

Bird diversity and noteworthy records from the western side of the Porculla Pass and the Huancabamba-Chamaya river sub-basin, northwest of Peru

Irwing S. Saldaña^{1*}, Armando Ugaz^{1,2}, Adalhif Baldeón¹, Diego A. Benites^{1,2}, Robert Barrionuevo², Luis Martín Vallejos^{1,3,4}

¹ Maria Koeppke Lab of Ornithology, Centro de Investigación en Biología Tropical y Conservación – CINBIOTYC, Piura, Peru.

² Escuela de Ciencias Biológicas, Universidad Nacional de Piura, Piura, Peru.

³ Laboratorio de Ecología de Aves. IBRAG, Universidade do Estado do Rio de Janeiro, RJ, Brasil.

⁴ Programa de Pós-Graduação em Ecologia. Instituto de Biologia, Universidade Federal do Rio de Janeiro, RJ, Brasil.

* Corresponding author: irwingssaldu@gmail.com

Funding Information

This study was funded by the authors.

Data Availability Statement

All relevant data are available in the manuscript itself.

Conflict of interest disclosure

The authors declare that they have no conflict of interest.

Authors' contribution

ISS conceived the initial idea. All the authors performed field observations. ISS made the maps. ISS, AB and AU took the photographs here presented. All the authors wrote and gave final corrections to the manuscript.

Received:

10 February 2020.

Accepted:

6 March 2020.

Published (online):

30 March 2020.

Published (printed):

30 April 2020.

Citation:

Saldaña, I.S., Ugaz, A., Baldeón, A., Benites, D.A., Barrionuevo, R., & Vallejos L.M. 2020. Bird diversity and noteworthy records from the western side of the Porculla Pass and the Huancabamba-Chamaya river sub-basin, northwest of Peru. *Arnaldoa* 27(1): e113-e133. <http://doi.org/10.22497/arnaldoa.271.27111>

Abstract: Despite the great importance of the level of biodiversity and endemism that the Equatorial Seasonal Tropical dry Forest hosts, many of its areas remain unexplored. Here we present the results of the field evaluations carried out between 2014 and 2018 along the western side of the Porculla pass and the Huancabamba-Chamaya river sub-basin, in the northwest of Peru. This research is part of the dataset of the project Bird Assessments in Ecosystems of the Northwest of Peru – CINBIOTYC. We reported 174 bird taxa, belonging to 163 species and 32 families. Likewise, we reported two migratory bird species, one boreal and one austral, six endemics of Peru, and 31 restricted-range species, from which 25 belong to the Tumbesian Region, seven to the Marañón Valley and one was shared between them. We highlighted the record of four trans-Andean bird taxa, *Amazilia amazilia leucophaea*, *Euphonia saturata*, *Basileuterus trifasciatus*, and *Pyrocephalus rubinus piurae*, as well as, the remarkable records of *Patagioenas oenops*, *Thamnophilus shumbae*, *Pachyramphus spodiurus*, *Turdus maranonicus*, and *Incaspiza ortizi*.

Keywords: endemism, trans-Andean, northwest of Peru, subspecies, Equatorial Seasonally Dry Tropical Forest, hotspot.

Resumen: Diversidad de aves y registros notables en el lado occidental del abra de Porculla y la cuenca del río Huancabamba-Chamaya, noroeste de Perú. A pesar de la gran importancia de los niveles de biodiversidad y endemismo que el Bosque Tropical Estacionalmente Seco Ecuatorial alberga, muchas de sus áreas permanecen aún poco exploradas. Aquí se presentan los resultados de las evaluaciones de campo realizadas entre el 2014 y 2018 a lo largo del lado occidental del Abra de Porculla y la cuenca del río Huancabamba-Chamaya, noroeste de Perú. La presente investigación forma parte del proyecto de largo aliento *Bird Assessments in Ecosystems of the Northwest of Peru – CINBIOTYC*. Se reportó 174 taxa de aves, pertenecientes a 163 especies y 32 familias. Así mismo, se registró dos especies migratorias, una boreal y una austral, seis endémicas de Perú, y 31 aves de rango restringido, de los cuales 25 pertenecen a la Región Tumbesina, siete al Valle del Marañón, y una compartida entre ellas. Resaltamos el registro trans-Andino de cuatro taxa de aves, *Amazilia amazilia leucophaea*, *Euphonia saturata*, *Basileuterus trifasciatus*, y *Pyrocephalus rubinus piurae*, así como los registros destacables de *Patagioenas oenops*, *Thamnophilus shumbae*, *Pachyramphus spodiurus*, *Turdus maranonicus*, e *Incaspiza ortizi*.

Palabras clave: endemismo, trans-Andino, noroeste de Perú, subspecies, Bosque Tropical Estacionalmente Seco Ecuatorial, hotspot.

INTRODUCTION

The seasonally dry tropical forest (SDTF) of the southwest of Ecuador and northwest of Peru (the Equatorial SDTF) has an outstanding level of endemism and is a critically-important hotspot of biodiversity in the world (Linares-Palomino, Kvist, Aguirre-Mendoza, et al., 2010; Myers, Mittermeier,

Mittermeier, et al., 2000; Singh & Chaturvedi, 2018). This uniqueness in the biodiversity is the result of a variety of habitats, ranging from the arid coastal plains to the montane dry forest formations on the Andean slopes (Marcelo-Peña, Huamantupa, Särkinen, et al., 2016; Singh & Chaturvedi, 2018).

The partially synchronous uplift process of the northern and the central Andean chains produced the separation of the Equatorial SDTF into two well-defined biogeographic units: the Tumbes/Piura dry forest ecoregion on the western side of the Andes, and the Marañón valley dry forests ecoregion on the eastern side (Cadena, Pedraza, & Brumfield, 2016; Hoorn, Wesselingh, Steege, et al., 2010; Oswald, Overcast, Mauck, et al., 2017). Nowadays, Porculla Pass — at 2145 m in the northwest of Peru — is the lowest point of this geographical separation (Linares-Palomino, 2006; Linares-Palomino, Pennington, & Bridgewater, 2003; Weigend, 2002).

In terms of endemism, the western and eastern sides of the Porculla Pass belong to different endemic bird areas (EBAs): the Tumbesian Region (EBA 045) and the Marañón Valley (EBA 048), respectively (BirdLife International, 2019b, 2019a). Globally, few EBAs have the same amount of restricted-range bird species as the Tumbesian Region (55 species) and the Marañón Valley (22 species) have (BirdLife International, 2019b, 2019a; Ugaz & Saldaña, 2014). The survival of their populations are worryingly supported by small fragments of dry forests and scrub remaining in the area — less than 10% — mainly distributed on inaccessible slopes since most of the natural vegetation has been destroyed by human activities for farmland and livestock (Best & Kessler, 1995; Parker, Schulenberg, Graves, et al., 1985).

The topographic complexity and the access difficulty are responsible for the poor attention the area has received. The last scientific report about the avian diversity near to Porculla Pass has been published the last century by Parker, Schulenberg, Graves, & Braun (1985), who recorded 42 species in the desert scrub northeast of Huancabamba city. To date, no extensive work about the birds of the Huancabamba-Chamaya system nor the western side of the Porculla Pass has been published. Our goal was to update the checklist of bird species associated with this area, with a special emphasis on the Huancabamba-Chamaya river sub-basin. Additionally, our noteworthy records of trans-Andean bird taxa suggest that exhaustive fieldwork will continue to produce discoveries concerning the distribution and biogeography of the Tumbes-Piura and Marañón valley dry-forest avifauna, and they could give us a better understanding of the interactions between the restricted-range bird species whose populations co-occur on the east side of the Porculla Pass.

MATERIALS AND METHODS

Study area

The Porculla Pass lies on the northwest of Peru, between the regions of Piura, Lambayeque, and Cajamarca. This mountain pass has its lowest point at 2145 m in “Cuello de Porculla town” at 5°50′25.26″S, 79°30′21.71″W, Piura region (Figure 1). The western side has uniform open valleys and dense vegetation associated with Tumbes-Piura dry forest ecoregion (Figure 1b). It is dominated by semi-deciduous species at lower elevations, such as *Eriotheca discolor*, *Ceiba trichistandra*, *Bursera graveolens*, and *Loxopterygium huasango*, as well as a more mixed and diverse forest at higher elevations, including species such as *Ocotea cernua* and *Myrcianthes discolor* (Rasal Sánchez et al. 2011, Ceroni Stuva 2003, I.S.S. personal observation). The upper part of the

Porculla Pass contains some patches of transitional habitat to dense montane scrub, with species such as *Oreocallis grandiflora*. The streams on the eastern side come together creating the Huancabamba-Chamaya river sub-basin, which is the westernmost tributary of Marañón river in Peru. This side is eroded and arid, with sandstone and limestone sequences characteristic of Marañón valley tributaries (Marcelo-Peña et al. 2016). The vegetation, dominated by two to three species of *Acacia* genus, is quite scattered, getting more open as one descends the elevational gradient.

Bird surveys

Since 2014, the Maria Koepcke Lab of Ornithology from the Peruvian NGO CINBIOTYC (Spanish initial of “Centro de Investigación en Biología Tropical y Conservación”), has been investigating the bird diversity in ecosystems of Tumbes, Piura, Lambayeque, Cajamarca and La Libertad regions with the self-financed project *Bird Assessments in Ecosystems of the Northwest of Peru* (unpublished data, <https://www.birdsmklo.com/nwperu.html>). The project's goal is to compile and update information about the distribution of the bird species of northwestern Peru, involving thesis projects, short communications and scientific articles highlighting their field observations. Here we present the presence-only data of 30 georeferenced localities between 1000 to 2200 m on both sides of Porculla Pass (Figure 1), obtained between August 2014 to October 2018.

The data collection followed the same methodology in all the localities surveyed: two line-transects of 500 m long per locality with two visits on most of them (n=20), with a total effort of 50 line-transects, which represent 25 km walked. The evaluations were mainly performed early in the morning or before sunset (5:00–10:00 and 15:00–18:00 hrs). The bird species were identified to subspecies level when it was possible, following the nomenclature of del Hoyo, Elliott, Sargatal, Christie, & de Juana (2018) and the descriptions published in the literature (del Hoyo et al., 2018; Schulenberg, Stotz, Lane, et al., 2010; Ugaz & Saldaña, 2014).

SPECIES ACCOUNTS

We recorded 174 bird taxa (including species and subspecies reported), belonging to 163 species and 32 families (Table 2). All the species were residents, except for two migratory species, one boreal migratory Black-billed Cuckoo (*Coccyzus erythrophthalmus*), and one austral migratory Slaty Thrush (*Turdus nigriceps*). Likewise, we reported one vagrant species Orange-crowned Euphonia (*Euphonia saturata*, Figure 11A,B) on the east side of the Porculla Pass.

The bird species richness was greater on the western side (144 species) than on the eastern side (121 species) of Porculla pass. We reported six endemic species of Peru and 31 restricted-range species, from which seven are restricted to Marañón Valley EBA, 25 to Tumbesian Region EBA, and one is shared between them (Grey-breasted Flycatcher *Lathrotriccus griseipectus*; Figure 5E). Ten species belonging to the IUCN's red list of threatened species, six Vulnerable (VU), three Near Threatened (NT), and one Data Deficient species (DD; Table 2). We obtained four previously undocumented new records

Table 1. Localities of bird evaluation on both sides of the Porculla Pass.

Code	Locality Name	Region	Latitude	Longitude	Elevation
West of Porculla Pass					
1w	Paipay	Lambayeque	5°54'51.93"S	79°31'31.64"W	1038 m
2w	Paipay	Lambayeque	5°55'4.65"S	79°31'21.09"W	1132 m
3w	Paipay	Lambayeque	5°55'20.20"S	79°31'6.86"W	1270 m
4w	Chinche	Piura	5°52'58.90"S	79°31'25.29"W	1360 m
5w	Chinche	Piura	5°52'43.64"S	79°31'9.94"W	1470 m
6w	above Chinche	Piura	5°52'36.54"S	79°30'45.31"W	1535 m
7w	west of Cuello de Porculla 1	Piura	5°52'4.97"S	79°31'5.52"W	1637 m
8w	west of Cuello de Porculla 2	Piura	5°51'30.16"S	79°30'55.44"W	1706 m
9w	west of Cuello de Porculla 3	Piura	5°51'15.63"S	79°30'46.01"W	1891 m
10w	west of Cuello de Porculla 4	Piura	5°51'2.31"S	79°30'38.49"W	1979 m
11w	west of Cuello de Porculla 5	Piura	5°51'9.04"S	79°30'13.72"W	2132 m
12w	west of Cuello de Porculla 6	Piura	5°50'33.52"S	79°30'20.46"W	2125 m
13w	west of Cuello de Porculla 7	Piura	5°50'37.98"S	79°30'36.75"W	2160 m
East of Porculla Pass					
1e	above Pucara 1	Cajamarca	6° 2'34.29"S	79° 8'3.63"W	1036 m
2e	bridge to Sóndorillo	Piura	5°19'22.93"S	79°25'26.03"W	1740 m
3e	Pomahuaca	Cajamarca	5°55'14.69"S	79°14'5.43"W	1120 m
4e	above Pucara 2	Cajamarca	6° 3'6.38"S	79° 8'16.77"W	1230 m
5e	above Pucara 3	Cajamarca	6° 3'24.94"S	79° 8'20.49"W	1470 m
6e	below Tacarpo	Piura	5°23'14.40"S	79°24'21.38"W	1664 m
7e	route to Atumpampa 1	Lambayeque	6° 2'50.06"S	79°12'20.94"W	1770 m
8e	route to Atumpampa 2	Lambayeque	6° 3'22.51"S	79°13'13.77"W	1912 m
9e	above Tacarpo	Piura	5°23'28.37"S	79°23'47.10"W	1768 m
10e	route to Tuluca	Piura	5°23'54.11"S	79°24'37.41"W	1909 m
11e	route to Mancucur	Piura	5°23'54.24"S	79°23'27.65"W	1758 m
12e	Chirimoyo 1	Piura	5°26'51.04"S	79°24'7.49"W	1861 m
13e	above Sóndor	Piura	5°20'44.79"S	79°23'51.55"W	2128 m
14e	Chirimoyo 2	Piura	5°26'38.55"S	79°23'50.11"W	2024 m
15e	east of San Isidro 1	Piura	5°42'12.98"S	79°25'16.42"W	2080 m
16e	east of San Isidro 2	Piura	5°42'12.49"S	79°26'6.50"W	2170 m
17e	east of Cuello de Porculla	Piura	5°50'18.83"S	79°29'57.04"W	2074 m

of trans-Andean birds, all of them on the eastern side of the Andes in Huancabamba-Chamaya river sub-basin: Amazilia Hummingbird *Amazilia amazilia leucophoea* (Figure 2D), Orange-crowned Euphonia *Euphonia saturata* (Figure 11A,B), Three-banded Warbler *Basileuterus trifasciatus* and Common Vermilion Flycatcher *Pyrocephalus rubinus piurae* (Figure 6 A,B; Table 2). Besides, two records were removed from the original checklists due to the lack of evidence to prove them, remaining as hypothetical (not confirmed nor documented) observations to the eastern side of the Porculla pass in the Huancabamba-Chamaya river sub-basin (Maranon Sparrow *Arremon nigriceps* and Maranon Crescentchest *Melanopareia maranonica*). We will discuss our remarkable observations in the following paragraphs.

Ochre-bellied Dove *Leptotila ochraceiventris*

ISS and AB observed an individual walking through the undergrowth, and heard another 30 min later in understory at 1500 m, route to Cuello de Porculla town – Piura region, on 13 June 2016. AU and ABC heard another individual in the same locality, on 28 March 2018. This species has been largely confined to the zone at 500–1800 m due to habitat

deforestation. Records of this species are uncommon due to their low abundance in most of their distribution range (Schulenberg et al., 2010). However, its vocalizations are quite distinctive, it is difficult to mistake for *L. verrauxi* (del Hoyo, Elliott, Sargatal, et al., 2019).

Black-billed Cuckoo *Coccyzus erythrophthalmus*

ISS observed on 18 March 2017 an individual flying over an relict forest of *Acacia macracantha*, at 1750 m on the route Sóndor- Sóndorillo – Piura region. Although this common species is widely distributed in Peru during its migration (del Hoyo, Elliott, et al., 2019; Schulenberg et al., 2010), this is the first confirmed record in the dry habitats of Marañón valley.

Peruvian Pigeon *Patagioenas oenops*

This Marañón valley endemic has been overlooked in the Huancabamba-Chamaya river sub-basin. ISS made an opportunistic record of an individual perching in a *Eucalyptus* sp. tree out of the study area, at 2450 m on the Huancabamba-Canchaque route – Piura region (-5.271753°S -79.472275°W), on 20 July 2017. This record was confirmed later when ISS, DAB, and AB observed and photographed two individuals at

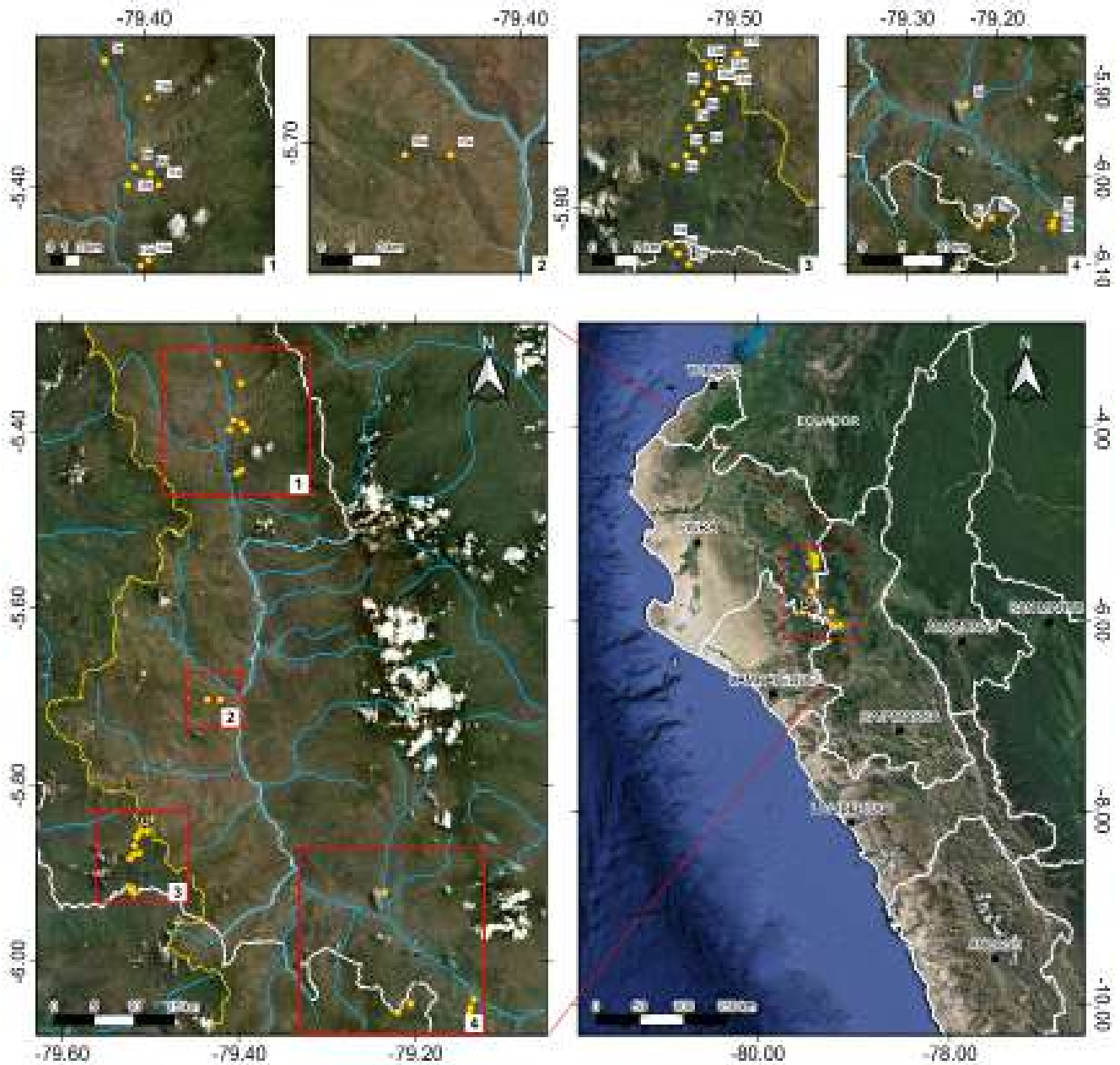


Figure 1. Location map of the study area. Yellow circles: bird evaluation localities on both sides of Porculla Pass. White circle with black cross inside: Porculla Pass (5°50'25.26"S, 79°30'21.71"W). Yellow line: watershed separating the Pacific basin (west) from the Amazon basin (east). Light-blue lines: hydrography. Imagery source: Bing Aerial BaseMaps (<https://www.bing.com/maps/aerial>).

1750 m near Chirimoyo town – Piura region, on 17 May 2018 (Figure 2B). Our records represent the westernmost ones and determine that the species has not been extirped from the area as BirdLife International (2018) states.

Porculla Hermit *Phaethornis porcullae*

Several observations by ISS, RBG, AB, and AU between 1250 and 1948 m, mainly in the dense understory. Frequently subordinated by other hummingbirds. It was more common in lower areas. This species is distributed between Loja province

–Ecuador and Lambayeque region – Peru. The plumage of *P. porcullae* (Figure 3D) is recognizable paler than that of *P. griseogularis zonura* (Figure 3C), which has been recorded in the Huancabamba-Chamaya river sub-basin (del Hoyo, Elliott, et al., 2019).

Grey-chinned Hermit *Phaethornis griseogularis zonura*

ISS photographed an adult in understory next to a trail above Pucará – Cajamarca region, on 22 March 2017 (Figure 3C). It appears to be rare in this region, no other records were

obtained from nearby localities, even in different visits. Maybe nomadic.

Amazilia Hummingbird *Amazilia amazilia leucophoea*

Fairly common in most of the surveyed areas. Frequently observed on the east side of the Porculla Pass, e.g., Chirimoyo – Piura region at 1750m (Figure 2D) or Pomahuaca – Cajamarca region at 1100 m. This is the first documented trans-Andean record the Amazilia Hummingbird (Schulenberg et al., 2010; Weller, 2000), despite it has already been observed in other areas of the Marañón valley in numerous occasions between 800-2650 m (ISS and LMV, personal communication).

Plumbeous Rail *Pardirallus sanguinolentus tschudii*

Common in small in anthropogenic flooded grasslands and riparian vegetation near Sónдор. Several observed and heard by ISS, AU, DAB, and AB at 1760-1900 m. The species tends to occur in a wide elevational range, including highlands up to 4000 m. Therefore, there was a possibility that the coastal subspecies *simonsi* would be reported as trans-Andean taxa. However, the subspecies *tschudii* was confirmed thanks to a juvenile photographed (Figure 4A), on February 19, 2014, following the descriptions of Schulenberg et al. (2010).

Maranon Antshrike *Thamnophilus shumbae*

This taxon was previously placed within *T. bernardi* as a subspecies. Now, it has been elevated as a species category, restricted to the Marañón valley (del Hoyo, Elliott, et al., 2019; Schulenberg et al., 2010). It is considered as Data Deficient according to the last version of the IUCN on 26 July 2019 (BirdLife International, 2019c). ISS photographed a female (Figure 4E) moving between *Acacia macracantha* relicts at 1733 m, Tacarpo – Piura region, on 9 August 2014. This record extends the distribution of the species 80 km to the northwest and 733 m above previous records in Jaén vicinity – Cajamarca region (del Hoyo, Collar, & Kirwan, 2019; Schulenberg et al., 2010; Sullivan, Wood, Iliff, et al., 2009).

Short-tailed Field-tyrant *Muscigralla brevicauda*

Common in open habitats in lowland and arid inter-Andean valleys (del Hoyo, Elliott, et al., 2019; Schulenberg et al., 2010; Ugaz & Saldaña, 2014). The trans-Andean status of the Short-tailed Field-tyrant has been previously documented in the literature, with several records in the Marañón Valley in Jaén vicinity – Cajamarca region, up to 1200 – 1500 m (del Hoyo, Elliott, et al., 2019; Schulenberg et al., 2010; Sullivan et al., 2009). ISS photographed this species at 1670 m at Tacarpo – Piura region (Figure 5B) and observed many others inhabiting the dry scrubland and open areas of Huancabamba-Chamaya river sub-basin up to 1750 m.

Piura Chat-Tyrant *Ochthoeca piurae*

One individual observed perching and flying over the bushes at 2125 m on the west side of the Cuello de Porculla town – Piura region, on 12 June 2016 (Figure 6C). This locality is one of the northernmost areas where the species has been regularly recorded (Farnsworth & Langham, 2019).

Vermilion Flycatcher *Pyrocephalus rubinus piurae*

This subspecies is supposed to be replaced by *P. rubinus ardens* in areas of the Marañón river basin (Farnsworth, Lebbin, & Kirwan, 2019). The observations made by ISS, AU,

AB, and DAB throughout the entire evaluated elevational range. Nevertheless, our records show that the subspecies *piurae* occurs on the eastern side of the Porculla Pass. All the females that we have observed on the Huancabamba-Chamaya river sub-basin have the pale plumage of *piurae* (Figure 6B) instead of the brighter orange tones on belly and crown that *ardens* has.

Slaty Becard *Pachyramphus spodiurus*

This Tumbesian Region endemic is rather uncommon, very local, and probably often overlooked. Its forest habitat has been nearly destroyed, and severely fragmented as a result of timber extraction and livestock grazing (del Hoyo, Elliott, et al., 2019). AU photographed an adult male at 1026 m (Figure 2) above Paipay – Lambayeque region, on 21 March 2017 (Figure 6E). This represents a new locality, in addition to the other approximately 29 to 31 previously known in its fragmented distributional range (Best & Kessler, 1995; del Hoyo, Elliott, et al., 2019; IUCN, 2019; Parker et al., 1985).

Maranon Thrush *Turdus maranonicus*

ISS and AU observed and photographed an individual on two occasions at 1036 m near Pucará – Cajamarca region, on 11 April 2015 (Figure 8D), where it appears to be uncommon. ISS observed one in flight at the same locality the next day. This species is fairly common in forested lower areas of Marañón valley (del Hoyo, Elliott, et al., 2019).

Grey-winged Inca-finch *Incapiza ortizi*

Two individuals observed and photographed by ISS at 2170 m on the Sónдор-Tabaconas highway – Piura region, on 19 May 2016 (Figure 8F), and an individual photographed on 18 April 2018 in the same locality. These records confirm the documented record of Parker et al. (1985) and the unpublished record of F. Angulo from June of 2014 (Sullivan et al., 2009). The scrub and natural dry bushes of the area have been severely degraded and burned, however, the species persists. Unfortunately, we did not find other locations for this species in the Huancabamba-Chamaya river sub-basin.

Three-banded Warbler *Basileuterus trifasciatus*

ISS photographed an adult at 1700 m near Tacarpo – Piura region, on 18 May 2016. Likewise, a flock of four Three-banded Warbler, one photographed by ISS, observed among the bushes at 1750m below Chirimoyo – Piura region, on 14 April 2018 (Figure 10E). These are the first documented records of this species on the eastern slope of the Andes, where is widely replaced by *B. tristriatus*, but only in more humid habitats. The Three-banded Warbler inhabits dense vegetation in dry forests, riparian thickets, shrubby forest clearings, and well-developed second growth with dense undergrowth, mainly at 500-2000 m (Curson, 2019).

Orange-crowned Euphonia *Euphonia saturata*

ISS observed two males foraging on an inflorescence of *Agave americana* at 1742 m near to Tacarpo – Piura region, on 18 May 2016 (Figure 11A,B). Our observation is the first documented trans-Andean record, as well as, the highest in Peru (Schulenberg et al., 2010), extending its distribution 170 km to the southeast and 1000 m above from its previously known range, in the limit between Ecuador and Peru (Hilty, 2018; Schulenberg et al., 2010).

ACKNOWLEDGEMENTS

We want to thank our friends and colleagues Angel Llompert, Luis Rangel, and Jhajaira A. Soria, for helping us in the field trips. To the Brazilian Higher Education Training Program (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior [CAPES]) who granted a Ph.D. scholarship to Luis Martin Vallejos.

LITERATURE CITED

- Best, B. J., & M. Kessler.** 1995. *Biodiversity and conservation in Tumbesian Ecuador and Peru*. BirdLife International.
- BirdLife International.** 2019a. Endemic Bird Areas factsheet: Marañón Valley. <http://www.birdlife.org>
- BirdLife International.** 2019b. Endemic Bird Areas factsheet: Tumbesian region. <http://datazone.birdlife.org/eba/factsheet/47>
- BirdLife International.** 2019c. *Patagioenas oenops*. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22690302A93269030.en>.
- BirdLife International.** 2019d. Species factsheet: *Patagioenas oenops*. <http://www.birdlife.org>
- Cadena, C. D., C. A. Pedraza, & R. T. Brumfield.** 2016. Climate, habitat associations and the potential distributions of Neotropical birds: Implications for diversification across the Andes. *Revista de La Academia Colombiana de Ciencias Exactas, Físicas y Naturales*, 40(155), 275–287. <https://doi.org/10.18257/raccefyn.280>
- Ceroni Stuva, A.** 2003. Composición florística y vegetación de la cuenca La Gallega, Morropón, Piura. *Ecología Aplicada*, 2(1), 1–5.
- Curson, J.** 2019. Three-banded Warbler (*Basileuterus trifasciatus*). In J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, & E. de Juana (Eds.), *Handbook of the Birds of the World Alive*. <https://www.hbw.com/node/61550>
- del Hoyo, J., N. Collar, & G. M. Kirwan.** 2019. Marañón Antshrike (*Thamnophilus shumbae*). In J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, & E. de Juana (Eds.), *Handbook of the Birds of the World Alive*. <https://www.hbw.com/node/1343590>
- del Hoyo, J., A. Elliott, J. Sargatal, D. A. Christie, & E. de Juana.** 2018. *Handbook of the Birds of the World Alive*. <https://www.hbw.com>
- del Hoyo, J., A. Elliott, J. Sargatal, D. A. Christie, & E. de Juana.** 2019. *Handbook of the Birds of the World Alive*. <https://www.hbw.com>
- Farnsworth, A., & G. Langham.** 2019. Piura Chat-tyrant (*Ochthoeca piurae*). In J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, & E. de Juana (Eds.), *Handbook of the Birds of the World Alive*. <https://www.hbw.com/node/57407>
- Farnsworth, A., D. Lebbin, & G. M. Kirwan.** 2019. Common Vermilion Flycatcher (*Pyrocephalus rubinus*). In J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, & E. de Juana (Eds.), *Handbook of the Birds of the World Alive*. <https://www.hbw.com/node/57383>
- Hilty, S.** 2018. Orange-crowned Euphonia (*Euphonia saturata*). In J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, & E. de Juana (Eds.), *Handbook of the Birds of the World Alive*. <https://www.hbw.com/node/61789>
- Hoorn, C., F. Wesselingh, H. Steege, M. A. Bermudez, A. Mora, J. Sevink, ... A. Antonelli.** 2010. Amazonia through time: Andean uplift, climate change, landscape evolution and biodiversity. *Science*, 330, 927–931. <https://doi.org/10.1126/science.1194585>
- IUCN.** 2019. The IUCN Red List of Threatened Species. Version 2019-1. ISSN 2307-8235. <https://www.iucnredlist.org/>
- Linares-Palomino, R.** 2006. Phytogeography and floristics of seasonally dry tropical forests in Peru. *Neotropical Savannas and Seasonally Dry Forests. Plant Diversity, Biogeography and Conservation*, (May 2006), 257–280. <https://doi.org/doi:10.1201/9781420004496.ch11>
- Linares-Palomino, R., L. P. Kvist, Z. Aguirre-Mendoza, & C. Gonzales-Inca.** 2010. Diversity and endemism of woody plant species in the Equatorial Pacific seasonally dry forests. *Biodiversity and Conservation*, 19(1), 169–185. <https://doi.org/10.1007/s10531-009-9713-4>
- Linares-Palomino, R., R. T. Pennington, & S. Bridgewater.** 2003. The phytogeography of the seasonally dry tropical forests in Equatorial Pacific South America. *Candollea*, 58(2), 473–499.
- Marcelo-Peña, J., I. Huamantupa, T. Särkinen, & M. Tomazello.** 2016. Identifying Conservation Priority Areas in the Marañón Valley (Peru) Based on Floristic Inventories. *Edinburgh Journal of Botany*, 73(01), 95–123. <https://doi.org/10.1017/S0960428615000281>
- Myers, N., R. A. Mittermeier, C. G. Mittermeier, G. A. B. da Fonseca, & J. Kent.** 2000. Biodiversity hotspots for conservation priorities. *Nature*, 403(6772), 853–858. <https://doi.org/10.1038/35002501>
- Oswald, J. A., I. Overcast, W. M. Mauck, M. J. Andersen, & B. T. Smith.** 2017. Isolation with asymmetric gene flow during the nonsynchronous divergence of dry forest birds. *Molecular Ecology*, 26(5), 1386–1400. <https://doi.org/10.1111/mec.14013>
- Parker, T. A., T. S. Schulenberg, G. R. Graves, & M. J. Braun.** 1985. The avifauna of the Huancabamba region, Northern Peru. *Ornithological Monographs*, (36), 169–197.
- Rasal Sánchez, M., J. Troncos Castro, C. Lizano Durán, O. Parihuamán Granda, D. Quevedo Calle, C. Rojas Idrogo, & G. E. Delgado Paredes.** 2011. Edaphic characteristics and floristic composition of the seasonally dry forest la menta and timbes, Piura Region, Peru. *Ecología Aplicada*, 10(2), 61–74.
- Schulenberg, T. S., D. F. Stotz, D. F. Lane, J. P. O'Neill, & T. A. Parker III.** 2010. *Birds of Peru* (Revised version). Princeton University Press.
- Singh, J. S., & R. K. Chaturvedi.** 2018. Tropical dry deciduous forest: Research trends and emerging features. <https://doi.org/10.1007/978-981-10-7260-4>
- Sullivan, B. L., C. L. Wood, M. J. Iliff, R. E. Bonney, D. Fink, & S. Kelling.** 2009. eBird: A citizen-based bird observation network in the biological sciences. *Biological Conservation*, 142(10), 2282–2292. <https://doi.org/10.1016/j.biocon.2009.05.006>
- Ugaz, A., & I. S. Saldaña.** 2014. *Aves de Piura* (First edition). Emdecosege S.A.
- Weigend, M.** 2002. Observations on the Biogeography of the Amotape-Huancabamba Zone in Northern Peru. *The Botanical Review*, 68(1), 38–54. [https://doi.org/10.1663/0006-8101\(2002\)068\[0038:OOTBOT\]2.0.CO;2](https://doi.org/10.1663/0006-8101(2002)068[0038:OOTBOT]2.0.CO;2)
- Weller, A. A.** 2000. Biogeography, geographic variation and habitat preference in the Amazilia Hummingbird, *Amazilia amazilia* Lesson (Aves: Trochilidae), with notes on the status of *Amazilia alticola* Gould. *Journal Fur Ornithologie*, 141(1), 93–101. <https://doi.org/10.1046/j.1439-0361.2000.00082.x>

Table 2. Continue.

Species	Status	West side of Porculla Pass (w)											East side of Porculla Pass (e)																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Thaumastura cora</i>		x	x																												
<i>Pardirallus sanguinolentus tschudii</i>				x																											
<i>Pardirallus sanguinolentus simonsi</i>																															
<i>Cathartes aura jota</i>		x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Coragyps atratus foetens</i>		x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Accipiter striatus</i>																															
<i>Buteogallus urubitinga</i>																															
<i>Buteogallus solitarius</i>		x																													
<i>Buteo albonotatus</i>																															
<i>Geranoaetus melanoleucus australis</i>																															
<i>Geranoaetus polyosoma*</i>		x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Rupornis magnirostris*</i>																															
<i>Parabuteo unicinctus harrisi</i>		x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Glaucidium peruanum</i>		x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Megascops roboratus pacificus</i>																															
<i>Colaptes atricollis peruvianus</i>	P	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Colaptes rubiginosus rubripileus</i>		x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Dryobates fumigatus</i>		x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Picumnus sclateri porcullae</i>	45	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Falco femoralis pichincae</i>																															
<i>Falco peregrinus*</i>																															
<i>Falco sparverius peruvianus</i>																															
<i>Forpus coelestis</i>	45	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Psittacara erythrogenys</i>	NT, 045	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Psittacara frontatus*</i>	NT	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Thamnophilus bernardi</i>	45	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Thamnophilus shumbae</i>	DD, 048, P																														
<i>Thamnophilus zarumae palambiae</i>	45																														
<i>Grallaria squamigera*</i>																															
<i>Grallaria guatemalensis regulus</i>																															
<i>Grallaria ruficapilla*</i>																															
<i>Scytalopus latrans subcinereus</i>																															
<i>Cranioleuca antisiensis palambiae</i>																															
<i>Clibanornis erythrocephalus palambiae</i>	VU, 045	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Furnarius cinnamomeus</i>																															
<i>Synallaxis azarae*</i>																															
<i>Syndactyla ruficollis</i>	VU, 045	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Melanopareia elegans paucaensis</i>																															
<i>Anairetes flavirostris huancabambae</i>	45	x	x	x	x	x	x	x	x	x	x	x	x																		
<i>Agriornis montana*</i>																															

Table 2. Continue.

Species	Status	West side of Porculla Pass (w)										East side of Porculla Pass (e)																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
<i>Camptostoma obsoletum*</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Contopus punensis</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Elaenia albiceps*</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Elaenia chiriquensis albivertex</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Euscarthmus fulviceps</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Knipolegus poecilurus peruanus</i>																																	
<i>Lathrotriccus griseipectus</i>	VU, 045, 048	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Mecocerculus calopterus</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Mionectes striatocollis</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Muscigralla brevicauda</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Myiarchus tuberculifer atriceps</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Myiarchus phaeocephalus phaeocephalus</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Myiodinastes bairdii</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Myiopagis subplacens</i>	45	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Myiophobus crypterythrus</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Myiotheretes striatocollis</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Ochthoeca piurae</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Phaeomyias tumbezana*</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Pyrocephalus rubinus piurae</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Sayornis nigricans angustirostris</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Tolmomyias sulphureus aequatorialis</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Tyrannus melancholicus melancholicus</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Pachyrhamphus spodiurus</i>	EN, 045	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Pachyrhamphus homochrous homochrous</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Pachyrhamphus albogriseus salvini</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Cyclarhis gujanensis saturata/contrerasi</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Cyclarhis gujanensis virenticeps</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Vireo olivaceus*</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Cyanocorax mystacalis</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Cyanocorax yncas longirostris</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Orochelidon murina</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Progne chalybea</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Pygochelidon cyanoleuca</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Campylorhynchus fasciatus fasciatus</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Cantorchilus superciliosus baroni</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Pheugopedius paucimaculatus</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Pheugopedius sclateri</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Troglodytes aedon*</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Polioptila maior</i>	048, P	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Polioptila plumbea bliineata</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 2. Continue.

Species	Status	West side of Porculla Pass (w)										East side of Porculla Pass (e)																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
<i>Turdus chiguanco</i>								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
<i>Turdus fuscater</i>																																	
<i>Turdus nigriceps</i>	Ma																																
<i>Turdus reevei</i>	45	x	x	x	x																												
<i>Turdus maranonicus</i>	48																																
<i>Mimus longicaudatus</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Asemospiza obscura pauper</i>																																	
<i>Catamenia analis analoides</i>																																	
<i>Coereba flaveola intermedia</i>		x	x	x	x	x																											
<i>Coereba flaveola magnirostris</i>																																	
<i>Conirostrum cinereum littorale</i>																																	
<i>Corydospiza alaudina*</i>																																	
<i>Coryphospingus cucullatus fargoi</i>																																	
<i>Diglossa sitoides decorata</i>																																	
<i>Geospizopsis plebejus ocularis</i>		x																															
<i>Incaspiza ortizi</i>	VU, 048, P																																
<i>Pipraeidea darwini</i>																																	
<i>Poospiza hispaniolensis</i>		x																															
<i>Saltator striatipectus immaculatus</i>		x	x	x	x	x																											
<i>Saltator striatipectus peruvianus</i>																																	
<i>Saltator nigriceps</i>	45																																
<i>Sicalis flaveola valida</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Sicalis luteola bogotensis</i>																																	
<i>Sporathraupis cyanocephala cyanocephala</i>																																	
<i>Sporophila luctuosa</i>																																	
<i>Sporophila simplex</i>	45	x																															
<i>Sporophila nigricollis inconspicua</i>																																	
<i>Tangara episcopus quoesita</i>		x	x	x	x	x																											
<i>Tangara episcopus caerulea</i>																																	
<i>Tangara viridicollis</i>																																	
<i>Thlypopsis ornata media</i>																																	
<i>Volatinia jacarina*</i>																																	
<i>Arremon assimilis*</i>																																	
<i>Arremon abeillei</i>																																	
<i>Atlapetes latinuchus latinuchus</i>																																	
<i>Atlapetes leucopterus dresseri</i>	45																																
<i>Atlapetes seebohmi*</i>	45																																
<i>Zonotrichia capensis huancabambae</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
<i>Amaurospiza moesta aequatorialis</i>																																	
<i>Piranga hepatica lutea</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	



Figure 2. A. *Metriopelia ceciliae* (east); B. *Patagioenas oenops*; C. *Amazilia franciae cyanocollis* (male); D. *Amazilia amazilia leucophaea* (east); E. *Chaetocercus mulsant* (female, east); F. *Heliomaster longirostris albicrissa*.



Figure 3. A. *Leucippus taczanowskii* (endemic); B. *Leucippus baeri*; C. *Phaethornis griseogularis zonura*; D. *Phaethornis porcellae*; E. *Colaptes atricollis peruvianus* (endemic); F. *Picumnus sclateri porcellae* (male).



Figure 4. **A.** *Pardirallus sanguinolentus simonsi* (juvenile); **B.** *Falco femoralis pichincae*; **C.** *Forpus coelestis* (female); **D.** *Thamnophilus zarumae palamblae*; **E.** *Thamnophilus shumbae* (endemic, female); **F.** *Thamnophilus bernardi* (male).



Figure 5. A. *Melanopareia elegans paucalensis* (male); B. *Muscigralla brevicauda* (east); C. *Agriornis montana*; D. *Myiopagis subplacens*; E. *Lathrotriccus griseipectus*; F. *Anairetes flavirostris huancabambae*.



Figure 6. **A.** *Pyrocephalus rubinus piurae* (east, male); **B.** *Pyrocephalus rubinus piurae* (east, female); **C.** *Ochthoeca piurae* (endemic); **D.** *Contopus punensis*; **E.** *Pachyramphus spodiurus* (male); **F.** *Pachyramphus homochrous homochrous* (male).



Figure 7. A. *Cyanocorax mystacalis*; B. *Pheugopedius paucimaculatus*; C. *Polioptila maior* (endemic, male); D. *Polioptila maior* (endemic, female); E. *Polioptila plumbea bilineata* (male); F. *Polioptila plumbea bilineata* (female).



Figure 8. A. *Cyclarhis gujanensis saturata/contrerasi*; B. *Cyclarhis gujanensis virenticeps*; C. *Turdus reevei*; D. *Turdus maranonicus*; E. *Coereba flaveola magnirostris*; F. *Incaspiza ortizi* (endemic).



Figure 9. A. *Saltator striatipectus peruvianus*; B. *Saltator striatipectus immaculatus*; C. *Sicalis luteola bogotensis*; D. *Sporophila nigricollis inconspicua* (male); E. *Asemospiza obscura pauper*; F. *Mimus longicaudatus* (east).



Figure 10. A. *Spinus magellanicus*; B. *Tangara episcopus caerulea*; C. *Arremon abeillei*; D. *Atlapetes leucopterus dresseri*; E. *Basileuterus trifasciatus* (east); F. *Geothlypis auricularis* (east).



Figure 11. A. *Euphonia saturata* (male); B. *Euphonia saturata* (two males); C. *Euphonia chlorotica taczanowskii* (male); D. *Euphonia laniirostris hypoxantha* (male); E. The progress of deforestation in the Huancabamba-Chamaya river sub-basin.