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SHORT-COMMUNICATION

New records and probable migration routes of the Sora *Porzana carolina* (Aves: Rallidae) in Peru

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ABSTRACT: The Sora *Porzana carolina* is the most abundant rail of North America, and historical records (1877–1994) indicate Peru as the southern limit of its wintering (October–May) range. Here, we present data from three consecutive austral summers (February/2014 to March/2016) recording this species on wetlands in north Peru, which fill a geographic gap of approximately 1000 km between Tumbes and Lima regions. Based on our records and secondary sources for South America, we indicate that Sora probably follows two parallel migration routes in western South America: the Pacific Coast and the Andean routes. Another recent study recorded Sora in Cusco province, which suggests that Peruvian Andes wetlands may currently becoming more important as non-breeding sites for Nearctic migrant waterbirds. Unlike the sites of historical records of Sora in Peru, the wetlands on which this rail was recently recorded have no legal protection, deserving management policies and continued monitoring.

KEY-WORDS: Andean wetlands, Boreal migration, Nearctic migrant, north Peru, Rail, wintering.

The Sora *Porzana carolina* (Linnaeus, 1758) is a Rallidae species known to breed in North America (April–July), emigrating to South America in boreal late summer and early autumn (Melvin & Gibbs 1996). Although the Sora is the most abundant rail of North America (Melvin & Gibbs 1996), its population, as well as the population of other rail species, is decreasing, particularly due to habitat loss and disturbance in both breeding and wintering habitats (Conway *et al.* 1994, Conway 2011). It arrives in northern South America in the non-breeding season, being recorded in Colombia (October–May), Venezuela (September–May) and Ecuador (January–February) (Buitrón & Freile 2006, Restall *et al.* 2006). There are scattered records in Peru and in the middle of the Pacific Ocean in Galapagos (Schulenberg *et al*. 2010) and Hawaii (Uyehara 2004) islands. Unlike other rails, Sora usually occurs along its entire range in slightly drier habitats, where the water is only a few inches deep, and it is more likely to be found in wet grassy terrain that borders large marshes (Taylor 2017). It also occupies wet meadows and is strongly associated with wetlands containing Cattail marshes (*Typha* sp., Typhaceae) (Ripley & Beehler 1985, Melvin & Gibbs 1996), along Beaver ponds and several other wetland habitats as artificial grassland; during migration it can be found foraging both in wild and domesticated rice fields (Gastezzi *et al.* 2013).

The historical records of Sora in Peru are restricted to four localities: Tumbes Mangroves National Sanctuary, Tumbes region, in northwest (Taczanowski 1877); Pantanos de Villa wetland, Pantanos de Villa Wildlife Refuge, Lima region, central coast (Koepcke 1954); Junin Lake, Junin National Reserve, Junin region, central Andes (Fjeldså & Krabbe 1990); and Laguna de Mejía wetland, Laguna de Mejia National Sanctuary, Arequipa region, southern coast (Wust *et al.* 1994). Here we report recent and original records of Sora on wetlands of the northwest of Peru obtained in Cajamarca (Peruvian Andes) and Piura (Pacific Coast) regions. Additionally, we present a map of the probable Andean and Pacific migration routes of this species, based on our records, coupled with secondary sources.

Our records from Cajamarca region occurred in the San Nicolas Lagoon (SNL; 7°14'04''S; 78°19'41''W; 2850 m a.s.l.), a wetland of 113 ha. One third of the lagoon's surface is covered by *Typha* sp. and pondweeds (*Potamogeton* sp., Potamogetonaceae), mostly at margins.

In addition, the lagoon surroundings present relicts of dry Andean shrubbery. SNL and its vicinity are unprotected areas that receive anthropic impacts by local people who inhabit the neighborhood (Rabanal & Vasquez 2013). Our first record of Sora on SNL was on 12 February 2014 at mid-morning (10:45 h), when we detected an individual a few meters from the border of Cattail marshes. A few minutes later we observed it for 30 min foraging on buds of *Typha* and *Potamogeton*. We identified the species based on its olive-brown upperparts, streaked black and white, flanks prominently barred and the yellow bill. Sora is unmistakable with other sympatric rails present on these wetlands such as Plumbeous Rail *Pardirallus sanguinolentus.* The individual from SNL was recognized as an adult female by having darker bill and less pronounced black on the face and throat than the male (Restall *et al.* 2006, Taylor 2017). Next year (3 January 2015, 11:30 h) we detected an individual at the same place, which fled into marshes when we approached. However, we used playback and a female quickly appeared, which we could observe for 5 min before it disappeared from sight among the marshes. We returned at SNL on 12 January 2015, at 10:40 h, to photograph and observe for 10 min an adult female Sora (Fig. 1A), which was foraging on *Potamotogeton* sp. and slowly walking back and forth near the marshes.

The record from Piura province occurred in the Santa Julia Lagoon (SJL; 5°12'12''S; 80°39'50''W; 23 m a.s.l.), a wetland in the northern Peruvian coast, 340 km northwest of SNL (Fig. 2). SJL is a geographical depression of 43.1 ha, that drains seasonal rains and filter waters of the urban surroundings. Around this lagoon occur relicts of dry shrub and forest (for details, see Mogollón *et al.* 2013). We recorded a single Sora at SJL on the morning of 02 February 2016 and on 02 March 2016. Based on our brief sightings and photography (Fig. 1B) we are unable to determine its age or gender. The bird was moving through the shoreline of the wetland, which is composed mainly of Saltwort *Batis maritima* (Bataceae).

Our records fill a geographic gap of *c.* 1000 km between Tumbes and Lima regions (Fig. 2). In addition to corroborating Sora as a boreal migrant in Peru (Plenge 2017) our records were the first documented ones after a time gap of twenty years. The absence of confirmed reports of Sora from Peru since 1994 do not appears to be only due to the lack of fieldwork effort, as the five localities of historical records of Sora in Peru are nationally protected areas in regularly surveyed regions (*e.g.* Franke 2006, Torres *et al.* 2006, Iannacone *et al.* 2010, Ugaz & Saldaña 2014, Núñez-Zapata *et al.* 2016). In addition, they include places visited by tourists, especially birdwatchers, interested in wildlife (SERNANP 2017).

A few months after our record in Cajamarca, a new point of occurrence was recorded in Cusco province, at Huaypo Lagoon on 31 December 2014 (Venero 2015), when a couple of adults were found foraging on invertebrates in an open area of the lagoon (S. Sanchez, pers. comm.). This new record fills another geographic gap for Sora in south Peru, as Huaypo Lagoon is 317 km northward from the Arequipa record, and approximately 500 km southeast of the Lima and Junin record points. Additionally, a Sora individual attributed to a protected area in the Titicaca Lake (Puno Region, on 24 November 2015), 260 km northeastern from the Arequipa record, had three photographs deposited anonymously in the Macaulay Library (ML21372251, ML21372301, ML21372311). Based on our records of Sora in Peru, in addition to bibliographic and part of the occurrence records of the species held in the online repository Global Biodiversity Information Facility (GBIF 2017), we were able to outline two possible migratory routes of Sora in western South America: the Pacific Coast route, and a

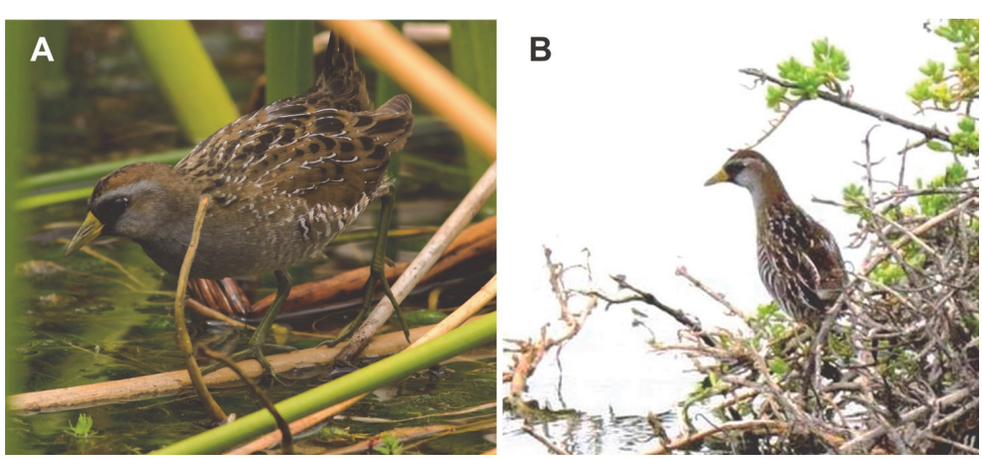

Figure 1. (**A**) Female Sora *Porzana carolina* in San Nicolas Lagoon, Cajamarca, Peru (Photo author: L.M. Vallejos). (**B**) Adult Sora *Porzana carolina* in Santa Julia Lagoon, Piura, Peru. Photo author: E. Nuñez.

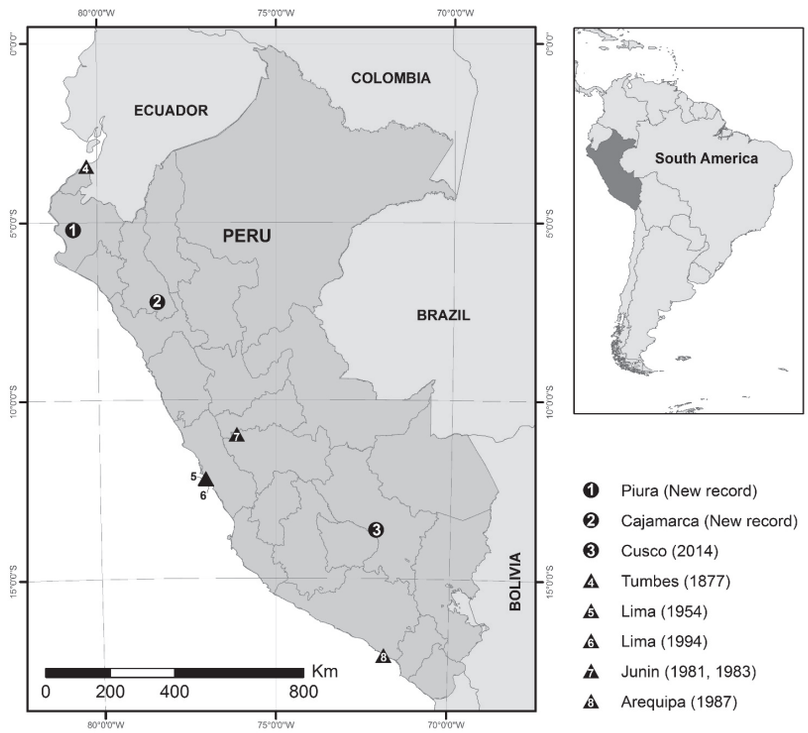

Figure 2. New Peruvian records (present study) of Sora *Porzana carolina* from Santa Julia Lagoon, Piura province (1), San Nicolas Lagoon, Cajamarca province (2), and recent record from literature (3). Numbered triangles indicate historical records of the species in Peru.

parallel Andean route from Central American incursions, both rarely extending southward below 5°S (Fig. 3).

Notably, there was a recent isolated record of this species in the southeastern Brazilian coast, where a single individual was photographed in January 2015 in Rio de Janeiro state (point "D" in Fig. 3, Camacho & Accorsi 2016). This first confirmed record from Brazil expands the southern limit of distribution of this species in *c.* 900 km, in relation to the previous known limit in Arequipa, southwestern Peru (Wust *et al.* 1994). However, this extreme occurrence point (and any other from the Brazilian coast) probably refers to vagrants coming from the northern South American route (Fig. 3).

Despite the fact that Sora is considered local and uncommon in southern Ecuador (Ridgely & Greenfield 2006), we suggest that its increasing frequency in the Peruvian Andes may be a recent process, such as observed over the last years in Colombia (*e.g.* Abril-Pulido *et al.* 2012) and elsewhere in Ecuador (*e.g.* Cisneros-Heredia 2006). For example, the Piura region has been surveyed previously to our record of Sora (Ugaz & Saldaña 2014, Saldaña *et al.* 2016) and this species was apparently absent even in wetlands of suitable habitat, such as in sites sampled in different seasons downstream of Rio Piura (I.S.S., pers. obs.).

The Sora is not directly protected by red lists in Peru nor in any South American country, but its wintering habitats constitute unique ecosystems, worthy of effective protection and management measures. The biodiversity importance of the wetlands and associate ecosystems where we recorded Sora in Peru is evidenced by the presence of several bird species of conservation concern, including other migrant birds (Mogollón *et al.* 2013, Rabanal & Vázquez 2013, Venero 2015). In the montane dry scrubs surrounding the SNL, we recorded two terrestrial endemic bird species, the Buff-bridled Inca-finch *Incaspiza laeta* and the Great Spinetail *Synallaxis hypochondriaca*, the latter categorized as "Vulnerable" by IUCN (2017). At least four bird species nationally threatened in Peru occur at SJL (Mogollón *et al.* 2013), where we also recorded one species globally categorized as "Endangered", the Rufous Flycatcher *Myiarchus semirufus*.

The sites of historical occurrence of Sora in Peru are nationally protected areas, but this is not the case of the lagoons of our new records, nor the Huaypo Lagoon. Also, none of these three lagoons is included in Peruvian sites from the Ramsar Convention on Wetlands of International Importance (Wittmann *et al.* 2015), which makes their long term conservation uncertain. Establishing management policies and the continued monitoring of these wetlands, as well as other potential wetlands in the Coast Pacific and Andean routes, is of great importance as they can be major seasonal habitats for migrant species, which have a greater risk of extinction

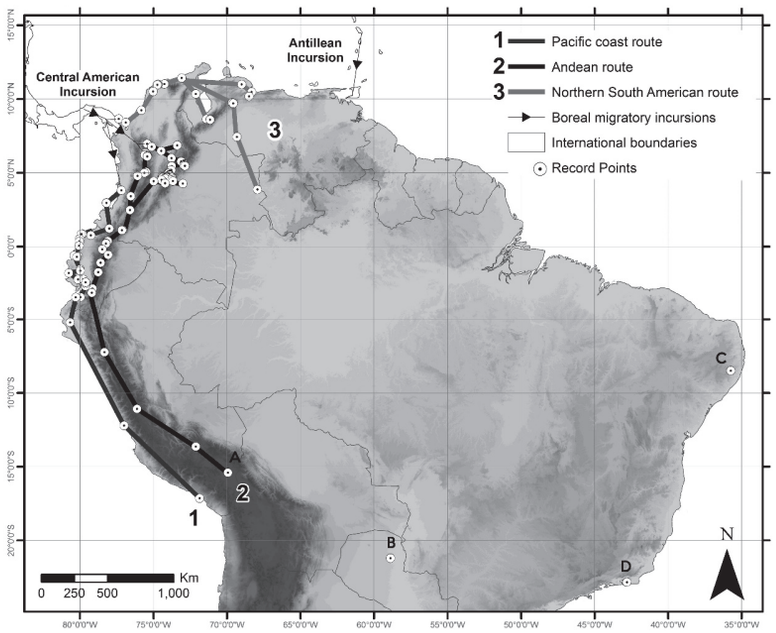

Figure 3. Probable migration routes from Central American and Antillean Incursions of Sora *Porzana carolina* in South America inferred from occurrence records from GBIF (2017), literature and the present study. Isolated records: A. anonymous record from Isla Esteves, Titicaca Lake, Puno region, Peru (GBIF 2017); B. Preserved specimen from Paraguay on Royal Ontario Museum - Collection Birds (ID urn:lsid:biocol.org:col:34954), without locality data (GBIF 2017); C. Preserved specimen without collector label from Bonito – Pernambuco, Brazil, on United States National Museum (catalog number 99992), which locality data is considered doubtful (Isler 2000); D. Photographic record from Maricá municipality, Rio de Janeiro, Brazil (Camacho & Accorsi 2016).

than resident species of similar population size and body size (Pimm *et al.* 1988). While most migrant species, including Sora, are cold-sensitive (Taylor 2017), and climate determines when and where they will winter (Adam *et al.* 2015, Lehikoinen *et al.* 2016), it is possible that, in response to recent climate changes, Andean wetlands will become increasingly important in the future as non-breeding sites for the Sora and dozens of other Nearctic migrant waterbirds species.

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REFERENCES

Abril-Pulido E., Pachon C. & Barragán-Barrera D. 2012. Bird monitoring to conserve Salitre wetland in Bogotá: strengthening local efforts in conservation. *Journal of Environmental Science and Engineering* B 1: 1162–1166.

Adam M., Musilová Z., Musil P., Zouhar J. & Romportl D. 2015. Long-term changes in habitat selection of wintering waterbirds: high importance of cold weather refuge sites. *Acta Ornithologica* 50: 127–138.

Buitrón G. & Freile J. 2006. Registros inusuales de aves migratorias y de bosques subtropicales en Quito, Ecuador. *Cotinga* 26: 54–56.

Camacho I. & Accorsi M. 2016. Confirmação da Sora, *Porzana carolina*, em território brasileiro e contribuições para a conservação das áreas úmidas da Área de Proteção Ambiental de Maricá (RJ) para espécies migratórias Neárticas. *Atualidades Ornitológicas* 191: 60–66.

Cisneros-Heredia D.F. 2006. Aves, *Podilymbus podiceps*, *Ardea alba*, *Egretta thula*, *Nycticorax nycticorax*, *Ixobrychus exilis*, *Porzana carolina*, *Porphyrula martinica*, *Gallinula chloropus*, *Phalaropus tricolor*, *Vanellus resplendens*: distribution extensions, filling gaps, historical occurence. *Check List* 2: 27–31.

Conway C.J. 2011. Standardized North American marsh bird monitoring protocol. *Waterbirds* 34: 319–346.

Conway C.J., Eddleman W.R. & Anderson S.H. 1994. Nesting success and survival of Virginia Rails and Soras. *Wilson Bulletin* 106: 466–473.

Fjeldså J. & Krabbe N. 1990. *Birds of the high Andes. A manual to the birds of the temperate zone of the Andes and Patagonia, South America*. Copenhagem: Zoological Museum, University of Copenhagen and Apollo Books, Svendborg and Zoological Museum.

Franke I. 2006. *Final report, Waterbirds in Peru:* Lima: Museo de Historia Natural de la Universidad Nacional Mayor de San Marco

Gastezzi P., Martínez D. & Villarreal J. 2013. *Monitoreo biológico de aves acuáticas en arrozales de la zona norte de Costa Rica*. http://www.lacbiosafety.org/wp-content/uploads/2012/09/Poster_Costa_Rica_Aves.pdf (access on 21 July 2016).

GBIF (Global Biodiversity Information Facility). 2017. Free and open access to biodiversity data. http://www.gbif.org/species/2474639 (access on 11 March 2017).

Iannacone J., Atasi M., Bocanegra T., Camacho M., Montes A., Santos S., Zuñiga H. & Alayo M. 2010. Diversidad de aves en el humedal Pantanos de Villa, Lima, Perú: periodo 2004–2007. *Biota Neotropica* 10: 295–304.

Isler M.L. 2000. The alleged Brazilian specimen of Sora (*Porzana carolina*) in the United States National Museum. *Nattereria* 1: 18.

IUCN. 2017. *The IUCN red list of threatened species*. http://www.iucn.org (access on 11 October 2017).

Koepcke M. 1954. Corte ecológico transversal en los Andes del Perú central con especial consideración de las aves. Parte I: costa, vertientes occidentales y región altoandina. *Memorias del Museo de Historia Natural "Javier Prado"* 3: 1–119.

Lehikoinen A., Foppen R.P.B., Heldbjerg H., Lindström Å., van Manen W., Piirainen S., van Turnhout C.A.M. & Butchart S.H.M. 2016. Large-scale climatic drivers of regional winter bird population trends. *Diversity and Distributions* 22: 1163–1173.

Melvin S.M. & Gibbs J.P. 1996. Sora (*Porzana carolina*). In: Poole A. & Gill F. (eds). *The birds of North America*. Washington and Philadelphia: The Academy of Natural Sciences and The American Ornithologists' Union.

Mogollón E.L, Liciapoma E.P. & Cortez E.I.N. 2013. Aves del humedal de Santa Julia, Piura - Perú. *Boletín Informativo de la Unión de Ornitólogos del Perú* 8: 10–20.

Núñez-Zapata J., Pollack-Velásquez L.E., Huamán E., Tiravanti J. & García E. 2016. A compilation of the birds of La Libertad region, Peru. *Revista Mexicana de Biodiversidad* 87: 200–215.

Pimm S.L., Jones H.L. & Diamond J. 1988. On the risk of extinction. *American Naturalist* 132: 757–785.

Plenge M. 2017. *List of the birds of Peru.* Lima. https://www.sites.google.com/site/boletinunop/checklist (access on 10 March 2017).

Rabanal M.R. & Vázquez M. 2013. *San Nicolas Lagoon, Namora, Cajamarca, Peru.* Cajamarca: Martinez Compañón Editores S.R.L.

Restall R., Rodner C. & Lentino M. 2006. *Birds of northern South America, an identification guide*. Connecticut: Yale University Press.

Ridgely R.S. & Greenfield P.J. 2006. *Aves del Ecuador, guia de campo*. Guayaquil: Fundación de Conservación Jocotoco.

Ripley S.D. & Beehler B.M. 1985. Rails of the world: a compilation of new information, 1975–1983 (Aves: Rallidae). *Smithsonian Contributions to Zoology* 417: 1–28.

Saldaña I., Ugaz A., Baldeón A. & Vallejos L.M. 2016. Extensiones de rango y registros destacables de aves en el departamento de Piura, noroeste de Perú. *Cotinga* 38: 82–87.

Schulenberg T.S., Stotz D.F., Lane D.F., O'Neill J.P. & Parker-III T.A. 2010. *Birds of Peru: revised and updated edition.* Princeton and Oxford: Princeton University Press.

SERNANP (Servicio Nacional de Áreas Naturales Protegidas por el Estado). 2017. http://www.sernanp.gob.pe (access on 19 July 2016).

Taczanowski L. 1877. Supplément à la liste des oiseaux recueillis au nord du Pérou occidental par MM. Jelski et Stolzmann. *Proceedings of the Zoological Society of London* 1877: 744–754.

Taylor B. 2017. Sora (*Porzana carolina*). In: del Hoyo J., Elliott A., Sargatal J., Christie D. & de Juana E. (eds.). *Handbook of the birds of the world alive*. Barcelona: Lynx Editions. http://www.hbw.com/species/sora-porzana-carolina (access on 19 July 2016).

Torres M., Quinteros Z. & Takano F. 2006. Variación temporal de la abundancia y diversidad de aves limícolas em el Refugio de Vida Silvestre Pantanos de Villa, Lima - Perú. *Ecología Aplicada* 5: 119–125.

Ugaz A. & Saldaña I.S. 2014. *Aves de Piura*. Lambayeque: Emdecosege S.A.

Uyehara K.J. 2004. First record of the Sora in the state of Hawaii. *Western Birds* 35: 47–49.

Venero J.L. 2015. Aves de la Laguna Huaypo, Cusco - Perú. *Boletín de la Unión de Ornitólogos del Perú* 10: 26–30.

Wittmann F., Householder E., Oliveira A., Lopes A., Wittmann A.O., Junk W.J. & Piedade M.T.F. 2015. Implementation of the Ramsar Convention on South American wetlands: an update. *Research and Reports in Biodiversity Studies* 4: 47–58.

Wust W.H., Luscombe A. & Valqui T. 1994. *Las aves de los Pantanos de Villa y alrededores*. Lima: Asociación de Ecología y Conservación (ECCO).

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