenwickorum* for purposes of the Code.

Accordingly, the full citation of the species’ name should be:

Grallaria fenwickorum Barrera & Bartels, 2010.

ICZN Code of Ethics

The authors of this article (or their representatives) have communicated with Diego Carantón regularly and on numerous occasions over a period of greater than one year (in this case, starting 19 months before the date of this publication, which the authors consider to be a

more than reasonable period in the circumstances) in relation to the description of the new species of *Grallaria* described herein, and Sr. Carantón has failed to establish a new name for this species within that period. As a result, the authors have complied with the requirements of paragraph 2 of the ICZN Code of Ethics as regards that person.

Vocalizations

The song and calls of *G. fenwickorum* were recorded at multiple locations in the region of the type locality by the first two authors (n=6 recordings) and compared with those of all other members of the genus *Grallaria* on www.xeno-canto.com. Both the song and call clearly most closely resemble that of *G. milleri* but could not be confused with any other antpitta species. The recordings of *G. fenwickorum* were studied and compared with recordings of *G. milleri* available on www.xeno-canto.org, Alvarez et al. (2007) and Isler & Whitney (2002).

The vocal variables set out in Table 2 were studied. Both songs and calls were analyzed. Only the first three songs or calls for each available recording were studied. Data on the acoustic variables studied is set out in Table 2.

The song of *Grallaria fenwickorum* consists of three notes, progressively increasing in acoustic frequency and length, with the first note briefest and lowest, and the final note longest and highest. The song could be transcribed as: “tu, tuut, TUUET”.

The song of *G. milleri* is similar to that of *G. fenwickorum*, also comprising three notes of progressively higher pitch and greater length (**Figure 4**). However, each note of the *G. milleri* song is diagnosably longer and higher pitched than the equivalent note in *G. fenwickorum*. There are average differences in the length of intervals between notes (shorter in *milleri*) and total song duration (shorter in *milleri*) but songs are not fully diagnosable on these variables. There are also differences in note shape, with notes in *G. fenwickorum* songs appearing more as an up-down stroke and with longer “tails” compared with a flatter, more varying note shape in *G. milleri*.

We treat the acoustic frequency variables for each of the three notes as correlated; and the note duration of each of the three notes also has been correlated. As a result, these differences constitute two vocal differences (one note length based, one frequency based) for purposes of assessing species limits, with differences in note shape constituting a third difference. The diagnostic differences in acoustic frequency, note duration and note shape between *G. milleri* and *G. fenwickorum* therefore meet the suggested benchmark for species limits in Grallariidae (Donegan 2008a).

The call of *G. fenwickorum* is a sharp, loud, single note which is higher-pitched than the song (**Figure 5a**). The call is frequently heard in response to imitation of the song and playback. The call is similar to that of *G. milleri*, but differs in being shorter and lower-pitched with a less curved note shape (**Figure 5b**).

Table 2: Vocal variables of *G. m. milleri* and *G. fenwickorum* songs and calls. Data is presented in the form Mean \pm standard deviation (lower recorded limit – upper recorded limit) (n=sample number). Diagnosability is based on Donegan (2008)’s “Level 5” test (Isler et al. 1999’s diagnosability test).

Songs	<i>G. milleri</i>	<i>G. fenwickorum</i>	Diagnosable?
Number of notes in song;	3 (all)	3 (all)	No
Total song duration (s)	1.02 \pm 0.11 (0.85-1.14) (n=10)	0.83 \pm 0.02 (0.80-0.85) (n=16)	No
Song speed (No. of notes /s).	2.98 \pm 0.33 (2.63-3.52) (n=10)	3.62 \pm 0.07 (3.54-3.77) (n=16)	No
Duration of first note (s)	0.21 \pm 0.02 (0.19-0.24) (n=10)	0.10 \pm 0.01 (0.07-0.11) (n=15)	Yes
Duration of second note (s)	0.22 \pm 0.02 (0.19-0.25) (n=10)	0.10 \pm 0.01 (0.09-0.12) (n=17)	Yes
Duration of third note (s)	0.22 \pm 0.02 (0.17-0.25) (n=10)	0.12 \pm 0.01 (0.10-0.14) (n=17)	Yes
Duration of interval between first and second note (s)	0.28 \pm 0.11 (0.14-0.43) (n=10)	0.37 \pm 0.01 (0.35-0.41) (n=16)	No
Duration of interval between second and third note (s)	0.09 \pm 0.03 (0.06-0.14) (n=10)	0.12 \pm 0.01 (0.11-0.15) (n=17)	No
Acoustic freq. of 1 st note (kHz)	2.65 \pm 0.08 (2.55-2.77) (n=10)	2.33 \pm 0.03 (2.30-2.38) (n=16)	Yes
Acoustic freq. of 2 nd note (kHz)	2.80 \pm 0.07 (2.69-2.91) (n=10)	2.47 \pm 0.05 (2.40-2.60) (n=17)	Yes
Acoustic freq. of 3 rd note (kHz)	3.02 \pm 0.05 (2.91-3.08) (n=10)	2.76 \pm 0.04 (2.69-2.86) (n=17)	Yes
Calls			
Call duration (s)	0.45 \pm 0.01 (0.41-0.47) (n=18)	0.32 \pm 0.01 (0.30-0.36) (n=19)	Yes
Minimum acoustic freq. (kHz)	4.62 \pm 0.15 (4.32-4.75) (n=18)	4.25 \pm 0.04 (4.18-4.35) (n=19)	No
maximum acoustic freq. (kHz)	5.46 \pm 0.21 (5.10-5.78) (n=18)	4.90 \pm 0.06 (4.77-5.00) (n=19)	Yes
variation in freq. (kHz)	0.84 \pm 0.09 (0.72-1.05) (n=18)	0.65 \pm 0.06 (0.54-0.73) (n=19)	No

Figure 4: Territorial song of the holotype of *G. fenwickorum* (b), recorded by LFB on 11 January 2010 in Colibrí del Sol Bird Reserve and (a) *G. m. milleri* recorded by Nick Athanas on 20 February 2007 in El Mirador Bird Reserve, Quindío Dept (04°08’22”N 75°44’08”W), No.:XC10721. Accessible at www.xeno-canto.org/10721

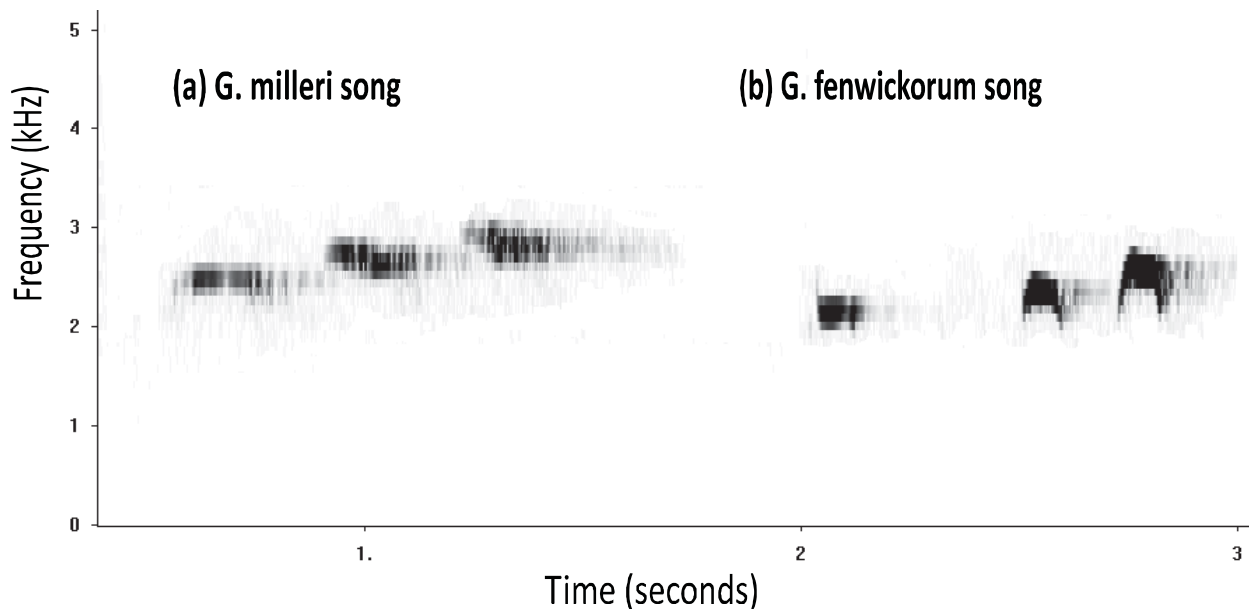
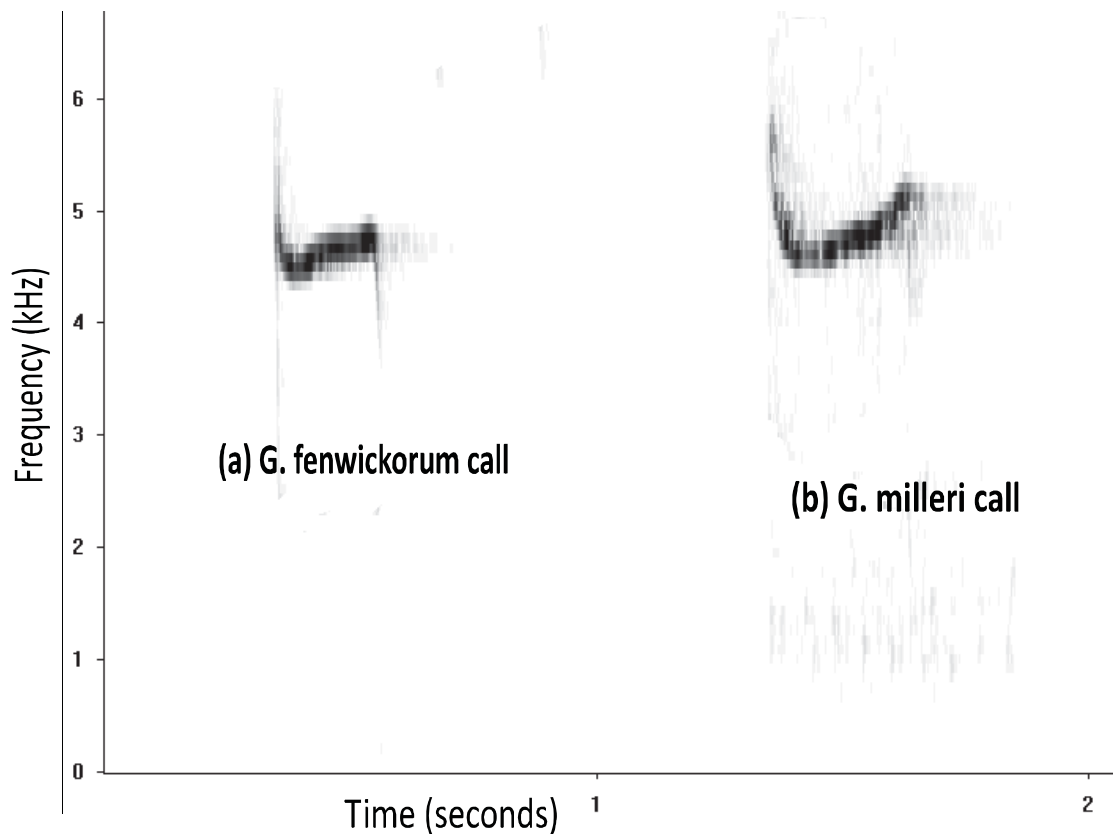


Figure 5: Calls of (a) *G. fenwickorum* recorded by LFB on 11 January 2010 in Colibrí del Sol Bird Reserve and (b) *G. m. milleri* recorded by Frank Lambert on 29 May 2007 in El Mirador Bird Reserve, Quindío Dept, No.:XC16777. Accessible at <http://www.xeno-canto.org/recording.php?XC=16777>



Distribution

Grallaria fenwickorum is known only from the immediate vicinity of the type locality of Colibrí del Sol Bird Reserve (**Figure 6**), on the southeastern slope of the Páramo del Sol massif, in the Municipality of Urrao, Department of Antioquia (06°25'N 76°04'W). Here, the Western Andes reaches its highest elevations. Other high elevation species, such as *Scytalopus canus* and *Coeligena orina* appear also to be restricted to the northern massifs of the western Andes and do not extend in distribution south to other high massifs in the range, such as Cerro Munchique in Cauca, which has been subject to extensive ornithological efforts.

We have documented eleven territories, of which only one has been found outside of the reserve (620 meters to the southeast in a isolated 1 ha forest patch), but all on the slightly less humid

eastern slope of the Western Andes. *G. fenwickorum* appears restricted to montane cloud forest dominated with *Quercus humboldtii* (Colombian Oak) between 2,600-3,300 meters elevation where territories are largely restricted to *Chusquea* bamboo thickets. It is interesting to note that the local district where the type-locality and reserve occurs is called “El Chuscal”, referring to the extent of *Chusquea* bamboo!

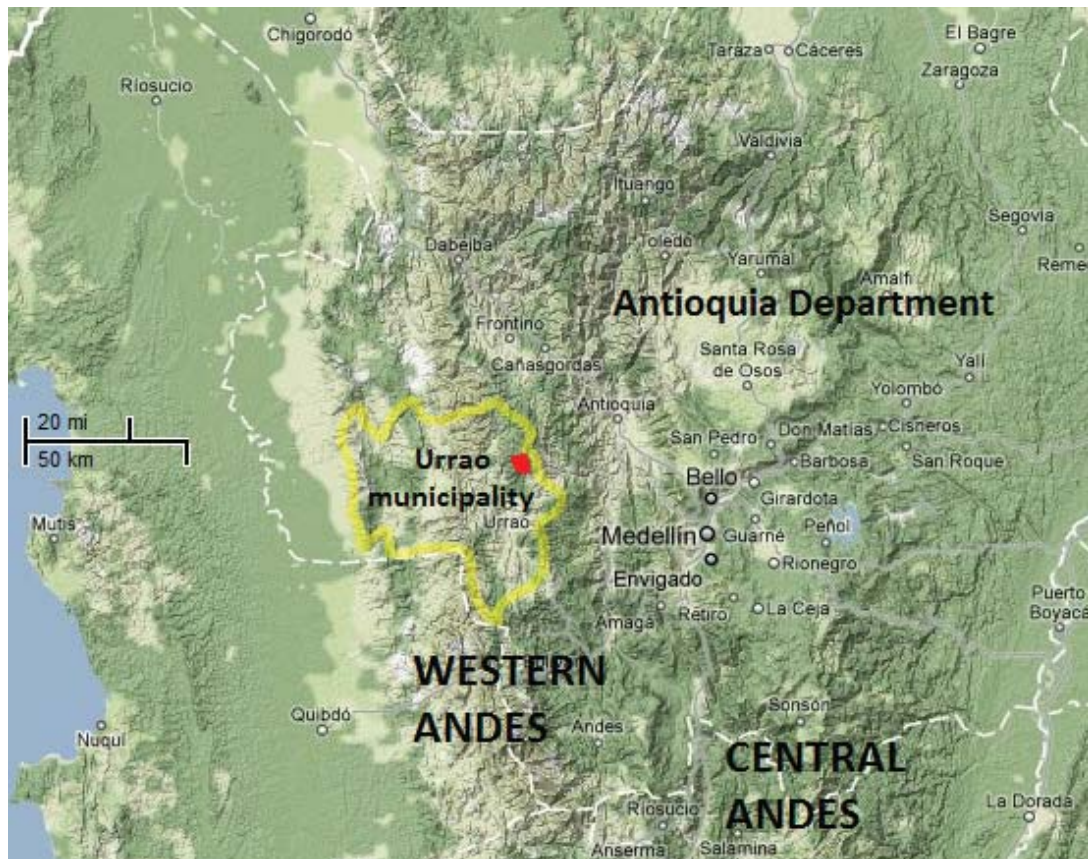
We suspect the range of *G. fenwickorum* to be larger than just the Colibri del Sol reserve, but surveys 45 km to the south on the eastern slope of the West Andes within its elevational range failed to locate the species. Furthermore, there have been many surveys of the montane forests of the West Andes by ornithologists and birders in the past decade, all of which have failed to report the species (Cuervo et al. 2003). This would suggest that *G. fenwickorum* has a particularly restricted

range, probably based on its unique ecological preferences on the more sheltered and slightly less humid eastern slopes of the West Andes, an area that has been severely impacted by deforestation. We consider that the species could range lower in elevation, below 2,500 m, however there is virtually no surviving humid montane forest below that elevation on the eastern slope of the West Andes, so the hopes of a viable population at lower elevations looks unlikely.

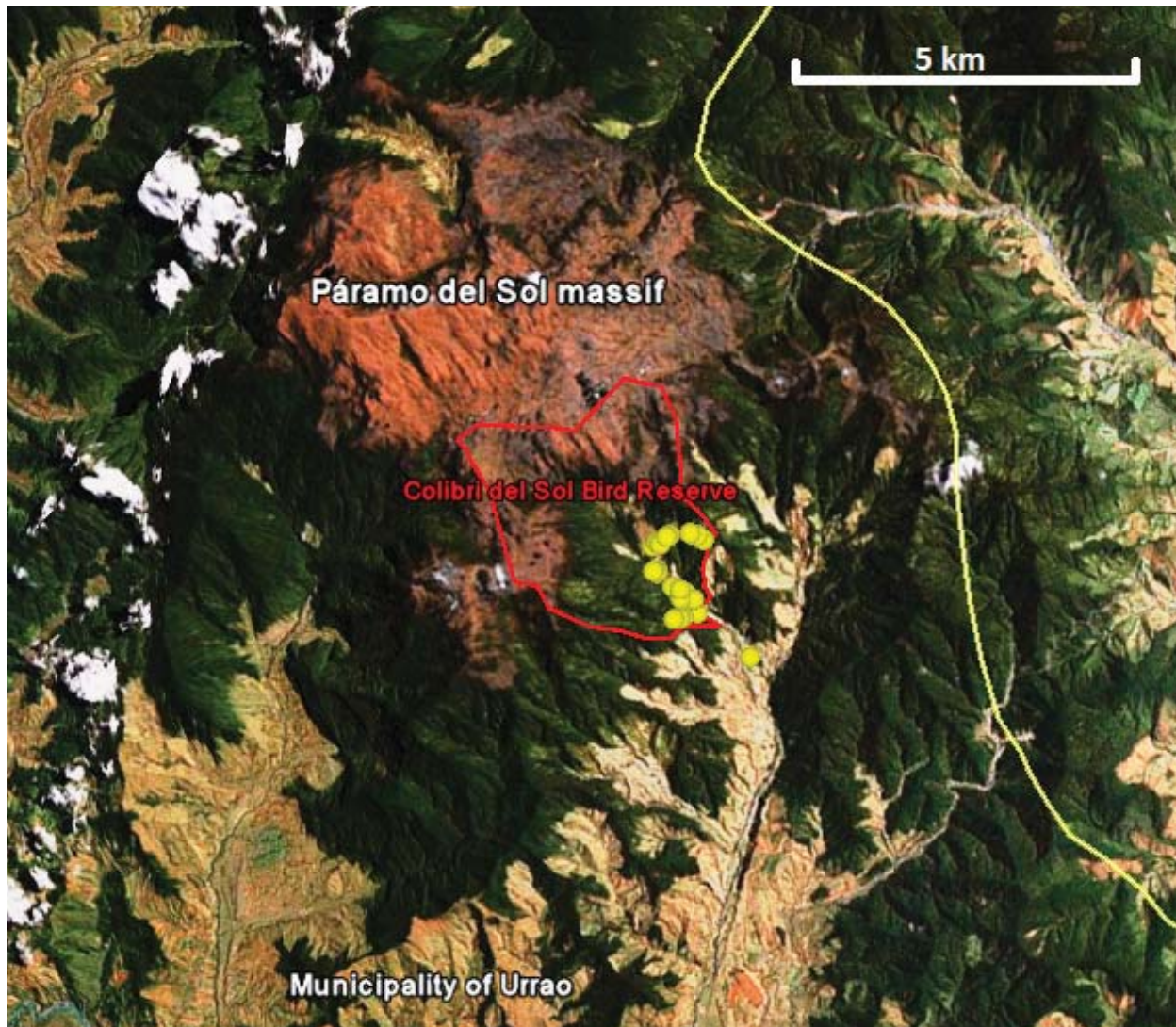
We hope that additional populations survive, with an important site for further studies being the eastern slopes of Farallones de Citará. However, this peak is highly exposed and much more humid. We hope that the availability of sound recordings of the new species in www.xeno-canto.com will aid birders' and ornithologists' searches for the species and hopefully result in the discovery of new populations.

Figure 6. Distribution map of *G. fenwickorum* in (a) Google Maps terrain image of the northern sector of the Western and Central Andes and (b) LandSat image of the Páramo del Sol massif in the Municipality of Urrao, Dept. of Antioquia, Colombia with territories shown (yellow spots).

A)



B)



Taxonomic affinities

The recent description of *G. milleri gilesi* and discussion of morphological features within *G. milleri* (Salaman *et al.* 2009a) allows light to be shed on the taxonomic affinities of *G. fenwickorum*. Based on morphological and vocalization characteristics described above, the closest relative of *G. fenwickorum* is clearly *G. milleri*. The new species is most probably most closely related to *G. m. gilesi*, which is larger in biometrics, being more similar to *G. fenwickorum* in this respect. Furthermore, *G. m. gilesi* is suspected formally to have occurred just 70 km east on the western slope of the northern sector of the Central Andes, whilst *G. m. milleri* occurs

further away - 165 km southeast in the middle sector of the Central Andes. There are no available vocalizations of the possibly extinct subspecies *G. m. gilesi* (Salaman *et al.* 2009).

Population and territory size

Surveys were conducted, consisting of transect point counts, using playback, between 2,780 m (the lowest of contiguous forest) and 3,345 m. The area surveyed was approximately 98 ha within the core area of known territories within the reserve. Most points were at intervals of at least 50 m apart, the exceptions occurring in habitat not considered to be prime (Type A; see Habitat details below) where no response to

playback was solicited. No two points that received responses were closer than 50 meters. In a few cases adjacent points received responses from the same area, in which case this was counted as one territory. In total 85 separate points were surveyed over 14 days between January 11 and February 2, 2010. All point counts were conducted between 0615-1030 hrs, though rarely after 0945hrs, and 1600-1730 hrs. The maximum period of playback at a point was ten minutes, roughly following a 30 seconds on, 30 seconds off pattern, though later on the usage of playback lessened, with more time between each playing as the birds often responded 1-3 minutes after playback stopped. Both song (60%) and call (40%) were used.

The transect point counts identified approximately 24 territories of *G. fenwickorum*. Due to time restrictions, an accurate size of each territory was not obtained, but based on the proximity of territories and micro-habitat boundaries it is estimated that the average territory area between 0.4-1.1 ha, which is consistent for territory size of *G. milleri* of an estimated 0.5-5.4 ha (Kattan & Beltran 2002). It is also estimated that the total area of occupancy was between 9.6 to 26.4 ha surveyed with an occupancy of 9.8-26.9% of the area surveyed.

Extrapolating habitat preferences across the reserve and adjacent suitable habitat based on contour maps of the eastern and southeastern slope of Páramo del Sol massif, *G. fenwickorum*'s estimated extent of occurrence is 5.8 km², giving a cautious estimate of between 57-156 territories. Each territory refers to a singing adult male, so does not necessarily translate to an estimate of the number of pairs.

Breeding

Territorial vocalizations appear more pronounced in the first half of the year, while evidence of breeding can only be confirmed between May-June, with one recently fledged pullus (estimated to be c. day 18), covered with down and only

moderate flight feather unsheathing, was found on June 12 2008. This record coincides with one of the wet seasons, May through June.

Habitat preferences

Grallaria fenwickorum is restricted in a thin altitudinal belt of humid cloud forest dominated with *Quercus humboldtii* (Colombian Oak) between 2600 m and 3300 m, and strongly dependant on *Chusquea* cf *scandens* (Andean Dwarf Bamboo) thickets under the forest canopy or treefall/landslide gaps. The climate at the reserve headquarters (in the core *G. fenwickorum* population area) averages 2,284 mm per annum with a minimum temperature average of 8.8°C and maximum temperature of 16.0°C with the driest months being December-March and wettest from May-June and October-November (unpublished weather station data).

The preferred habitat for *G. fenwickorum* can be classified into three classes based on the extent of *Chusquea* within an area: >90% = Type A, 60-90% = Type B to <20% = Type C habitats. Nineteen territories were found in Type A habitat, three were found in Type B and two in Type C. As the area studied is very mountainous, virtually all territories were on slopes averaging 20-30% grade. However, a few territories contained areas up to 60% grade while others near Quebrada Santa Barbara included areas with 0-5% grade. Photos of the various habitat types at are shown online at: <http://www.flickr.com/photos/proaves/sets/72157623898966996/>.

Type A (nineteen territories): the main habitat type is considered to be of early successional vegetation from large treefall sites or landslides and consists of thickets of dense, mature *Chusquea* bamboo with low light penetration. The low lighting is not generally due to a dense canopy but rather a fairly sparse upperstorey (trees sometimes spaced as far apart as 15-20 m) allowing *Chusquea* to flourish and dominate, creating a dense to very dense understorey "canopy" at 1.5-3 m above the forest floor. A

dominant characteristic of this habitat is the presence of clusters of horizontal to near horizontal dead and living *Chusquea* stalks with accumulated dead foliage that *G. fenwickorum* favors for cover. The relatively open forest floor, that most individuals preferred, was generally covered in a thin layer of dead *Chusquea* leaves, at most 5cm thick but usually averaging about 2cm. Height of the upperstorey (loosely equivalent to canopy) varied from 7-25 m and did not appear to be a factor influencing the density or location of territories.

Type B (three territories): very similar to Type A habitat with dense patches of *Chusquea*, but mixed patchily with other plant species, such as ferns and very young trees. Type B is typically representative of advancing successional vegetation.

Type C (two territories): two territories occurring along the same stream between 2815 and 2860m with very different habitat from Types A and B. The canopy is denser and lower, between 7-12m, also with a very dense understorey, between 0-1.5m, dominated by ferns (30% at one territory, 60% at other) and herbaceous plants with a limited presence (<5%) of *Chusquea* in the immediate area, although both territories had stands of *Chusquea* nearby (20m and 30m, respectively), that the individuals may or may not have been using. The forest floor was covered in a fairly thick layer of dead foliage, averaging between 5cm and 10cm.

Behavior

Grallaria fenwickorum exhibits typical behavior as seen by other members of the genus, being a shy terrestrial antpitta that forages on insects in the leaf-litter and dense understorey and ascends to perches up to 1.5 meters off the ground to sing from within the dense bamboo understory. The species is most active and vocal from dawn (~6.00 hrs) to 9.45 hrs and again from 16.00 hrs to dusk (~18.30 hrs).

The species responds well to playback throughout the year, however, individuals often hard to see. In order to minimize disturbing this very shy species with playback for visiting birders, LRG established a worm feeding station that immediately proved very successful. At mid-morning each day, worms are placed on two trays and birds are called up. Individuals, pairs and occasionally 3-4 individuals (assumed to be young) bound down the slopes to feed on the worms. *G. fenwickorum* territories occasionally overlap with the much larger Chestnut-naped Antpitta *G. nuchalis* (a species which is at least twice as large) which also frequents the worm-feeding station.

Threats

Grallaria fenwickorum is presently known from 24 territories with an estimated extent of occurrence is 5.8 km², giving a cautious estimate of between 57-156 territories, although it is unclear if all those territories are breeding pairs. The known and estimated population is extremely small and of great conservation concern. Furthermore, *G. fenwickorum* has highly specific ecological requirements, being dense *Chusquea* thickets within primary montane cloud forest on less humid east-facing or sheltered valleys of the Western Andes. Very few peaks of the height of Páramo del Sol exist and most of those are considerably further south in the West Andes (e.g. Munchique, Farallones de Cali). Those peaks have been surveyed extensively with no records of this new species. As a result, the species is likely restricted to high elevation peaks in the northern part of the West Andes only.

The fertile eastern slopes and valleys of the Western Andes have long been extensively deforested for rich pasture and agricultural lands primarily as it is less humid than the adjacent western or Pacific slope of the Western Andes. Even steep slopes have been cleared in the region, assisted by burning forests upslope during extreme droughts (typically El Niño years). The extent of montane cloud forest that survives

between 2,000-3,300 meters on the eastern slope of the Western Andes in the department of Antioquia is estimated at less than 21% of its original cover (approximately 978 km²). However, much of this is heavily fragmented and less than 0.16% is protected.

One core area of surviving humid montane forest dominated by *Quercus humboldtii* is the eastern slope of the Páramo del Sol massif, particularly the upper Río Urrao watershed, including Quebrada Santa Barbara that runs through the Colibrí del Sol Bird Reserve. The Río Urrao watershed totals 6,050 ha of which 37% is primary montane forest with moderate levels of forest fragmentation and of the surviving forest, the Colibrí del Sol Bird Reserve protects 19.2% (428 ha of forest). Examination of forest cover change between 2000 and 2007 within the Urrao watershed documented a loss of 83 ha of forest or 3.6% of forest cover, despite a gain in reforestation of 38 ha of pasturelands to forest in the Colibrí del Sol Bird Reserve.

Unfortunately, the partially eroded caldera complex underlying Páramo del Sol features high-level, volcanic-hosted heavy metal mineralization from Upper Tertiary intrusions (Aspden *et al.* 1987, MiningLife 2004). A significant improvement in public order within the region in recent years together with documented high grade gold, zinc and copper deposits hosted within the massif have attracted the attention of several mining companies. In August 2007, Continental Gold de Colombia S.A., a Canadian subsidiary of Continental Gold Ltd., secured mineral exploration rights to 500 ha area within the Colibrí del Sol Bird Reserve. This exploration was successfully disputed, but given that the entire Páramo del Sol massif is privately owned, land speculation has been rife. The likelihood of protecting additional forests in the area faces significant challenges.

Proposed IUCN status

Based on the information published within this article, *G. fenwickorum* meets the IUCN criteria:

CRITICALLY ENDANGERED B1a+b(i,iii,v); C2a(ii):

--B. Geographic range in the form of B1 (extent of occurrence) estimated to be less than 100 km², and (a.) known to exist at only a single location and (b.) projected decline in (i) extent of occurrence, (iii) area, extent and/or quality of habitat, and (v) number of mature individuals, and

--C. Population size estimated to number fewer than 250 mature individuals and (2.) a continuing projected decline in numbers of mature individuals (a.) Population structure in the form of (ii) at least 90% of mature individuals in one subpopulation.

It is noteworthy that the closest relative of *G. fenwickorum*, *G. milleri* is considered Endangered (EN: B1a+b(iii,v), VU: C2a(i); D1) with an estimated extent of occurrence of 660 km² and known from ten locations across the Central Andes (Salaman *et al.* 2009, BirdLife International 2010), while *G. m. gilesi* is considered probably Extinct (Salaman *et al.* 2009). This indicates that this group of antpittas are particularly sensitive to environmental conditions and prone to extinction.

Conservation Actions

While *Grallaria fenwickorum* is effectively protected within the 731 ha Colibrí del Sol Bird Reserve that is owned and managed by Fundación ProAves and registered within the National System of Protected Areas, the species requires a significantly larger area of suitable habitat protected while suitable forests still survive. It is also essential that searches should be made for *G. fenwickorum* along the eastern slope of the Western Andes to locate possible new populations.

Considering the critical importance of protecting *G. fenwickorum* and many other threatened and endemic species, American Bird Conservancy and Fundación ProAves will shortly publish a comprehensive Conservation Action Plan for the Páramo del Sol massif, based on extensive biodiversity surveys to identify key biodiversity sites. This plan will lay a strong framework for future actions, using the toolbox of conservation actions to ensure the strategic and effective protection of *G. fenwickorum* as well as many other threatened birds (e.g. Dusky Starfrontlet *Coeligena orina* [CR], Paramillo Tapaculo *Scytalopus canus* [proposed CR], and Chestnut-bellied Flowerpiecer *Diglossa glorrisisima* [EN]) and amphibians (e.g. Nicefori's Harlequin Frog *Atelopus nicefori* [CR], *Bolitoglossa medemi* [VU], *Hyloxalus borjai* [DD]) that depend on this critical Alliance for Zero Extinction site.

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