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Doryfera johannae (Bourcier, 1847) (Aves: Apodiformes: Trochilidae): new locality, range extension and notes on distribution

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Abstract: We present a new distribution map, including new locality records for the Blue-fronted Lancebill (*Doryfera johannae*) from southeast Peru. One of these records is the first physical capture record for the Madre de Dios region and supposes a range extension of ca. 470 km to the southeast. We provide notes related to the environment in which this individual was found, along with photos of the captured female from the Manu Learning Centre in the buffer zone of Manu Biosphere Reserve.

Key words: *Doryfera*, hummingbird, distribution, range extension, trochilidae

The Blue-fronted Lancebill (*Doryfera johannae)* is a hummingbird found in Brazil, Colombia, Ecuador, Guyana, Peru, and Venezuela (Avibase 2013; Stotz et al. 1996; Schuchmann 1999). Its natural habitats comprise subtropical or tropical moist lowland forests and subtropical or tropical moist montane forests, mostly along the eastern slopes of the Andes (IUCN 2013). Two subspecies are currently recognised: *D. johannae johannae* (east slope of Andes from central-eastern Colombia to central Peru) and *D. johannae guianensis* (southern Guyana, southern Venezuela and *tepuis* of adjacent northern Brazil) (Avibase 2013; Figure 1). Schulenberg et al. (2007) report its elevational range as between 500–1,400 m above sea level (a.s.l.) and its abundance in Peru as uncommon.

Within Peru, maps of distribution currently show its existence only in northern and central Peru (BirdLife International and NatureServe 2012; InfoNatura 2007; IUCN 2013; Schulenberg et al. 2007; Clements and Shany 2001), with the exception of a visual sighting and audio recording at Amazonia Lodge (071°22′32.934″ W, 012°52′12.0138″ S; 500–1050 m a.s.l.) in southeastrn Peru (Walter et al. 2006; Xeno canto 2013).

Based on a model of Amazonian deforestation, over three generations (12 years) the Blue-fronted Lancebill is expected to lose 16.2–17% of suitable habitat within its distribution (Soares-Filho et al. 2006). Based on these figures the species is predicted to decline by <25% during this time (IUCN 2013), therefore understanding more about its basic ecology and present distribution is critical for future potential conservation efforts.

The locality Mascoitania holds a research station and lodge; the Manu Learning Centre (071°23′28.06″ W, 012°47′21.849″ S, 460 m a.s.l.). The lodge is situated next to the Alto Madre de Dios River in the buffer area of Manu National Biosphere Reserve, on the eastern Andean foothills; between Manu National Park and the Amarakaeri Communal Reserve (Figure 1). Mascoitania is a 643 ha private reserve owned by The Crees Foundation, hosting tourism, research and volunteering activities. It contains areas of primary terra firme, regenerating logged, regenerating clear-felled and bamboo forest with an altitudinal gradient of approximately 460–700 m a.s.l. Over 485 species of birds have been recorded to date at the Manu Learning Centre, including 28 species from the family Trochilidae (species list available from research@crees-manu.org). All mist netting at the Manu Learning Centre was conducted under permit provided by the Ministry of Agriculture of Peru; Permit Number: 25397; Authorisation Number (Autorización No.) 2904-2012-AG-DGFFS-DGEFFS.

A map was created using presence locations of *D. johannae* as recorded in the literature (Appendix 1). Environmental factors were taken from WorldClim (version 1.4; http://www.worldclim.org; Hijmans et al. 2005) and added to the modelling program MaxEnt (version 3.3.3e; http://www.cs.princeton.edu/~schapire/maxent/; Phillips et al. 2004, 2006). No land use variables were included due to the historical nature

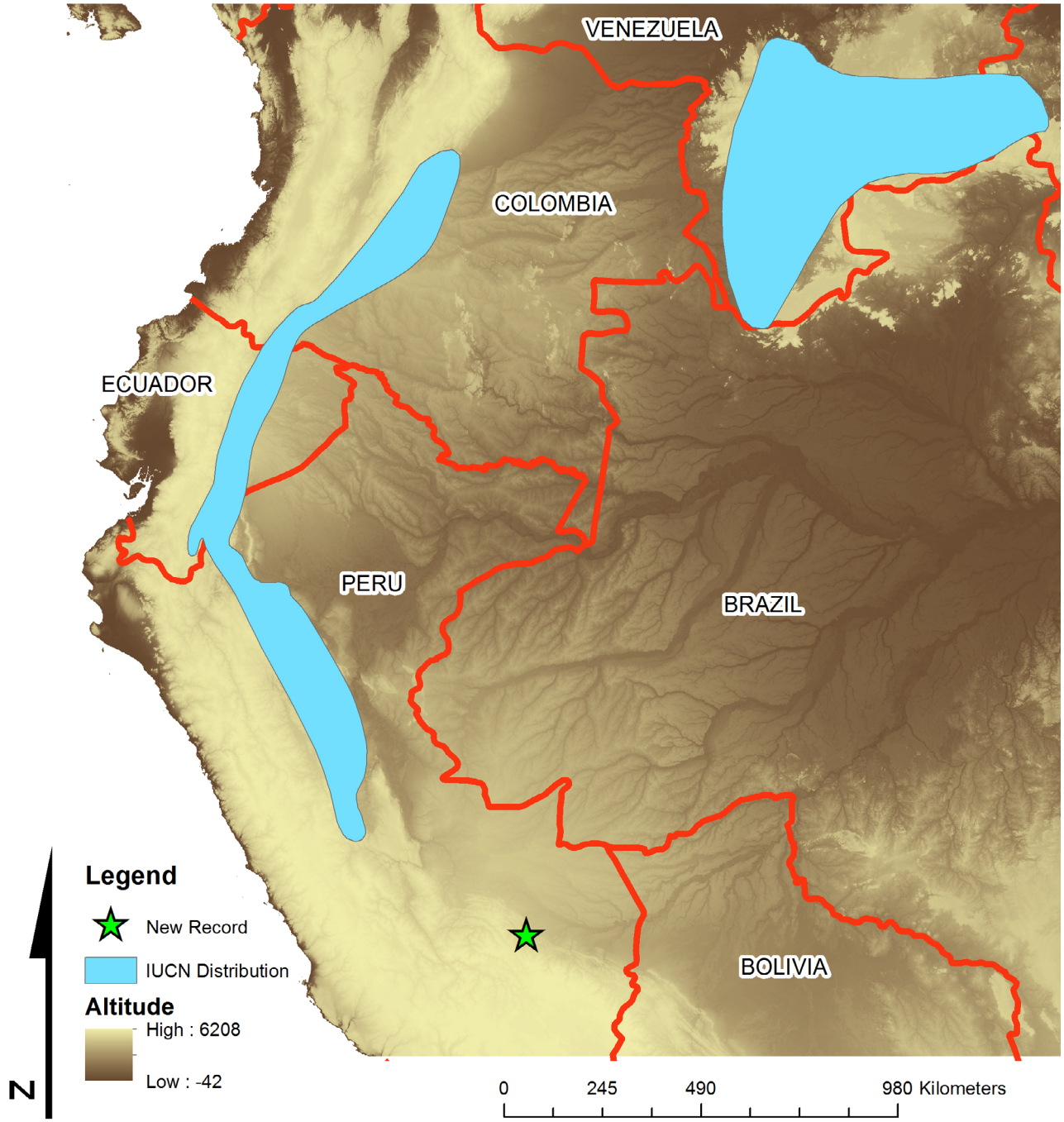

Figure 1. Map of the known distribution of *D. johannae* shaded in blue and the new locality record for *D. johannae johannae* in Peru, ca. 470 km to the southeast (shown by green star). Distribution shapefile taken from BirdLife International and NatureServe (2012).

of the presence locations. MaxEnt has been shown to perform well at low sample sizes (Hernandez et al. 2006, Raxworthy et al. 2007), such as the sample size for *D. johannae*. Five pilot models were constructed using the WorldClim data, four of which focussed on a different environmental variable (e.g., precipitation), with the fifth including all environmental variables. Variables with the highest permutation importance to each pilot model were used to construct a further model (Baldwin and Bender 2008). This model was jackknifed to assess variable importance and to identify highly correlated variables (Baldwin 2009). The final model was bootstrapped (100 replicates) to create a continuous logistic output of probability distribution.

In order to address sampling bias all models were run with a mask to limit the area used for background points by MaxEnt (Merow et al. 2013). The mask was determined by splitting the samples into two distinct groups (sample A and sample B, Figure 3). A minimum convex hull was drawn around each sample group, buffered by the observed mean distance for each group determined by running the Average Nearest Neighbor tool in ArcGIS 10 Spatial Analyst. Results from the model were then projected onto the previously masked area

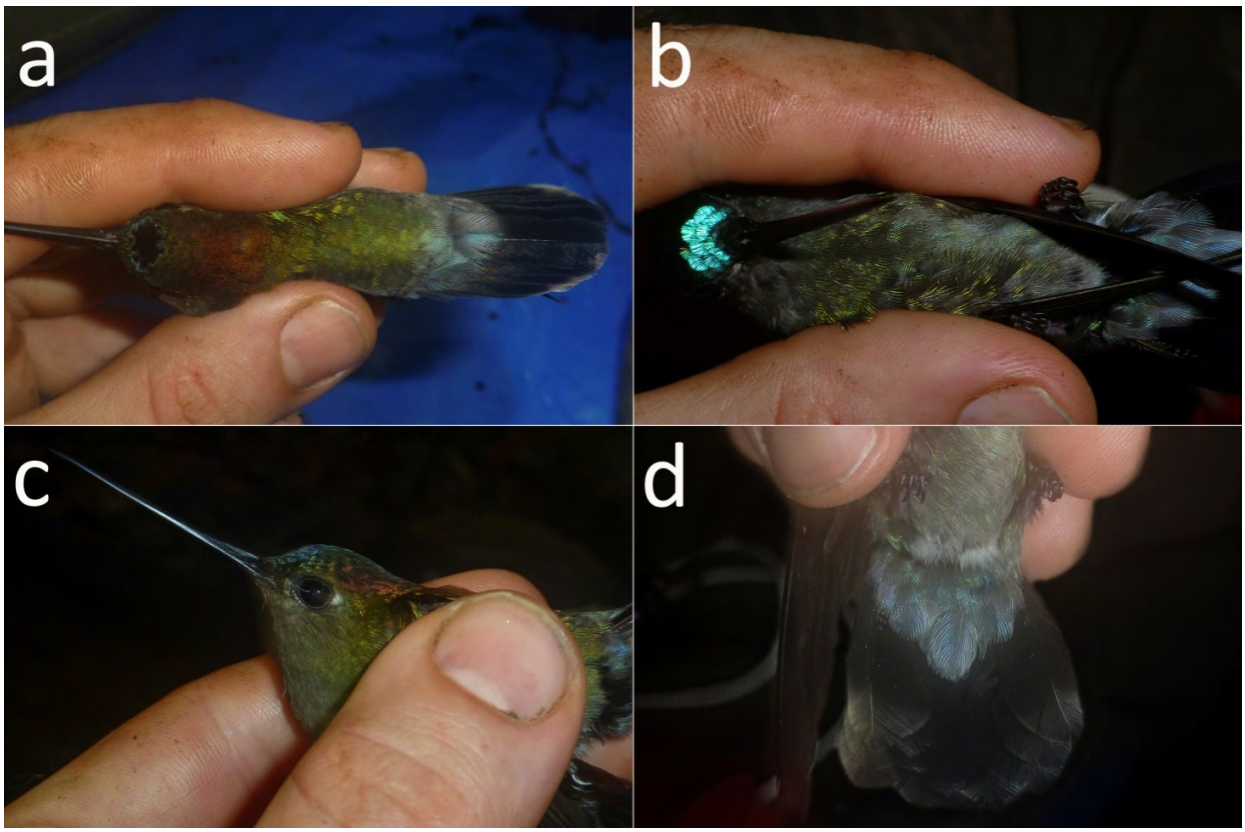

Figure 2. Photographs of the captured female individual.

using MaxEnt. To create a binary suitable/unsuitable habitat map the output was processed in ArcGIS 10 using the maximum training sensitivity plus specificity logistic threshold (Cao et al. 2013).

At 7:25 h on 2 August 2013, a female *D. johannae* was captured during a mist-netting session on the Mascoitania land (071°24′25.886″ W, 012°48′33.475″ S, 700 m a.s.l.) on the western side of the Alto Madre de Dios basin, Madre de Dios Region. It was captured in a 10 m mist-net setup heading east to west along a ridge line trail within primary forest. The bird was measured (Table 1), photographed (Figure 2) and then released.

The map in Figure 3 shows the presence locations of *D. johannae* as recorded in the literature along with the predicted distribution map created in this study. The average training area under curve (AUC) value for the replicate runs in the receiver operator characteristic (ROC) output was 0.92 in the final model, showing a very good model fit. However, there is evidence of some overprediction and it should be noted that the map shows only potential and not realised distribution (Phillips et al. 2006).

Previous maps of the distribution of *D. johannae* show the species to be present in northern and central Peru. This mist-net capture from the Mascoitania land is the first physical capture record for the Madre de Dios region and the Manu Biosphere Reserve. Along with other audio and visual records from southeast Peru our findings represent a range extension for the species from the Pasco region of central Peru to ca. 470 km to the southeast. Our map projection indicates that this species may exist even further to the southeast of Peru and into the northwest region of Bolivia. However, as there is evidence that the map may show some degree of over prediction (Phillips et al. 2006), physical verification of this predicted presence in Bolivia is needed.

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Table 1. Physical measurements (in g and mm) from the captured female

Weight	Primaries	Tail length	Total length	Culmen length	Culmen width	Culmen depth
8.5 g	52 mm	29 mm	95 mm	32.5 mm	3.1 mm	2.5 mm

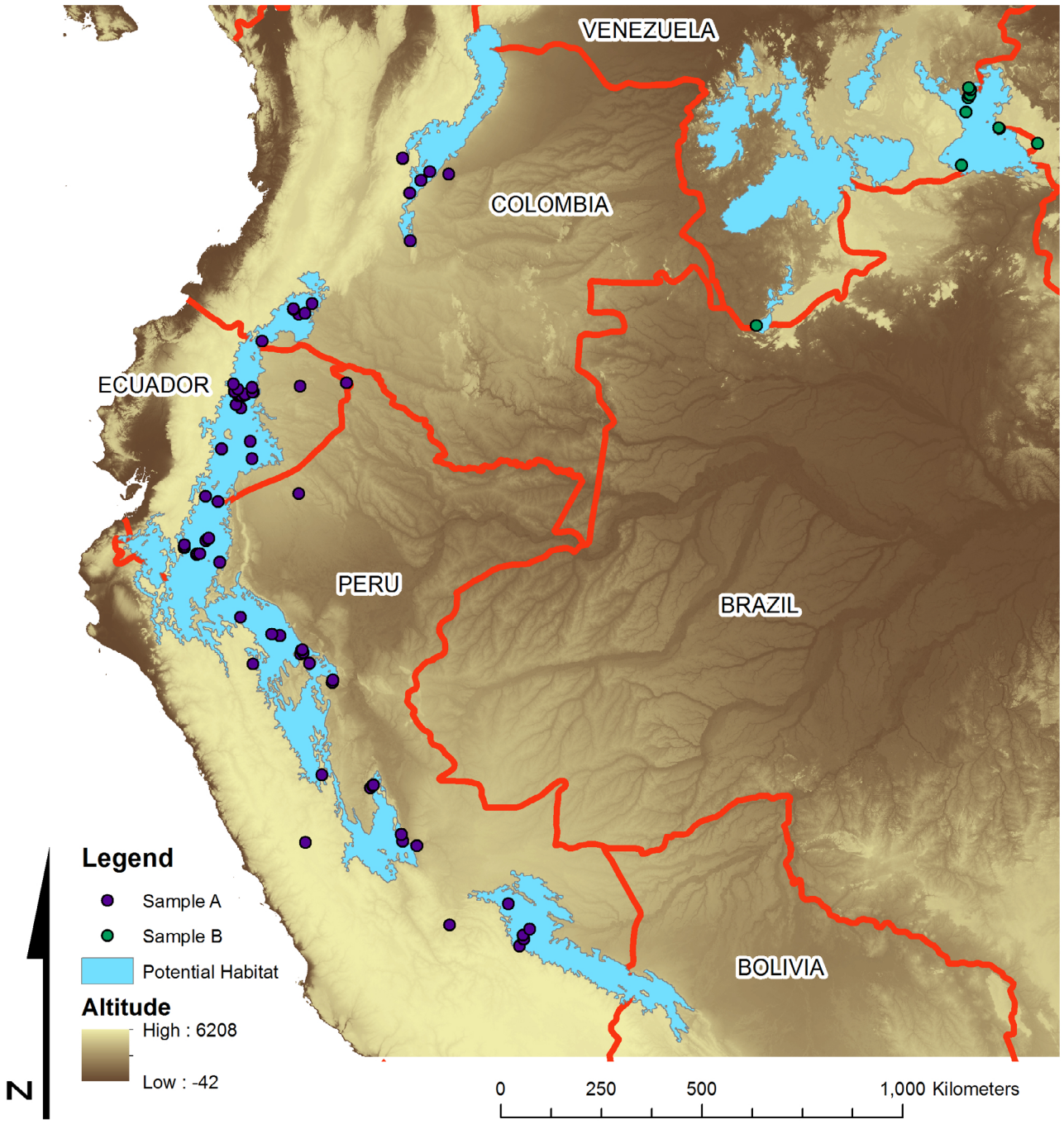

Figure 3. Known locality records of both *D. johannae johannae* (Sample A records) and *D. johannae guianensis* (Sample B records) and a map of the potential distribution; with new records from southeast Peru projecting a range extension for the species of approximately 470 km to the southeast, from the Pasco region of central Peru.

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LITERATURE CITED

Avibase 2013. Avibase – Bird checklists of the world. Accessed at http://avibase.bsc-eoc.org/checklist.jsp?lang=EN, 26 October 2013.

Baldwin, R.A. 2009. Use of maximum entropy modeling in wildlife research. Entropy 11: 854 866. doi: 10.3390/e11040854

Baldwin, R.A. and L.C. Bender 2008. Den-site characteristics of Black Bears in Rocky Mountain National Park, Colorado. Journal of Wildlife Management 72(8): 1717–1724. doi: 10.2193/2007-393

BirdLife International and NatureServe 2012. Bird species distribution maps of the world. BirdLife International, Cambridge, UK and NatureServe, Arlington, USA. Accessed at: http://www.birdlife.org/datazone/info/spcdownload, 26 October 2013.

Cao, Y., R.E. DeWalt, J.L. Robinson, T. Tweddale, L.Hinz and M. Passino 2013. Using Maxent to model the historic distributions of stonefly species in Illinois streams: The effects of regularization and threshold selections. Ecological Modelling 259: 30–39. doi: 10.1016/j.ecolmodel.2013.03.012

Clements, J.F. and N. Shany 2001. A field guide to the birds of Peru. Temecula, CA: Ibis Publishing Company. 76 pp.

Hernandez, P.A., C.H. Graham, L.L. Master and Albert, D.L. 2006. The effect of sample size and species characteristics on performance of different species distribution modelling methods. Ecography 29(5): 773–785. doi: 10.1.1.307.3273

Hijmans, R.J., S.E. Cameron, J.L. Parra, P.G. Jones and A. Jarvis 2005. Very high resolution interpolated climate surfaces for global land areas. International Journal of Climatology 25: 1965–1978. doi: 10.1002/joc.1276

InfoNatura 2007. Animals and ecosystems of Latin America [web application]. Version 5.0 . Arlington, Virginia (USA): NatureServe. Accessed at http://www.natureserve.org/infonatura, 26 October 2013.

IUCN. 2013. The IUCN Red List of threatened species. Version 2013.1. Accessed at http://www.iucnredlist.org, 26 October 2013.

Merow, C., M.J. Smith and J.A. Silander Jr 2013. A practical guide to MaxEnt for modeling species' distributions: what it does, and why inputs and settings matter. Ecography 36: 1058–1069. doi: 10.1111/j.1600-0587.2013.07872.x

Phillips, S.J., M. Dudikand R.E. Schapire 2004. A maximum entropy approach to species distribution modelling; pp. 655–662, in: Proceedings of the 21st International Conference on Machine Learning. New York: ACM Press.

Phillips, S.J., R.P. Andersonand and R.E. Schapire 2006. Maximum entropy modelling of species geographic distributions. Ecological Modelling 190: 231–259. doi: 10.1016/j.ecolmodel.2005.03.026

Raxworthy, C., C. Ingram, N. Rabibisoa and R. Pearson 2007. Applications of ecological niche modeling for species delimitation: a review and empirical evaluation using day geckos (*Phelsuma*) from Madagascar. Systematic Biology 56(6): 907–923. doi: 10.1080/10635150701775111

Schuchmann, K. L. 1999. Family Trochilidae (Hummingbirds); pp. 468–680, in: J. del Hoyo, A. Elliott and J. Sargatal (eds.). Handbook of the birds of the world, volume 5: barn owls to hummingbirds. Barcelona: Lynx Edicions.

Schulenberg, T. S., D.F. Stotz, D.F.Lane, J.P. O'Neill and T.A. Parker 2007. Birds of Peru. Princeton, NJ: Princeton University Press. pp. 230.

Soares-Filho, B. S., D.C. Nepstad, L.M. Curran, G.C.Cerqueira, R.A. Garcia, C.A. Ramos, E. Voll, A. McDonald, P. Lefebvre and P.Schlesinger 2006. Modelling conservation in the Amazon basin. Nature 440(7083): 520–523. doi: 10.1038/nature04389

Stotz, D. F., J.W. Fitzpatrick, T.A. Parker and D.K. Moskovits 1996. Neotropical birds: ecology and conservation. University of Chicago Press, Chicago. pp. 246.

Walker, B., D.F. Stotz, T. Pequeño and J.W. Fitzpatrick 2006. Birds of the Manu Biosphere Reserve, pp. 23–49; in B.D. Patterson, D. F. Stotz and S. Solari (eds.). Mammals and birds of the Manu Biosphere Reserve, Peru. Fieldiana, Zoology (n.s.) 110.

Xeno canto 2013. Xeno canto – Sharing bird sounds from around the world. Accessed at http://www.xeno-canto.org, 26 October, 2013.

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Appendix 1. Known records gathered from the literature and online resources, utilised to create the new distribution map for *D. johannae*.

Date	Location	Data publisher	Dataset	Latitude	Longitude	Notes
2010	Manguriari, Peru	Robbins, M.B., D. Geale, B. Walker, T.J. Davis, M. Combe, M.D. Eaton and K.P. Kennedy. 2011. Foothill avifauna of the upper Urubamba Valley, dpto. Cusco, Peru. Cotinga 33: 34-35.		12° 33'23.8"S	073° 01'36.1"W	Currently southernmost record in Peru
Unpublished	Amazonia Hacienda Lodge, Peru			12°51'59.87"S	071°22'01.24"W	Unpublished sighting, personal communication from H. Lloyd
Unpublished	Pantiacolla Lodge, Peru	"		12°38'51.21"S	071°14'16.61"W	"
Unpublished	Manu National Park, Peru	"		12° 4'49.81"S	071°42'51.11"W	No specific location. Unpublished sighting, personal communication from H. Lloyd
Unpublished	Quita Calzones, Peru	"		13° 1'32.80"S	071°28'12.35"W	Unpublished sighting, personal communication from H. Lloyd
02/08/2011	Amazonia Hacienda Lodge, Peru	Daniel Lane (xeno-canto)		12°51'59.87"S	071°22'01.24"W	Unpublished
24/12/2009	Tunnel near Tarapato, San Martin, Peru	Andrew Spencer (xeno-canto)		06°23'52.90"S	076°19'32.21"W	"
13/06/2012	Wildsumaco, 5 km NW Guagua Sumaco, Napo, Ecuador	Scott Olmstead (xeno-canto)		00°41'14.28"S	0077°35'57.12"W	"
27/02/2011	"	Tayler Brooks (xeno-canto)		00°41'14.28"S	077°35'57.12"W	"
23/02/2011	"			00°41'14.28"S	077°35'57.12"W	"
23/02/2011	"	Tayler Brooks (xeno-canto)		00°41'14.28"S	077°35'57.12"W	"
23/02/2011	"	"		00°41'14.28"S	077°35'57.12"W	"
12/08/2011	Tepui Trail, Cabanas Yankuam, Zamora-Chinchipe, Ecuador	Andrew Spencer (xeno-canto)		04°15'52.97"S	78°41'32.36"W	"
02/10/2013	Manu Learning Centre, Peru	Alex Fowler, Crees Foundation		12°47'21.849"S	071°23'28.06"W	
04/02/2006	Bolivar, Venezuela	Cornell Lab of Ornithology (from Global Biodiversity Information Facility website)		04°26'37.38"N	061°35'14.68"W	
16/11/1991	Bolivar, Venezuela			05°37'54.28"N	061°29'00.79"W	

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Appendix 1. *Continued.*

Date	Location	Data publisher	Dataset	Latitude	Longitude	Notes
04/11/1999	Bolívar, Venezuela	Cornell Lab of Ornithology (from Global Biodiversity Information Facility website)		05°57′2.91″N	061°26′02.40″W	
13/03/1995	Bolívar, Venezuela	"		06°00′38.97″N	061°24′11.79″W	
09/03/2012	"	"		06°01′32.96″N	061°23′56.95″W	
10/03/2012	"	"		06°01′32.96″N	061°23′56.95″W	
08/01/2007	"	"		06°07′46.67″N	061°22′50.21″W	
08/01/2007	"	"		06° 7′46.67″N	061°22′50.21″W	
08/03/2007	"	"		06°10′27.96″N	061°25′32.05″W	
01/07/1969	Huanuco, Peru	"	NMNH Vertebrate Zoology Birds Collection, Smithsonian Institution	09°30′00.00″S	074°47′60.00″W	Specimen
01/07/1969	"	"	"	09°30′00.00″S	074°47′60.00″W	"
01/08/1977	Departmento Amazonas, Peru	"	MVZ Bird Collection (Arctos)	04°26′29.76″S	078°10′19.92″W	"
09/07/2010	Amazonas, Peru	"	Field Museum of Natural History (Zoology) Bird Collection	06°43′18.12″S	077°25′30.00″W	"
10/10/2008	Ucayali, Peru	"		10°40′54.12″S	074°05′15.00″W	
04/11/2008	"	"		10°31′33.24″S	074°7′04.08″W	
05/11/2008	"	"		10°31′33.24″S	074°7′04.08″W	
10/10/2008	"	"		10°40′54.12″S	074°05′15.00″W	
05/11/2008	"	"		10°31′33.24″S	074°07′4.08″W	
02/11/2008	"	"		10°31′33.24″S	074°07′4.08″W	
04/11/2008	"	"		10°31′33.24″S	074°07′4.08″W	
02/11/2008	"	"		10°31′33.24″S	074°07′4.08″W	
10/08/2006	Junin, Peru	"		10°47′09.96″S	073°46′00.12″W	
11/09/1972	Huánuco, Peru	"		09°11′53.52″S	075°53′09.96″W	
31/07/1996	Loreto, Peru	"		07°08′00.24″S	075°39′22.32″W	
03/08/1996	"	"		07°04′27.12″S	075°38′59.64″W	
06/08/1996	"	"		07°04′27.12″S	075°38′59.64″W	
02/08/1996	"	"		07°04′27.12″S	075°38′59.64″W	
08/07/1996	"	"		07°04′27.12″S	075°38′59.64″W	
09/12/2011	San Martin, Peru	"		06°03′19.44″S	0077°00′27.00″W	
21/04/2008	"	"		06° 4′59.88″S	076°49′59.88″W	
24/12/2009	"	"		06°24′24.12″S	076°20′30.12″W	
20/04/2008	"	"		06°04′59.88″S	076°49′59.88″W	
08/08/2010	"	"		06°27′32.04″S	076°17′58.20″W	
24/12/2009	"	"		06°24′24.12″S	076°20′30.12″W	
03/05/2012	"	"		05°40′26.40″S	077°42′15.84″W	
25/10/2012	Zamora-Chinchipe, Ecuador	"		04°05′13.20″S	078°57′28.08″W	
30/03/2007	"	"		04°03′12.96″S	078°57′45.36″W	
02/07/2012	"	"		04°06′28.42″S	078°57′50.04″W	
02/07/2012	"	"		04°06′28.42″S	078°57′50.04″W	
15/10/1999	"	"		04°06′33.84″S	078°57′57.24″W	
26/10/2007	"	"		04°05′13.20″S	078°57′28.08″W	
09/02/2011	"	"		04°06′30.90″S	078°57′49.66″W	
09/02/2011	"	"		04°06′30.90″S	078°57′49.66″W	
09/02/2011	"	"		04°06′30.90″S	078°57′49.66″W	
09/02/2011	"	"		04°06′30.90″S	078°57′49.66″W	

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Appendix 1. *Continued.*

Date	Location	Data publisher	Dataset	Latitude	Longitude	Notes
09/02/2011	Zamora-Chinchipe, Ecuador	Cornell Lab of Ornithology (from Global Biodiversity Information Facility website)		04°06′30.90″S	078°57′49.66″W	
04/11/1990	Zamora-Chinchipe, Ecuador	"		04°06′33.83″S	078°57′57.21″W	
22/12/2011	Morona-Santiago, Ecuador	"		02°58′14.16″S	078°29′43.44″W	
23/12/2011	Napo, Ecuador	"		00°42′53.64″S	077°43′51.96″W	
10/07/2012	"	"		00°40′31.46″S	077°36′03.68″W	
07/10/2007	"	"		00°43′32.88″S	077°39′54.36″W	
17/12/2008	"	"		00°41′41.34″S	077°41′13.52″W	
11/06/2012	"	"		00°40′36.84″S	077°35′55.68″W	
21/03/2010	"	"		00°41′03.48″S	077°36′08.28″W	
18/07/2012	"	"		00°34′15.70″S	077°45′40.32″W	
09/06/2011	"	"		00°27′02.16″S	077°51′36.36″W	
13/06/2012	"	"		00°40′36.84″S	077°35′55.68″W	
22/12/2006	"	"		00°41′41.28″S	077°41′13.56″W	
01/08/1998	"	"		00°37′22.44″S	077°50′17.16″W	
21/02/2012	"	"		00°40′36.84″S	077°35′55.68″W	
16/07/2011	"	"		00°42′59.04″S	077°45′24.48″W	
22/02/2012	"	"		00°40′37.05″S	077°35′55.82″W	
10/07/2012	"	"		00°40′31.44″S	077°36′03.60″W	
19/07/2012	"	"		00°34′15.60″S	077°45′39.96″W	
21/03/2010	"	"		00°41′03.48″S	077°36′08.28″W	
16/02/2010	"	"		00°59′21.12″S	077°41′27.96″W	
07/10/2007	"	"		00°43′32.88″S	077°39′54.36″W	
17/08/2011	"	"		00°40′36.84″S	077°35′55.68″W	
04/02/2007	Orellana, Ecuador	"		00°31′50.52″S	077°26′42.72″W	
06/09/2012	Napo, Ecuador	"		00°41′55.32″S	077°44′14.64″W	
16/08/2009	"	"		00°40′36.84″S	077°35′55.68″W	
07/10/2007	"	"		00°37′24.96″S	077°50′25.44″W	
14/02/1990	Sucumbíos, Ecuador	"		00°29′53.88″S	076°22′22.80″W	
14/02/1990	"	"		00°29′53.88″S	076°22′22.80″W	
15/10/1989	Cundinamarca, Colombia	"		04°17′31.92″N	073°28′42.60″W	
04/02/2006	Bolívar, Venezuela	"		04°26′44.16″N	061°35′13.56″W	
04/11/1999	"	"		05°57′02.88″N	061°26′02.40″W	
16/11/1991	"	"		05°37′54.48″N	061°29′00.60″W	
08/03/2007	"	"		06°10′27.84″N	061°25′31.80″W	
09/03/2012	"	"		06°1′32.88″N	061°23′56.76″W	
10/03/2012	"	"		06°1′32.88″N	061°23′56.76″W	
13/03/1995	"	"		06°0′38.88″N	061°24′11.52″W	
08/01/2007	"	"		06°7′46.56″N	061°22′50.16″W	
08/01/2007	"	"		06°7′46.56″N	061°22′50.16″W	
18/07/1994	Amazonas, Peru	"	Macaulay Library Audio and Video Collection	03°54′00.00″S	078°25′11.64″W	
14/07/1994	Upper Rio Comainas, Peru	"	Conservation International Rapid Assessment Program (RAP) Biodiversity Survey Database	03°55′01.20″S	078°25′58.44″W	
24/04/1940	Pastaza, Ecuador	"	Santa Barbara Museum of Natural History (SBMNH Vertebrate Zoology)	02°06′59.76″S	077°26′59.64″W	Specimen
16/05/1937	Region de Amazonas, Peru	"	University of Washington Burke Museum	02°54′18.36″S	076°24′09.72″W	Specimen

Continued

Appendix 1. *Continued.*

Date	Location	Data publisher	Dataset	Latitude	Longitude	Notes
	Machiyaco, Oriente, Ecuador	Cornell Lab of Ornithology (from Global Biodiversity Information Facility website)	Royal Ontario Museum Ornithology Collection	01°54′00.72″S	078°08′04.92″W	Specimen
	Machiyaco, Oriente, Ecuador	"	"	01°54′00.72″S	078°08′04.92″W	"
23/04/1936	Napo, Ecuador	"	Moore Laboratory of Zoology (MLZ Bird Collection Arctos)	01°43′58.80″S	077°28′58.80″W	"
05/05/1935	"	"	"	00°37′59.88″S	077°24′59.76″W	"
20/08/1927	"	"	"	00°54′59.76″S	077°47′59.64″W	"
26/05/1933	"	"	"	00°37′59.88″S	077°25′00.12″W	"
30/05/1935	"	"	"	00°37′59.88″S	077°25′00.12″W	"
01/05/1935	"	"	"	00°37′59.88″S	077°25′00.12″W	"
?/5/1939	"	"	"	00°37′59.52″S	077°25′59.52″W	"
07/08/1935	"	"	"	00°37′59.88″S	077°25′00.12″W	"
01/05/1935	"	"	"	00°37′59.88″S	077°25′00.12″W	"
10/03/1933	"	"	"	00°25′59.88″S	075°19′59.52″W	Specimen (Coordinates fall outside specified country, territory or island)
10/05/1923	"	"	"	00°25′59.88″S	075°19′59.52″W	"
10/03/1933	"	"	"	00°25′59.88″S	075°19′59.52″W	"
15/03/1933	"	"	"	00°25′59.88″S	075°19′59.52″W	"
15/03/1933	"	"	"	00°25′59.88″S	075°19′59.52″W	"
15/03/1933	"	"	"	00°25′59.88″S	075°19′59.52″W	"
13/03/1933	"	"	"	00°25′59.88″S	075°19′59.52″W	"
20/03/1933	"	"	"	00°25′59.88″S	075°19′59.52″W	"
01/09/1998	Nariño, Colombia	"	Instituto de Investigacion de Recursos Biologicos Alexander von Humboldt (Aves de Colombia coleccion)	00°30′06.84″N	077°13′42.60″W	Specimen
01/09/1998	"	"	"	00°30′6.84″N	077°13′42.60″W	"
01/09/1998	"	"	"	00°30′06.84″N	077°13′42.60″W	"
03/04/1984	Terr. Fed. Amazonas, Venezuela	"	American Museum of Natural History	00°51′00.00″N	66°10′11.64″W	"
12/09/2000	Caquetá, Colombia	"	Instituto de Investigacion de Recursos Biologicos Alexander von Humboldt (Aves de Colombia coleccion)	01°20′54.96″N	076°06′11.16″W	"
03/09/2000	"	"	"	01°20′54.96″N	076°06′11.16″W	"
06/09/2000	"	"	"	01°20′54.96″N	076°06′11.16″W	"
15/09/2000	"	"	"	01°20′54.96″N	076°06′11.16″W	"
19/01/1942	Plateau, Mt. Macarena, Colombia	"	American Museum of Natural History	02°45′00.00″N	073°55′00.12″W	"
21/11/1995	Meta, Colombia	"	Instituto de Ciencias Naturales	03°48′57.96″N	073°55′10.20″W	"
	Cundinamarca, Colombia	"	Cornell University Museum of Vertebrates (CUMV Bird Collection)	04°36′35.06″N	074°04′55.22″W	"
	Bogota, Colombia	"	American Museum of Natural History	04°35′60.00″N	074°04′59.88″W	"
	"	"	"	04°35′60.00″N	074°04′59.88″W	"
	"	"	"	04°35′60.00″N	074°04′59.88″W	"
20/06/1969	Meta, Colombia	"	University of Michigan Museum of Zoology (UMMZ Birds Collections)	04°15′00.00″N	073°02′60.00″W	"
01/10/1995	"	"	Instituto de Ciencias Naturales	04°06′10.80″N	073°40′26.40″W	"
15/07/2004	Kopinang Village, Guyana	"	National Museum of Natural History, Smithsonian Institution (NMNH Vertebrate Zoology Birds Collections)	04°55′48.00″N	059°52′48.00″W	"
18/07/2004	"	"	"	04°55′48.00″N	059°52′48.00″W	"
07/02/1995	Bolivar, Venezuela	"	"	04°55′48.00″N	059°52′48.00″W	"

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Appendix 1. *Continued.*

Date	Location	Data publisher	Dataset	Latitude	Longitude	Notes
09/02/1995	Machiyaco, Oriente, Ecuador	Cornell Lab of Ornithology (from Global Biodiversity Information Facility website) "	National Museum of Natural History, Smithsonian Institution (NMNH Vertebrate Zoology Birds Collections)	04°55′48.00″N	059°52′48.00″W	Specimen
06/02/1995	"	"	"	04°55′48.00″N	059°52′48.00″W	"
24/03/2001	N slope Mt. Roraima, Guyana	"	University of Kansas Biodiversity Institute (KUBI Ornithology Collection)	05°16′59.88″N	060°45′00.00″W	"
08/04/2001	"	"	"	05°15′59.76″N	060°43′59.88″W	"
08/04/2001	"	"	"	05°15′59.76″N	060°43′59.88″W	"
05/04/2001	"	"	"	05°15′59.76″N	060°43′59.52″W	"
08/04/2001	"	"	"	05°15′59.76″N	060°43′59.52″W	"
05/04/2001	"	"	"	05°15′59.76″N	060°43′59.52″W	"
09/04/2001	"	"	National Museum of Natural History, Smithsonian Institution (NMNH Vertebrate Zoology Birds Collections)	05°15′59.76″N	060°43′59.52″W	"
24/03/2001	"	"	University of Kansas Biodiversity Institute (KUBI Ornithology Tissue Collection)	05°15′59.76″N	060°43′59.52″W	"
08/04/2001	"	"	Cornell Lab of Ornithology Macauly Library Audio and Video Collection	05°15′59.76″N	060°43′59.52″W	"
08/04/2001	"	"	University of Kansas Biodiversity Institute (KUBI Ornithology Collection)	05°15′59.76″N	060°43′59.52″W	"
11/04/2001	"	"	"	05°15′59.76″N	060°43′59.52″W	"
08/04/2001	"	"	"	05°15′59.76″N	060°43′59.52″W	"
08/04/2001	"	"	"	05°15′59.76″N	060°43′59.52″W	"
23/03/2001	"	"	"	05°16′59.88″N	060°45′00.00″W	"
23/03/2001	"	"	"	05°16′59.88″N	060°45′00.00″W	"
11/04/2001	"	"	"	05°15′59.76″N	060°43′59.52″W	"
1847	San Martin, Peru	Bourcier, 1847. Proceedings of the Zoological Society of London 15: 45.	Bourcier	06°29′23.52″S	076°21′25.45″W	
1999	Puerto Bello, Municipio Piamonte, Colombia	Salaman, P.G.W., T.M. Donegan and A.M. Cuervo. 1999. Ornithological surveys in Serrania de 10s Churumbelos, southern Colombia. Cotinga 12: 29–39.		01°07′60.00″N	076°15′60.00″W	
1999	"	"		01°07′60.00″N	076°15′60.00″W	
1999	"	"		01°07′60.00″N	076°15′60.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	Rio Nabueno, Municipio Piamonte, Colombia	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	"	"		01°06′00.00″N	076°24′00.00″W	
1999	Alto Rio Hornoyaco, Municipio Santa Rosa, Colombia	"		01°13′00.00″N	076°30′60.00″W	
1999	"	"		01°13′00.00″N	076°30′60.00″W	

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Appendix 1. *Continued.*

Date	Location	Data publisher	Dataset	Latitude	Longitude	Notes
1999	Alto Rio Hornoyaco, Municipio Santa Rosa, Colombia	Salaman, P.G.W., T.M. Donegan and A.M. Cuervo. 1999. Ornithological surveys in Serrania de 10s Churumbelos, southern Colombia. Cotinga 12: 29–39.		01°13′00.00″N	076°30′60.00″W	
1999	"	"		01°13′00.00″N	076°30′60.00″W	
1999	"	"		01°13′00.00″N	076°30′60.00″W	
1999	Villa Iguana, Municipio Santa Rosa, Colombia	"		01°14′00.00″N	076°30′60.00″W	
1989	Pasco, San Martin, Peru	Gill, F.B. and J.A. Gerwin. 1989. Protein Relationships among Hermit Hummingbirds. Proceedings of the Academy of Natural Sciences of Philadelphia. 141: 409–421.		10°42′17.19″S	076°15′19.59″W	Approximate location as no grid reference given. Specimen
1989	"			10°42′17.19″S	076°15′19.59″W	"
1989	"	"		10°42′17.19″S	076°15′19.59″W	"
1977	Cerro Urutani, border of Venezuela and Brazil	Dickerman, R.W. and J.R. Phelps.1982. An annotated list of the birds of Cerro Urtani on the border of Estado Bolivar, Venezuela, and Territorio Roraima, Brazil. American Museum of Natural History 2732: 1–20.		03°39′60.00″N	062°55′23.31″W	Specimen
1977	"	"		03°39′60.00″N	062°55′23.31″W	Specimen
1977	"	"		03°39′60.00″N	062°55′23.31″W	Specimen
1977	"	"		03°39′60.00″N	062°55′23.31″W	Specimen
2010	Cerros del Sira, Peru	Socolar, S.J., O. Gonzalez and G. Forero-Medina. 2013. Noteworthy bird records form the northen Cerros del Sira, Peru. Cotinga 35: 24–36.		09°25′55″S	074°44′56″W	
2010	"			09°25′30″S	074°44′02″W	
2010	"	"		09°25′30″S	074°44′02″W	
2011	Paquisha Hito, Ecuador	Montalvo, L.D. 2012. Notas de distribución de aves en la Cordillera del Cóndor. Revista Politécnica 30: 172–178.		03°53′242,3″S	078°28′42.7″W	
00/07/1976	la Cueva de los Tayos, Morona Santiago, Ecuador	Albuja, L. and T. de Vries. 1977. Aves Colectadas y Observadas en la Cueva de los Tayos, Morona Santiago, Ecuador. Revista de la Universidad Católica, Número Monográfico de Biología Año16: 199–215.		03°05′00.00″S	078°13′00.00″W	
00/04/2009	Tepuis de San Miguel de las Orquídeas, Ecuador	Freile, J.F., P. Piedrahita, G. Buitron-Jurado, C.A. Rodriguez and E. Bonaccorso. 2011. Aves de los Tepuyes de la Cuenca Alta del Río Nangaritza, Cordillera del Cóndor. Boletín de Evaluación Ecológica Rápida 58: 63–75.		04°15′00.94″S	078°37′02.86″W	
00/05/2009	"			04°15′08.60″S	078°40′01.81″W	
2008	Alta del Río Cuyuní, Guayana	Lentino, M., M. Salcedo and D. Ascanio. 2013. Evaluación Rápida de la Biodiversidad de los Ecosistemas Acuáticos de la Cuenca Alta del Río Cuyuní, Guayana Venezolana: 217–224.				Approximate location as no grid reference given.
2003	Caserio primavera, Peru	Merkord, C.L., T. Mark, D. Susanibar, A. Johnson and C.C. Witt. 2009. Avifaunal survey of the Rio Chipaota valley in the Cordillera Azul region, San Martin, Peru. The Neotropical Ornithological Society 20: 535–552.		06°41′47.28″S	076° 9′59.87″W	