First record of Rufous-thighed Kite Harpagus diodon in Colombia

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First record of Rufous-thighed Kite *Harpagus diodon* in Colombia

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Summary.—We report the first record of Rufous-thighed Kite *Harpagus diodon* in Colombia, the north-westernmost documented record of this species during its non-breeding season. In addition, we conducted a spatiotemporal analysis of the species' distribution based on a compilation of available records. Documented records evidence that this raptor either moves further north-west than was previously assumed, or that vagrants reach north-western Amazonia, suggesting that further ornithological research into austral and intra-tropical migrants in southern Colombia is needed. Differences between patterns of documented and undocumented records of this species suggest the need for multimedia evidence to substantiate data generated by citizen science initiatives.

One of the most remarkable global phenomena in nature is bird migration. Migration, the regular seasonal movement of individuals between breeding and non-breeding ranges, can be over short to long distances, even in the same species (Monti *et al*. 2018, Gómez-Bahamón *et al*. 2020). Neotropical birds exhibit different types of migrations—latitudinal, longitudinal or altitudinal. Latitudinal migration includes Nearctic–Neotropical (boreal), i.e. species that breed in North America, and austral–Neotropical (austral), i.e. those that nest in southern South America, both of which migrate to the tropics. Longitudinal and altitudinal, or intra-tropical migrations, include movements across elevational gradients and between forest types, to over-winter within the tropics (Hayes 1995, Jahn *et al*. 2004, Ocampo-Peñuela 2010). Nearctic–Neotropical migration is by far the best-studied migration system, with more than 40 years of extensive investigation (Faaborg *et al*. 2010, Gómez *et al*. 2012). In contrast, austral and intra-tropical migration systems are still relatively poorly known (Ocampo-Peñuela 2010, Gómez *et al*. 2012). To ensure successful conservation of Neotropical birds, a complete and updated baseline of distribution, habitat use, spatial abundance, spatiotemporal analysis of pattern movements, and long-term abundance change is needed.

The inclusion of semi-structured data from citizen science initiatives (Sullivan *et al*. 2009, La Sorte *et al*. 2018) is important to the development of research focused on austral and intra-tropical migrations (Johnston *et al*. in review). For example, the distribution and migratory status of Rufous-thighed Kite *Harpagus diodon* were recently analysed using citizen science data (Lees & Martin 2015). Although its status as a migrant was known (Cabanne & Seipke 2005), the species' breeding distribution has only recently been clarified and systematic long-term monitoring to assess the extent of its migratory behaviour is still lacking. Originally considered to be a near-endemic breeder to the Atlantic Forest (Lees & Martin 2015), Rufous-thighed Kite is now known to nest also in the Austral Yungas of Bolivia and Argentina (Areta & Juhant 2019). Nevertheless, during the presumed non-breeding season (May–August) the species extends its range north into Amazonia (Lees & Martin 2015, Areta & Juhant 2019). We report here the first documented record of *H. diodon* in Colombia, in north-western Amazonia. We also analysed records between the

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expected breeding and non-breeding seasons and the spatiotemporal distribution of this poorly known raptor using documented (museum specimens, photo, audio) records and undocumented observations (citizen science and published sightings).

Methods

On 12 June 2019, we observed a Rufous-thighed Kite on a 9-km trail (03º77.5'N, 70º33.9'W) between Puerto Nariño and San Martín de Amacayacu, dpto. Amazonas, in southern Colombian Amazonia between the Amazon and Amacayacu Rivers. This trail has been used for environmental outreach and for training local communities in tourism and monitoring activities.

To place this record in context, we compiled all available breeding, non-breeding and migratory records of the species and conducted a spatiotemporal analysis. Distributional records (both documented and undocumented) were accessed via two previously published studies of the species' breeding range (Lees & Martin 2015, Areta & Juhant 2019), WikiAves (https://www.wikiaves.com.br), Bierregaard *et al*. (2019), the Macaulay Library at the Cornell Lab of Ornithology (https://www.macaulaylibrary.org), and Global Biodiversity Information Facility (GBIF), which include specimens and citizen science data (i.e. eBird). Via the Kaggle platform, we downloaded the dataset 'Brazilian bird observation metadata from Wikiaves' which includes all observations of Rufous-thighed Kite prior to 8 December 2019 (Lessa-Bernardineli 2019). To avoid duplication, we deleted WikiAves data from the Lees & Martin (2015) dataset and selected one record per day from each locality in WikiAves. To access GBIF data, we used the 'dismo' package as of 20 June 2019 (Hijmans *et al*. 2017). Multimedia data in the Macaulay Library at the Cornell Lab of Ornithology were manually extracted using dates and coordinates for photo and audio records made on the same day. We categorised a record as documented if it involves a specimen in a museum, photo or audio, and all others as undocumented, even for those published in peer-reviewed journals (e.g. Ridgely 1980).

We assigned each record to one of the five life-cycle categories representing six temporal periods designated by Areta & Juhant (2019): breeding season (16 October–14 March), breeding / migration overlap (15–31 March and 1–15 October), northbound migration (1–30 April), non-breeding season (1 May–31 August), and southbound migration (1–30 September). To display spatiotemporal relationships, we used a Loess-smoothing algorithm with the geom_smooth in the 'ggplot2' package (Wickham 2016) for the documented and the undocumented datasets separately. Assessment and data analysis were performed in the R program, creating figures using 'ggplot2' and QGIS.

Results and Discussion

We report for the first time a documented record of Rufous-thighed Kite in the Colombian Amazon (Fig. 1). Rufous-thighed Kite can be confused with Bicoloured Hawk *Accipiter bicolor*, probably due to Batesian mimicry (Willis 1976) or interspecific social dominance mimicry (Prum 2014, but see Leighton *et al*. 2018). We eliminated *A. bicolor* based on the diagnostic combination of the obvious rufous thighs and two notches in the maxilla (Fig. 1b).

We assessed a total of 4,164 records collected between 1884 and 2019, from which we excluded 63 records due to incomplete date information (i.e. month and day) and 510 due to their being duplicates (Appendix, see Supplementary Information). Overall 3,591 records were utilised in the analyses, 2,030 documented and 1,561 undocumented (Fig. 2). Citizen science data contributed 90% of these (WikiAves 1,743 and eBird 1,515). Of the total,

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Figure 1. First documented record of Rufous-thighed Kite *Harpagus diodon*, dpto. Amazonas, Colombia, June 2019, showing (a) predation of a lizard, and (b) the two notches in the maxilla (William Daza-Díaz).

2,607 records were from the breeding season (Fig. 2a), 56 during northbound migration (Fig. 2b), 260 during the non-breeding season, including our own record (Fig. 2c), and 209 during southbound migration (Fig. 2d). Additionally, the first breeding / migration overlap category in March accounted for 90 records, and the second breeding / migration overlap category in October for 369 (Fig. 2).

Our record is not the northernmost but is the westernmost of the species to be documented, more than 600 km from the nearest record supported by verifiable evidence (at San Carlos de Rio Negro, Amazonas, Brazil; Fig. 2a–e). There is an undocumented but probably correct record from the Ecuadorian Amazon during the non-breeding season (Ridgely 1980), 800 km west of Puerto Nariño (Fig. 2c). Our record in Colombia is from the non-breeding season of this raptor, but it might represent only a vagrant occurrence in north-west Amazonia, although ornithological field work in this region is comparatively low, and raptor surveys, especially standardised migration surveys, basically non-existent (e.g. Juhant 2012).

Spatiotemporal Loess fits revealed a consistent pattern of seasonality in latitude (Fig. 2f) but less clear in longitude (Fig. 2g). Changes in latitude supported by documented data during migration were more evident than undocumented data (Fig. 2f), which pattern was also highlighted by Lees & Martin (2015). The difference between documented and undocumented patterns could be explained by two possibilities. First, some individuals remain in the southern breeding range year-round. As already noted, there is a lack of long-term systematic monitoring of the species' migratory behaviour, with just two sites where active migration has been recorded, one in south-east Brazil (Cabanne & Seipke 2005) and the other in eastern Bolivia (Juhant 2012). Secondly, misidentification of Rufous-thighed Kite via confusion with the very similar Bicoloured Hawk, Double-toothed Kite *Harpagus bidentatus* and / or Sharp-shinned Hawk *Accipiter striatus*. To assess Wallacean shortfalls—incomplete knowledge of a species' distribution—Areta & Juhant (2019) recommended (a) to integrate bibliographic searches and specimen data with citizen science, and (b) critically determine life-cycle categories, as was attempted here. Nevertheless, multimedia evidence

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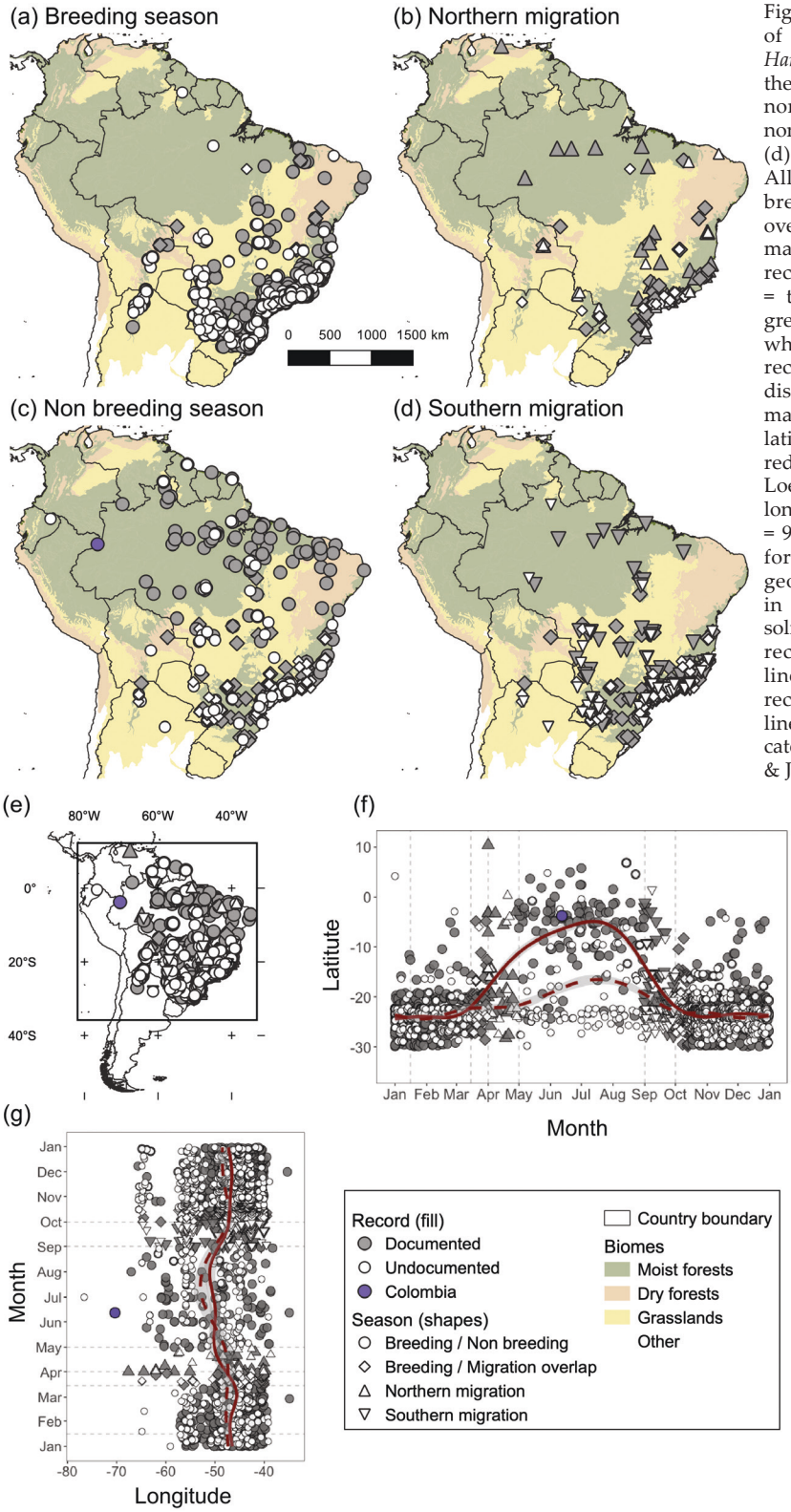

Figure 2. Map of records of Rufous-thighed Kite *Harpagus diodon* during (a) the breeding season, (b) northerly migration, (c) non-breeding season, and (d) southerly migration. All four panels show breeding / migration overlap, with (e) an inset map combining all of the records; the purple dot = the Colombian record; grey = documented and white = undocumented records. Spatiotemporal distribution of records is mapped in relation to (f) latitude and (g) longitude; red lines in (f–g) show Loess fits for latitude / longitude, the shaded area = 95% confidence interval for each fit following geom_smooth function in ggplot2 R package, solid line = documented records and dashed line = undocumented records; dashed vertical lines separate life-cycle categories following Areta & Juhant (2019).

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(photo and audio recordings) is crucial, especially during the non-breeding season, to confirm the migration and overwintering ranges of the species.

Our updated spatiotemporal analysis could suggest that misidentification of Rufous-thighed Kite is more frequent than previously believed (Fig. 2f). Moreover, we added the species to the Colombian avifaunal list (Avendaño *et al*. 2017), from north-west Amazonia (see Ridgely 1980), a region in need of urgent conservation focus and monitoring because of recent increases in deforestation (Armenteras & Defler 2019, Clerici *et al*. 2019). Nonetheless, the Colombian portion of this part of Amazonia has also yielded several recent novelties in avian distribution (Carantón Ayala *et al*. 2016, Peña Alzate *et al*. 2020), highlighting the need for further surveys and field work. Additional work with Rufous-thighed Kite could include the use of satellite tags or solar geolocators to analyse the movements of this austral migrant across Amazonia (Lees & Martin 2015, Winkler *et al*. 2017), techniques which have proven efficient at tracking raptor movements elsewhere in the world (Phipps *et al*. 2019). Such studies should include birds breeding in the Atlantic Forest of Brazil (Lees & Martin 2015), the Cerrado in eastern Bolivia, and Austral Yungas in Bolivia and Argentina (Areta & Juhant 2019). Another priority is to conduct systematic migration counts of this (and other migratory raptors) throughout South America (M. A. Juhant pers. comm.).

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References:

Areta, J. I. & Juhant, M. A. 2019. The Rufous-thighed Kite *Harpagus diodon* is not an endemic breeder of the Atlantic Forest: lessons to assess Wallacean shortfalls. *Ibis* 161: 337–345.

Armenteras, D. & Defler, T. 2019. Colombia: new plan imperils Amazon. *Nature* 569: 487.

Avendaño, J. E., Bohórquez, C. I., Rosselli, L., Arzuza-Buelvas, D., Estela, F. A., Cuervo, A. M., Stiles, F. G. & Renjifo, L. M. 2017. Lista de chequeo de las aves de Colombia: una síntesis del estado del conocimiento desde Hilty & Brown (1986). *Orn. Colombiana* 16: eA01.

Azevedo, M. A. G., Piacentini, V. Q., Ghizoni, I. R., Albuquerque, J. L. B., Silva, E. S., Joenck, C. M., Mendonça-Lima, A. & Zilio, F. 2006. Biologia do gavião-bombachinha, *Harpagus diodon*, no Estado de Santa Catarina, sul do Brasil. *Rev. Bras. Orn*. 14: 351–357.

Belton, W. 1984. Birds of Rio Grande do Sul, Brazil. Part 1. Rheidae through Furnariidae. *Bull. Amer. Mus. Nat. Hist*. 178: 369–636.

Bierregaard, R. O., Bonan, A., Marks, J. S. & Sharpe, C. J. 2019. Rufous-thighed Kite (*Harpagus diodon*). *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Handbook of the birds of the world Alive*. Lynx Edicions, Barcelona (retrieved from https://www.hbw.com/node/52974 on 20 August 2019).

Cabanne, G. S. & Roesler, I. 2007. A description of a nest and nestlings of the Rufous-thighed Kite (*Harpagus diodon*), with additional comments on diet and behavior. *Orn. Neotrop*. 18: 469–476.

Cabanne, G. S. & Seipke, S. H. 2005. Migration of the Rufous-thighed Kite (*Harpagus diodon*) in southeastern Brazil. *Orn. Neotrop*. 16: 547–549.

Carantón Ayala, D., Delgado Bermeo, G. & Ruiz Burbano, A. 2016. Primeros registros del carpintero cabecirrufo (*Celeus spectabilis*: Picidae) en Colombia. *Acta Biol. Colombiana* 21: 649.

Clerici, N., Salazar, C., Pardo-Díaz, C., Jiggins, C. D., Richardson, J. E. & Linares, M. 2019. Peace in Colombia is a critical moment for Neotropical connectivity and conservation: save the northern Andes–Amazon biodiversity bridge. *Conserv. Lett*. 12: 1–7.

Faaborg, J., Holmes, R. T., Anders, A. D., Bildstein, K. L., Dugger, K. M., Gauthreaux, S. A., Levey, D. J., Marra, P. P., Merkord, C. L., Nol, E., Rothstein, S. I., Sherry, T. W., Sillett, T. S., Thompson, F. R. & Warnock, N. 2010. Conserving migratory land birds in the New World: do we know enough? *Ecol. Appl.* 20: 398–418.

Ferrante, L. & Fearnside, P. M. 2019. Brazil's new president and 'ruralists' threaten Amazonia's environment, traditional peoples and the global climate. *Environ. Conserv.* 46: 261–263.

Gómez, C., Bayly, N. J., González, A. M., Abril, E., Arango, C., Giraldo, J. I., Sánchez-Clavijo, L. M., Botero, J. E., Cárdenas, L., Espinosa, R., Hobson, K., Jahn, A. E., Johnston, R., Levey, D., Monroy, A. & Naranjo, L. G. 2012. Avances en la investigación sobre aves migratorias neárticas neotropicales en Colombia y retos para el futuro: Trabajos del III Congreso de Ornitología Colombiana, 2010. *Orn. Colombiana* 11: 3–13.

ISSN-2513-9894 (Online)

Gómez-Bahamón, V., Márquez, R., Jahn, A. E., Miyaki, C. Y., Tuero, D. T., Laverde-R., O., Restrepo, S. & Cadena, C. D. 2020. Speciation associated with shifts in migratory behavior in an avian radiation. *Current Biol*. 30: 1–10.

Hayes, F.E. 1995. Definitions for migrant birds: what is a Neotropical migrant? *Auk* 112: 521–523.

Hijmans, R. J., Phillips, S., Leathwick, J. & Elith, J. 2017. dismo: Species distribution modeling. A package for R. Version 1.1-4. http://CRAN.R-project.org/package=dismo.

Jahn, A. E., Levey, D. J. & Smith, K. G. 2004. Reflections across hemispheres: a system-wide approach to New World bird migration. *Auk* 121: 1005–1013.

Johnston, A., Hochachka, W. M., Strimas-Mackey, M. E., Ruiz-Gutierrez, V., Robinson, O. J., Miller, E. T., Auer, T., Kelling, S. T. & Fink, D. in review. Best practices for making reliable inferences from citizen data: case study using eBird to estimate species distributions. https://www.biorxiv.org/content/10.1101/574392v2.

Juhant, M. A. 2012. Raptor migration at Concepción, Bolivia. *Wilson J. Orn*. 124: 636–640.

La Sorte, F. A., Lepczyk, C. A., Burnett, J. L., Hurlbert, A. H., Tingley, M. W. & Zuckerberg, B. 2018. Opportunities and challenges for big data ornithology. *Condor* 120: 414–426.

Lees, A. C. & Martin, R. W. 2015. Exposing hidden endemism in a Neotropical forest raptor using citizen science. *Ibis* 157: 103–114.

Leighton, G. M., Lees, A. C. & Miller, E. T. 2018. The hairy–downy game revisited: an empirical test of the interspecific social dominance mimicry hypothesis. *Anim. Behav*. 137: 141–148.

Lessa-Bernardineli, D. 2019. Brazilian bird observation metadata from Wikiaves. https://doi.org/10.34740/kaggle/dsv/695231.

Monti, F., Grémillet, D., Sforzi, A., Dominici, J. M., Bagur, R. T., Navarro, A. M., Fusani, L., Klaassen, R. H. G., Alerstam, T. & Duriez, O. 2018. Migration distance affects stopover use but not travel speed: contrasting patterns between long- and short-distance migrating ospreys. *J. Avian Biol.* 49: 1–14.

Ocampo-Peñuela, N. 2010. El fenómeno de la migración en aves: una mirada desde la Orinoquia. *Orinoquia* 14: 188–200.

Peña Alzate, F. Á., Manjarrez, C. & Acevedo-Charry, O. 2020. *Heterocercus aurantiivertex* (Aves: Passeriformes: Pipridae), una nueva especie para Colombia del Parque Nacional Natural La Paya, Leguízamo, Putumayo. *Caldasia* 42: 142–146.

Phipps, W. L., López-López, P., Buechley, E. R., Oppel, S., Álvarez, E., Arkumarev, V., Bekmansurov, R., Berger-Tal, O., Bermejo, A., Bounas, A., Alanís, I. C., de la Puente, J., Dobrev, V., Duriez, O., Efrat, R., Fréchet, G., García, J., Galán, M., García-Ripollés, C., Gil, A., Iglesias-Lebrija, J. J., Jambas, J., Karyakin, I. V., Kobierzycki, E., Kret, E., Loercher, F., Monteiro, A., Morant Etxebarria, J., Nikolov, S. C., Pereira, J., Peške, L., Ponchon, C., Realinho, E., Saravia, V., Şekercioğlu, Ç. H., Skartsi, T., Tavares, J., Teodósio, J., Urios, V. & Vallverdú, N. 2019. Spatial and temporal variability in migration of a soaring raptor across three continents. *Front. Ecol. Evol*. 7: 1–14.

Prum, R. O. 2014. Interspecific social dominance mimicry in birds. *Zool. J. Linn. Soc*. 172: 910–941.

Ridgely, R. S. 1980. Notes on some rare or previously unrecorded birds in Ecuador with additional information on identification and habitat. *Amer. Birds* 34: 242–248.

Sazima, I. 2010. Five instances of bird mimicry suggested for Neotropical birds: a brief reappraisal. *Rev. Bras. Orn*. 18: 328–335.

Sullivan, B. L., Wood, C. L., Iliff, M. J., Bonney, R. E., Fink, D. & Kelling, S. 2009. eBird: a citizen-based bird observation network in the biological sciences. *Biol. Conserv*. 142: 2282–2292.

Wickham, H. 2016. *ggplot2: elegant graphics for data analysis. A package for R*. Second edn. Springer Verlag, New York.

Willis, E. O. 1976. A possible reason for mimicry of a bird-eating hawk by an insect-eating kite. *Auk* 93: 841–842.

Winkler, D. W., Gandoy, F. A., Areta, J. I., Iliff, M. J., Rakhimberdiev, E., Kardynal, K. J. & Hobson, K. A. 2017. Long-distance range expansion and rapid adjustment of migration in a newly established population of Barn Swallows breeding in Argentina. *Curr. Biol.* 27: 1080–1084.

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Appendix (Supplementary Information): Records of Rufous-thighed Kite *Harpagus diodon* used in the spatiotemporal analyses (see Fig. 2). .xls file available online at https://10.25226/bboc.v140i2.2020.a2.

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