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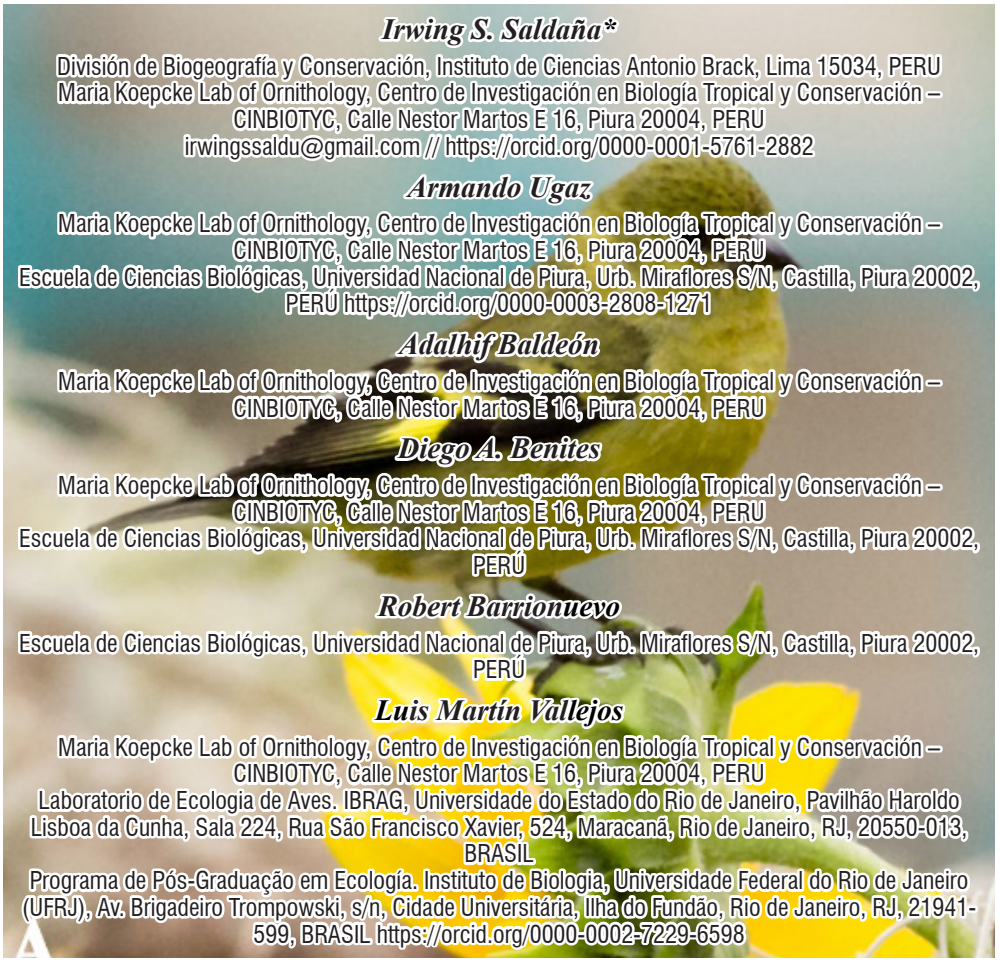
Bird diversity and noteworthy records from the western side of the Porculla Pass and the Huancabamba-Chamaya river sub-basin, northwest of Peru [with Erratum]

Diversidad de aves y registros notables del lado occidental del Abra Porculla y la sub-cuenca del río Huancabamba-Chamaya, noroeste de Perú [con Errata]



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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 170 bird taxa, belonging to 163 species and 32 families. Likewise, we reported two migratory bird species, one boreal and one austral, four endemic of Peru, and 29 restricted-range species, from which 25 belong to the Tumbesian Region, five to the Marañón Valley and one was shared between them. We highlighted the record of four trans-Andean bird taxa, *Amazilia amazilia leucophoea*, *Euphonia saturata*, *Basileuterus trifasciatus*, and *Pyrocephalus rubinus piurae*, as well as, the remarkable records of *Patagioenas oenops*, *Pachyramphus spodiurus*, *Turdus maranonicus*, *Incaspiza ortizi*, and the record of *Thamnophilus bernardi* at the east slope of the Andes (east of Porculla Pass).

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

Resumen

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 170 taxa de aves, pertenecientes a 163 especies y 32 familias. Así mismo, se registró dos especies migratorias, una boreal y una austral, cuatro endémicas de Perú, y 29 aves de rango restringido, de los cuales 25 pertenecen a la Región Tumbesina, cinco al Valle del Marañón, y una compartida entre ellas. Resaltamos el registro trans-Andino de cuatro taxa de aves, *Amazilia amazilia leucophoea*, *Euphonia saturata*, *Basileuterus trifasciatus*, y *Pyrocephalus rubinus piurae*, así como los registros destacables de *Patagioenas oenops*, *Pachyramphus spodiurus*, *Turdus maranonicus*, *Incaspiza ortizi*, y el registro de *Thamnophilus bernardi* en la vertiente oriental de los Andes (este del Abra Porculla).

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

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Introduction

The seasonally dry tropical forest (SDTF) of the southwest of Ecuador and northwest of Peru (Equatorial SDTF) has an outstanding level of endemicity 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)5-6 dry months within the annual cycle, and nutrient-poor soil. Several terms have been used for this vegetation type such as seasonally dry tropical forest (SDTF. 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)5-6 dry months within the annual cycle, and nutrient-poor soil. Several terms have been used for this vegetation type such as seasonally dry tropical forest (SDTF. 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 of the Andes (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 division (Linares-Palomino, 2006; Linares-Palomino, Pennington, & Bridgewater, 2003; Weigend, 2002).

In terms of endemism, in the same way as with the ecoregions, the western and eastern side of the Porculla pass belong to a different endemic bird area (EBA): the Tumbesian Region (EBA 045) and the Marañón Valley (EBA 048), respectively (BirdLife International, 2019b, 2019a). Globally, very few EBAs have the same amount of restricted-range bird species as the Tumbesian Region (55 species) and the Marañón Valley (22 species) (BirdLife International, 2019b, 2019a; Ugaz & Saldaña, 2014). However, the survival of these birds are worryingly supported by small fragments of dry forests and scrub remaining in the area, mainly 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 this area has received. The last scientific report about the avian diversity of this area has been published 35 years ago 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 rest 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

Porculla pass area lies on the north 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 *Loxopterigium 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 from cloud forest to dense montane scrub, with species such as *Oreocallis grandiflora*. The eastern side streams create 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 (Figure 1b, Marcelo-Peña et al. 2016). The vegetation, dominated by *Acacia macracantha*, is quite scattered, even more opened as one descends the elevational gradient.

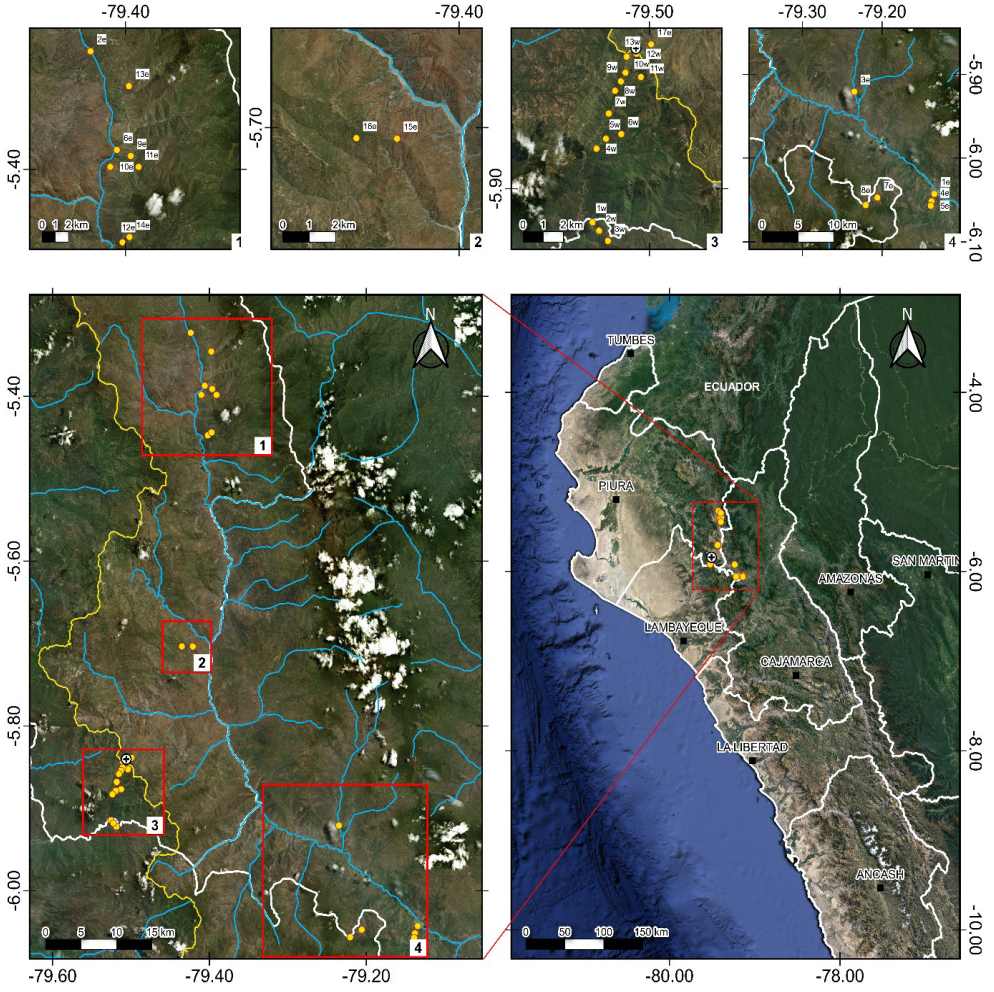

Fig. 1. Location map of the study area. Yellow circles: bird evaluation localities on both sides of Porculla pass. White circle with black cross inside: Porculla pass (5°50′25.26″S, 79°30′21.71″W). Yellow line: watershed separating the Pacific basin (west) from the Amazon basin (east). Light-blue lines: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

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). The project's goal is to compile and update the 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 official taxonomy for South American Classification Committee (SACC; Remsen, Areta, Cadena, et al., 2019) and the descriptions published in the literature (Angulo, Palomino, Arnal-Delgado, et al., 2008; del Hoyo, Elliott, Sargatal, et al., 2018; Schulenberg, Stotz, Lane, et al., 2010; Ugaz & Saldaña, 2014).

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 Tuluce	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

Species accounts

We recorded 170 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 erythropthalmus*), and one austral migratory Slaty Thrush (*Turdus nigriceps*). Likewise, we reported one vagrant species Orange-crowned Euphonia (*Euphonia saturata*, ***Figure 11***A,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 four endemic species of Peru and 29 restricted-range species, from which five 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, one Endangered (EN), six Vulnerable (VU), and three Near Threatened (NT; Table 2). We obtained four previously undocumented

new records 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 abeillei 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).

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 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.

Black-billed Cuckoo *Coccyzus erythropthalmus*

ISS observed on 18 March 2017 an individual flying over a 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 dry habitats of Marañón valley.

Gray-chinned Hermit *Phaethornis griseogularis*

Several observations by ISS, RBG, ABC, and AU between 1250 and 1948 m, mainly in the dense understory on the western side of the Porculla Pass. ISS photographed an adult in understory next to a trail above Pucará – Cajamarca region, on 22 March 2017 (Figure 3C). Frequently subordinated by other hummingbirds. It was more common in lower areas of the Pacific slope. This species is distributed between Loja province –Ecuador and Lambayeque region – Peru. The record of *P. griseogularis* on the eastern slope require more evidence to elucidate the which subspecies – *P. g. porcullae* o *P. g. zonura* – occur there.

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).

Collared Antshrike *Thamnophilus bernardi*

ISS photographed a male juvenile (Figure 4E) moving between *Acacia macracantha* relicts at 1733 m, Tacarpo – Piura region, on 9 August 2014. Despite the lack of evidence to determine which subspecies of *T. bernardi* occur on the eastern slope of the Porculla Pass, this record is interesting because on either case it could clarify the trans-Andean status of western *T. b. bernari*, or it could represent the westernmost record of the less-known, Marañón endemic subspecies *T. b. shumbae* (del Hoyo, Collar, & Kirwan, 2019). There is necessary to perform more detailed fieldwork to demonstrate which is the case here.

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, Wood, Iliff, 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* (endemic)

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). 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 (Farnsworth et al., 2019; Schulenberg et al., 2010).

Slaty Becard *Pachyramphus spodiurus*

This Tumbesian Region's 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 *Incaspiza ortizi* (endemic)

Two individuals observed and photographed by ISS at 2170 m on the Sóndor-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 Huancamaba-Chamaya river sub-basin, on the east slope of the Porculla Pass.

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).

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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.

Conflict of interest disclosure

The authors declare that they have no conflict of interest.

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Appendix

Table 2. Species checklist of the birds recorded on both sides of the Porculla pass. Abbreviations: P, endemic of Peru; Va, vagrant species; †, reported only by Parker et al. (1985); *, subspecies not identified; 045, restricted to EBA Tumbesian Region; 048, restricted to EBA Marañón Valley; Ma, austral migrant; Mb, boreal migrant.

		West side of Porculla pass (w)													East side of Porculla pass (e)																
Species	**Status**	**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**
Nothoprocta pentlandii				x					x				x																		
Columba livia						x								x																	
Columbina cruziana		x	x	x	x	x	x		x	x		x	x	x	x	x	x		x				x				x			x		x
Columbina buckleyi			x																		x	x									
Leptotila verreauxi		x	x	x		x	x		x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Leptotila ochraceiventris	VU, 045						x																								
Metriopelia ceciliae										x				x	x			x		x				x	x						x
Patagioenas fasciata												x	x	x											x		x				
Patagioenas oenops	VU, 048																									x		x			
Zenaida auriculata		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	
Zenaida meloda		x	x	x	x	x	x	x	x	x	x																				
Coccyzus erythropthalmus	Mb																			x											
Coccyzus melacoryphus†	Ma															x															
Crotophaga sulcirostris		x	x	x	x				x	x	x		x	x	x	x	x	x	x				x		x	x			x	x	
Piaya cayana nigricrissa						x	x		x			x	x																		

Piaya cayana mesura																				x	x										
Tapera naevia		x		x	x	x		x			x			x		x	x	x	x	x	x	x	x			x	x	x		x	
Aeronautes montivagus												x		x	x			x						x					x		x
Chaetura brachyura	45			x		x					x			x																	
Streptoprocne rutila							x				x	x		x		x							x		x	x	x	x	x	x	x
Streptoprocne zonaris												x		x										x			x			x	x
Amazilia amazilia leucophaea		x	x		x	x		x	x		x				x		x	x		x						x		x			
Amazilia franciae																				x	x	x	x	x	x	x	x	x	x		
Chaetocercus mulsant										x	x					x				x	x		x			x	x	x	x	x	
Colibri coruscans		x	x	x	x	x	x	x	x	x			x	x		x			x			x	x				x	x		x	x
Heliomaster longirostris		x	x	x	x	x		x			x		x				x	x		x			x			x		x			
Lesbia nuna													x	x		x						x						x			
Lesbia victoriae														x													x				
Thaumasius baeri	45	x	x																												
Thaumasius taczanowskii	048, P														x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
Myrmia micrura				x																											
Myrtis fanny		x			x			x		x	x			x	x		x	x	x				x	x		x			x	x	x
Patagonas gigas													x	x										x	x						
Phaethornis griseogularis	45			x	x		x							x				x													
Thaumastura cora		x	x																												

Pardirallus sanguinolentus					x										x																
Cathartes aura		x	x			x	x	x	x	x	x		x	x	x	x	x	x		x	x			x	x	x	x		x	x	x
Coragyps atratus		x	x	x	x	x		x	x		x	x	x		x	x	x	x	x			x	x	x	x	x	x	x	x	x	x
Accipiter striatus													x	x								x									x
Buteogallus urubitinga						x			x																						
Buteogallus solitarius		x																													
Buteo albonotatus							x																								
Geranoaetus melanoleucus														x			x		x					x			x				x
Geranoaetus polyosoma			x		x			x	x		x		x	x						x	x								x	x	x
Rupornis magnirostris															x		x									x					
Parabuteo unicintus		x	x				x			x									x			x			x						
Glaucidium peruanum		x			x				x	x	x								x							x	x				
Megascops roboratus			x		x						x																				
Colaptes atricollis peruvianus	P															x			x	x	x		x	x	x		x	x			
Colaptes rubiginosus		x	x	x		x	x	x	x	x		x																			
Dryobates fumigatus												x	x															x			
Picumnus sclateri	45	x	x	x	x	x	x		x			x		x																	
Falco femoralis																								x							

Falco peregrinus							x				x						x														x
Falco sparverius					x			x		x		x	x	x	x	x	x	x	x	x		x		x	x		x	x	x		x
Forpus coelestis	45	x	x		x		x	x						x	x		x	x	x												
Psittacara erythrogenys	NT, 045			x					x	x		x																			
Psittacara wagleri	NT			x						x		x							x		x					x					
Thamnophilus bernardi	45	x																x		x											
Thamnophilus zarumae	45											x	x	x																	
Grallaria squamigera							x					x																			
Grallaria guatimalensis									x																						
Grallaria ruficapilla		x		x	x	x		x	x	x	x	x	x	x					x		x	x			x	x		x			
Scytalopus latrans														x																	
Cranioleuca antisiensis									x	x	x																			x	
Clibanornis erythrocephalus	VU, 045		x																												
Furnarius cinnamomeus		x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Synallaxis azarae										x	x	x	x	x							x	x								x	x
Syndactyla ruficollis	VU, 045			x			x	x				x		x																	
Melanopareia elegans	45	x	x																												
Anairetes flavirostris														x															x	x	x

Agriornis montana													x	x								x			x	x	x	x		x	
Camptostoma obsoletum			x	x	x	x	x		x	x		x	x	x		x	x	x	x		x	x	x	x		x	x	x	x	x		x
Contopus punensis					x	x	x	x		x	x			x	x	x	x		x	x	x	x	x	x		x	x	x	x			
Elaenia albiceps				x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x		x	x	x		x		x	x
Elaenia chiriquensis													x																			x
Euscarthmus fulviceps			x	x	x		x								x			x	x	x	x					x						
Knipolegus poecilurus																x											x					
Lathrotriccus griseipectus	VU, 048	045,					x	x		x									x													
Mecocerculus calopterus			x	x	x	x	x			x		x	x					x								x						
Mionectes striaticollis												x	x	x								x								x	
Muscigralla brevicauda			x												x	x		x		x												
Myiarchus tuberculifer												x		x								x										
Myiarchus phaeocephalus				x		x	x		x																							
Myiodynastes bairdii			x																													
Myiopagis subplacens	45		x	x	x	x	x	x	x		x																					
Myiophobus crypterythrus			x	x	x		x	x				x	x				x			x	x					x	x	x				x

Myiotheretes striaticollis												x	x								x						x		x	x
Ochthoeca piurae	NT, 045, P											x																		
Phaeomyias tumbezana	45	x		x	x		x	x		x	x	x		x												x					
Pyrocephalus rubinus piurae		x	x	x	x	x	x			x	x		x	x	x	x	x	x	x	x	x	x	x			x	x	x			x
Sayornis nigricans		x			x			x							x	x	x														
Tolmomyias sulphurescens			x		x	x																									
Tyrannus melancholicus		x	x	x	x	x	x	x	x	x		x	x		x	x	x		x	x	x	x	x		x	x	x	x	x		x
Pachyramphus spodiurus	EN, 045		x																												
Pachyramphus homochrous		x	x	x																											
Pachyramphus albogriseus					x		x		x				x	x														x			
Cyclarhis gujanensis saturata/ contrerasi																x	x		x		x	x			x						
Cyclarhis gujanensis virenticeps		x			x		x	x		x	x	x																			
Vireo olivaceus		x	x	x	x	x	x		x	x	x				x	x	x	x	x	x	x	x	x	x	x		x	x			
Cyanocorax mystacalis		x	x	x																											
Cyanocorax yncas															x			x													
Orochelidon murina														x																	x
Progne chalybea		x		x	x				x	x	x				x	x	x				x					x	x				

Pygochelidon cyanoleuca		x			x	x	x	x	x		x		x	x			x		x				x	x		x	x	x	x	x	x
Campylorhynchus fasciatus		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x
Cantorchilus superciliaris		x	x	x	x	x	x																								
Pheugopedius sclateri paucimaculatus		x	x																												
Pheugopedius sclateri sclateri																					x	x						x			
Troglodytes aedon		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x		x	x
Polioptila plumbea maior															x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Polioptila plumbea bilineata		x	x	x																											
Turdus chiguanco										x	x		x	x		x				x		x		x	x		x	x	x	x	x
Turdus fuscater													x	x						x		x	x		x		x	x	x	x	x
Turdus nigriceps	Ma												x															x			
Turdus reevei	45	x	x	x	x	x																									
Turdus maranonicus	48														x																
Mimus longicaudatus		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Asemospiza obscura													x	x	x	x	x	x			x		x				x	x		x	
Catamenia analis														x						x			x	x			x	x	x	x	x
Coereba flaveola intermedia		x	x		x	x	x	x																							
Coereba flaveola magnirostris																x	x				x		x		x	x	x				

Conirostrum cinereum				x		x	x			x	x	x	x						x				x							x	x
Porphyrospiza alaudina														x		x								x		x	x				
Coryphospingus cucullatus															x																
Diglossa sittoides										x	x			x													x				x
Geospizopsis plebejus		x							x		x	x	x		x	x	x	x	x		x		x	x	x	x	x	x	x	x	x
Incaspiza ortizi	VU, 048, P																										x				
Pipraeidea bonariensis																x				x			x		x	x					
Poospiza hispaniolensis			x																												
Saltator striatipectus immaculatus		x	x	x	x	x	x																								
Saltator striatipectus peruvianus															x	x	x	x	x	x	x		x		x	x					
Saltator nigriceps	45												x	x																x	
Sicalis flaveola		x	x	x			x	x			x		x	x			x	x		x	x	x	x		x	x					
Sicalis luteola																							x	x				x			
Sporathraupis cyanocephala													x														x				
Sporophila luctuosa									x	x	x			x						x	x				x	x		x			x
Sporophila simplex	45	x									x					x															
Sporophila nigricollis																				x			x	x		x					
Tangara episcopus quaesita		x	x	x	x		x																								

Tangara episcopus caerulea														x	x	x									x						
Tangara viridicollis												x	x											x		x					
Thlypopsis ornata											x	x	x								x								x		
Volatinia jacarina					x					x				x	x	x	x	x	x												
Arremon assimilis						x		x				x													x	x					
Arremon abeillei		x	x																												
Atlapetes latinuchus latinuchus											x	x	x								x						x		x		
Atlapetes leucopterus dresseri	45								x	x	x																				
Atlapetes seebohmi	45								x				x	x																	
Zonotrichia capensis		x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Amaurospiza moesta														x																x	
Piranga flava				x	x	x		x		x	x	x	x	x		x	x				x		x		x	x	x				
Piranga rubra					x		x	x			x					x				x							x				
Pheucticus chrysogaster		x	x	x	x	x	x	x	x	x	x	x	x			x				x	x	x	x		x	x				x	
Basileuterus trifasciatus	45													x												x	x				
Geothlypis auricularis																x			x	x				x	x			x	x		
Myioborus miniatus														x														x			
Myiothlypis fraseri	45	x	x	x	x	x	x	x	x	x		x		x																	
Myiothlypis nigrocristata														x																	

		65	57	51	53	48	46	39	44	44	50	45	53	68	41	50	44	39	41	46	41	41	42	30	43	54	50	49	25	38	38
Setophaga pitiayumi			x	x	x	x	x	x	x	x	x	x	x																		
Leistes bellicosus												x				x	x												x		x
bellicosus																															
Icterus graceannae	45		x																												
Icterus mesomelas			x	x	x																										
Dives warczewiczi			x	x	x	x	x	x	x	x		x	x		x	x	x	x	x	x						x	x	x			
Molothrus bonariensis			x	x	x	x	x		x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x		
Spinus magellanicus			x	x					x		x		x	x	x			x	x				x	x		x	x	x	x	x	x
Spinus psaltria											x									x				x							
Euphonia chlorotica																x	x	x	x	x	x	x	x			x					
Euphonia laniirostris			x																												
Euphonia saturata	Va																								x						
Total		**65**	**57**	**51**	**53**	**48**	**46**	**39**	**44**	**44**	**50**	**45**	**53**	**68**	**41**	**50**	**44**	**39**	**41**	**46**	**41**	**41**	**42**	**30**	**43**	**54**	**50**	**49**	**25**	**38**	**38**

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

Fig. 3. A. *Thaumasius taczanowskii* (endemic); **B.** *Thaumasius baeri*; **C.** *Phaethornis griseogularis* (east slope); **D.** *Phaethornis griseogularis* (west slope); **E.** *Colaptes atricollis peruvianus* (endemic); **F.** *Picumnus sclateri* (male).

Fig. 4. A. *Pardirallus sanguinolentus* (juvenile); **B.** *Falco femoralis*; **C.** *Forpus coelestis* (female); **D.** *Thamnophilus zarumae*; **E.** *Thamnophilus bernardi* (female); **F.** *Thamnophilus bernardi* (male).

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

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

Fig. 7. A. *Cyanocorax mystacalis*; **B.** *Pheugopedius sclateri paucimaculatus*; **C.** *Polioptila plumbea maior* (east slope, male); **D.** *Polioptila plumbea maior* (east slope, female); **E.** *Polioptila plumbea bilineata* (male); **F.** *Polioptila plumbea bilineata* (female).

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

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

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

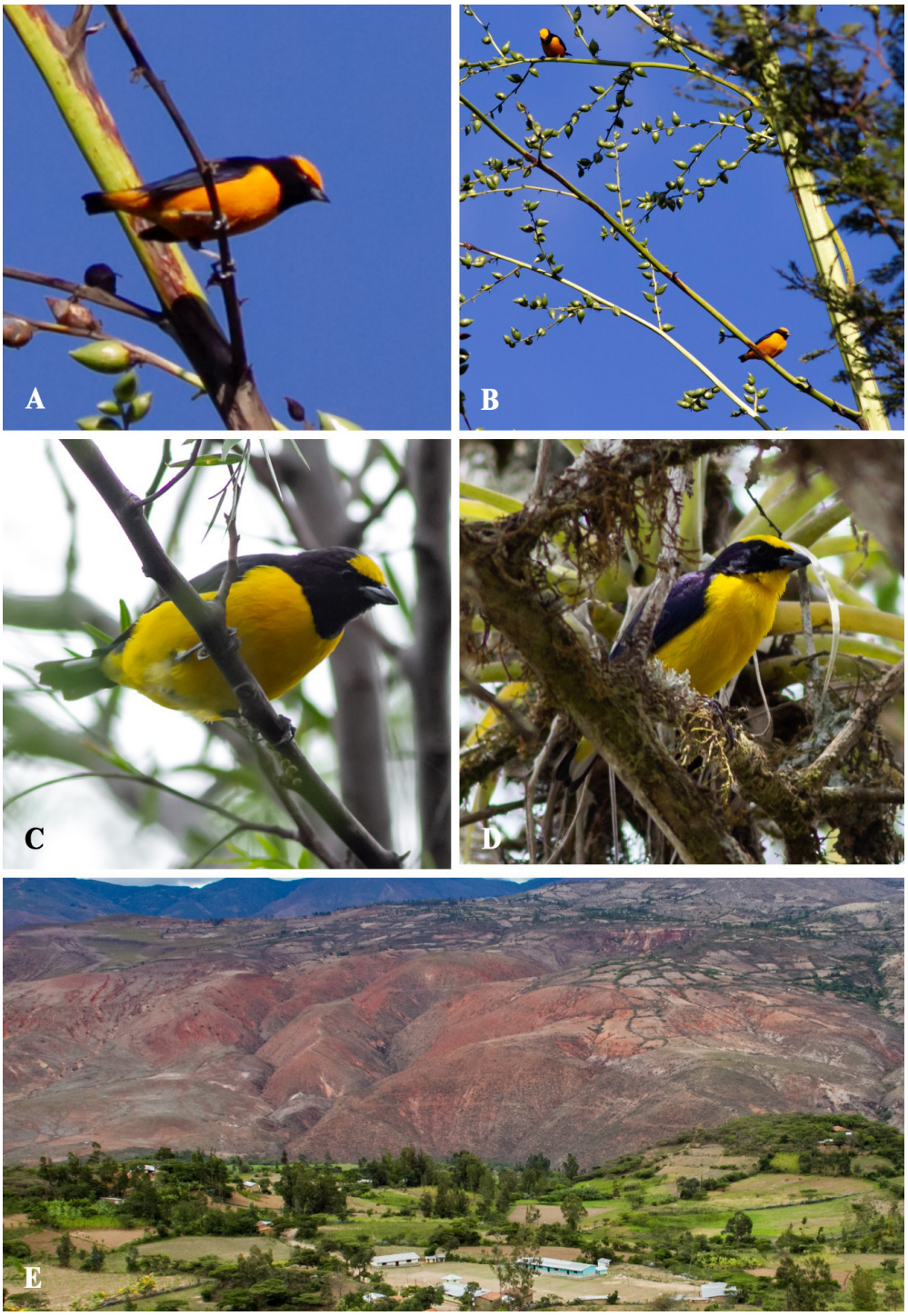

Fig. 11. A. *Euphonia saturata* (male); **B.** *Euphonia saturata* (two males); **C.** *Euphonia chlorotica* (male); **D.** *Euphonia laniirostris* (male); **E.** The progress of deforestation in the Huancabamba-Chamaya river sub-basin.