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DOT-WINGED CRAKE *PORZANA SPILOPTERA* (RALLIDAE; DURNFORD, 1877) IN CHILE: NEW RECORDS AND A REVIEW OF THE STATUS OF PACIFIC POPULATIONS

Jorge Ruiz[1,2]* · Gabriela Biscarra[1] · Marcelo Flores[1] · Gabriel Morales[3] · Jorge A. Tomasevic[4] · Felipe Otondo[3] · Víctor Poblete[3] · Juan G. Navedo[1,2]

[1] Bird Ecology Lab, Instituto de Ciencias Marinas y Limnológicas, Universidad Austral de Chile, Valdivia, Chile.
[2] Estación Experimental Quempillén, Facultad de Ciencias, Universidad Austral de Chile, Ancud, Chile.
[3] Instituto de Acústica, Facultad de Ciencias de la Ingeniería, Universidad Austral de Chile, Valdivia, Chile.
[4] Centro de Humedales Río Cruces, Universidad Austral de Chile, Valdivia, Chile.
E-mail: Jorge Ruiz · jorge.ruiz@uach.cl

Abstract · We report new records of the Dot-winged Crake *Porzana spiloptera* in southern Chile, an almost unknown species distributed mainly in Argentina and recently discovered in Chile. The occasional capture of a juvenile of the species at Cruces River wetland (39°S), and the analysis of sound recordings obtained to explore the acoustic attributes of urban wetland soundscapes, made it possible to discuss the status of the Pacific populations of the species. The new records show that *P. spiloptera* has a resident status and suggest that the presence of the species in Chile went historically unnoticed, and that it has been confused with the Black Rail *Laterallus jamaicensis*. Comprehensive surveys and dedicated research that provide fundamental biological aspects such as the current distribution, population abundance, habitat requirements, and main threats for these secretive rails are urgently needed for their conservation.

Resumen · *Porzana spiloptera* (Rallidae; Durnford, 1877) en Chile: nuevos registros y una revisión sobre el estado de las poblaciones del Pacífico

Reportamos nuevos registros de *Porzana spiloptera* en el sur de Chile, una especie casi desconocida distribuida principalmente en Argentina y descubierta recientemente en Chile. La captura fortuita de un ejemplar juvenil en el humedal del río Cruces, y el análisis de grabaciones obtenidas para explorar los atributos acústicos de paisajes sonoros en humedales urbanos, permitió evaluar el estado de las poblaciones de la especie en el Pacífico. Los registros recolectados muestran que *P. spiloptera* tiene un estatus de residente y sugieren que históricamente la presencia de la especie en Chile ha pasado desapercibida y ha sido confundida con *Laterallus jamaicensis*. Se necesitan con urgencia estudios exhaustivos e investigaciones dedicadas que puedan proporcionar conocimientos sobre aspectos biológicos fundamentales de esta especie, como la distribución actual, la abundancia de sus poblaciones, los requisitos de hábitat y las principales amenazas para su conservación.

Key words: *acoustic ecology · Laterallus jamaicensis · marsh waders · sound recordings · wetland birds*

INTRODUCTION

Due to their elusive behavior, cryptic habits, and size, several species of small rails inhabiting swamps and humid grasslands of South America have been barely studied (e.g. genera *Laterallus*, *Porzana*, and *Coturnicops*). In Chile, until recently, the only small rail species recorded was the Black Rail *Laterallus jamaicensis*. Classified as globally endangered (BirdLife International 2022), this species presents an extensive but disjoint geographic distribution: *L. j. jamaicensis* is present in North America, from the Great Lakes east to New York, and south to central Florida, Belize, and Guatemala; *L. j. coturniculus* is resident in southwestern North America, from central California south to northwestern Baja California, and inland east to the lower Colorado River of western Arizona and northwestern Sonora; *L. j. murivagans* is resident in coastal central Peru; *L. j. tuerosi* is endemic from Lake Junín, Peru; *L. j. salinasi*, distributed in coastal southwest Peru to central Chile (Eddleman et al. 2020). Although *L. jamaicensis* was previously described in Argentina (Taylor 1996, Eddleman et al. 2020), it is currently accepted that it is not present there (Pearman & Areta 2020). In Chile, this species is distributed between the subtropical northern region (c. 18°S) and the northern austral region (c. 41°S) (Couve et al. 2016, Ruiz 2002, eBird 2022). However, based on photographs taken on 25 April 2019 at Lenga estuary (c. 37°S) (Maureira et al. 2019), the presence of the Dot-winged Crake *Porzana spiloptera* in Chile was confirmed for the first time.

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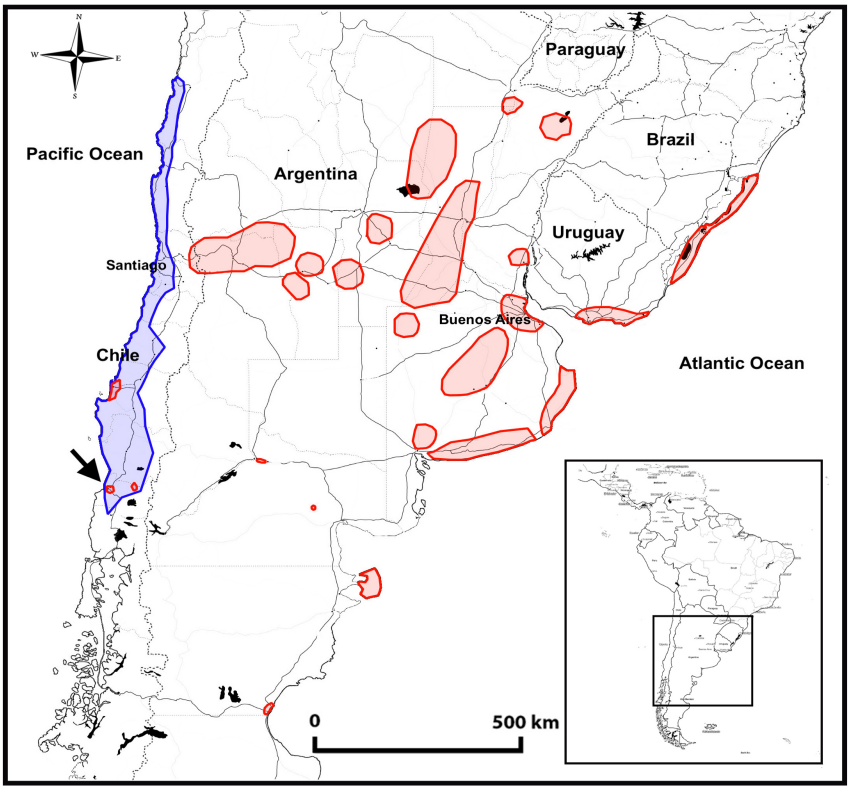

Figure 1. *Porzana spiloptera* (Red) and *Laterallus jamaicenis salinasi* (Blue) distributions (Polygons and their limits are approximations to concentrations of records or points of known presence for the species (Taylor & van Perlo 1998, Chatellenaz & Zaninovich 2009, López-Lanús et al 2012b, Lucero 2013, 2014; Antunes et al. 2017, Larracoechea 2017, Zarco et al. 2017, Maureira et al 2019, Fariña et al. 2021, eBird 2022), and location of Valdivia city in Chile (black arrow) (this work).

Despite belonging to a different genus, *P. spiloptera* and *L. jamaicensis* are very similar to each other (Stervander et al. 2019). They are alike in morphology and behavior, including vocalizations and tonal structure (López-Lanús et al. 2012a, Maureira et al. 2019). In fact, some authors placed it in the predominantly South American clade *Laterallus* and proposed the name *Laterallus spilopterus* for the species (e.g. Garcia-R et al. 2014, Stervander et al. 2019, Kirchman et al. 2021). However, the South American Classification Committee (SACC) proposal to place it in *Laterallus* has not been accepted so far (Remsen et al. 2022). *P. spiloptera* presents a relatively broad and discontinuous distribution as well. It has been reported in Uruguay (Maldonado, Canelones, Colonia, and Montevideo departments), southern Brazil (localities in Rio Grande do Sul), and Argentina (recorded in the provinces of Buenos Aires, Santa Fe, Córdoba, Chaco, San Juan, Chubut, and Mendoza) (Bencke et al. 2003, Chebez 2008, Chatenellaz & Zaninovich 2009, López-Lanús et al. 2012b, Lucero 2013, Antunes et al. 2017, Rost 2017, Zarco et al. 2017) (Figure 1).

Porzana spiloptera is considered a lowland species mainly using halophilic grasslands, saltmarshes, and brackish marshes (Bencke et al. 2003). It has been commonly associated with tall and dense grasslands of *Spartina densiflora* and *Juncus acutus* in flooded soils (Martínez et al. 1997, Babarskas et al. 2003, Chebez 2008). These habitat requirements, along with an apparently low dispersal ability (Sheard et al. 2020), have been considered probable limitations that explain its discontinuous geographic distribution (Chebez 2008). However, recent records show that *P. spiloptera* is distributed in very different types of environments, including high-elevation sites (Zarco et al. 2017, Maureira et al. 2019), suggesting a greater tolerance of the species to higher altitudes and lower temperatures than previously assumed.

After finding *P. spiloptera* near Concepción, Chile (Maureira et al. 2019), field efforts were carried out by means of acoustic detections in other areas of the country. Furthermore, Maureira et al. (2019) reviewed sound and photographic archives attempting to verify the presence of the species in earlier occasions. Noticeably, they identified *P. spiloptera* in images and audio recordings initially misidentified as Black Rails as early as 2014 (Table 1). Although most of these records were concentrated near the Lenga estuary, one observation was made at Inca Lagoon, located at 2,800 m a.s.l. and very close to the border with Argentina (ca. 33°S, Maureira et al. 2019) (Figure 1).

Here we report the occasional capture of one juvenile of *P. spiloptera* and digital audio recordings of territorial vocalizations of this species made throughout an annual cycle at three

Table 1. Reassigned records from *Laterallus jamaicensis* to *Porzana spiloptera* in Chile (modified from Maureira et al. 2019).

Date	Locality	Record type	Source
May 2014	Quiñenco lagoon, Coronel, Bíobío Region	Audio records	M. Almonacid
December 2014	Lenga estuary, Bíobío Region	Audio records	A. Maureira
April 2017	Inca Lagoon, Valparaíso Region	Photography	R. Oyarzún
July 2018	Lenga estuary, Bíobío Region	Audio records	J. Gaete

urban wetlands within Los Ríos Region (Poblete et al. 2021), c. 330 km south of previous records in Chile. Based on the results obtained we revisited the status of the species in the continental Pacific area of South America.

METHODS

Starting in November 2015, mist-netting sampling has been carried out in the Cruces River wetland (39°48'36''S; 73°14'69"W) by staff from the Bird Ecology Lab, Universidad Austral de Chile. This program is carried out through monthly systematic samplings of constant effort at two sites: Teja Island, Valdivia (39°52'32''S; 73°54'30''W) and the other 25km north of that point (39°47'13''S; 73°15'47''W). Twelve mist-nets (9 m long, 2.5 m height, 32 mm mesh) were deployed monthly over the wetland, stretched as a 108 m straight line during five hours (starting at sunrise) in both areas. Mist-netting sessions were carried out on days without rain or heavy wind. In each session, we banded individuals captured and recorded measurements of body mass (± 0.1 g, electronic balance), tarsus length (± 0.01 mm, caliper), wing chord (carpal joint to longest feather; ± 0.5 mm, ruler), and released them back on the same general area.

Simultaneously, as part of an interdisciplinary research project exploring the acoustic attributes of urban wetland soundscapes (www.soundlapse.net; Otondo & Poblete 2020, Poblete et al. 2021, Otondo & Rabello-Mestre 2022), environmental field recordings were conducted using Song Meter SM4 standalone acoustic recorders (Wildlife Acoustics, Maynard, MA, USA) on three urban wetlands in the city of Valdivia (39°49'8"S; 73°14'34"W): Angachilla, Miraflores, and Parque Urbano El Bosque. These locations were selected to capture as much sound diversity as possible in each site, trying to minimize traffic noise pollution that could mask specific sound sources of the urban environment (i.e., the recorders were not located near busy streets, but still captured vehicle sounds and other sources of anthropogenic noise). The recording devices were attached to tree trunks at three meters height. The recording protocol was designed to capture the first five minutes of every hour, except for longer periods at dawn and dusk, when 50 minutes were recorded to increase the probability of detecting the activity of cryptic species that may not vocalize during the hourly samples. The recording format was WAV-PCM (44.1 kHz sampling frequency, 16-bit quantization) that allowed capturing frequencies up to 22.05 kHz. Sampling took place between October 2019 and November 2020, and it was synchronized for the three areas, adding up to a total of 4,015 hours of recordings (Morales et al. 2022).

A semi-automated search was then carried out by using a cloud-based bioacoustics analysis algorithm (Arbimon, Rainforest Connection, Katy, TX, USA) which compares to reference recordings (LeBien et al. 2020). These references were extracted from a recording with an appropriate signal-to-noise ratio of the territorial song found in the Miraflores wetland (see the Results section, Figure 4) and an external recording of the call described as "pw" publicly available for the species (López-Lanús 2022, also see López-Lanús et al. 2012a).

RESULTS

On 25 February 2021, a *P. spiloptera* was surprisingly mist-netted on Teja Island. The individual was startled by a loud sound in the area and was trapped around 10:30 am (local time) fleeing the sound. Based on existing plumage descriptions and other characteristics (Taylor et al. 2020), *L. jamaicensis* was ruled out and the captured rail was identified as a juvenile of *P. spiloptera*. A diagnostic character to identify juveniles of this species is the dark brown coloration of the eyes (Figure 2). We provide the measurements of the individual in Table 2.

While conducting manual species cataloging on the audio recordings of the Soundlapse research project (Otondo & Rabello-Mestre 2022), we detected the presence of at least two individuals of *P. spiloptera* only in one of the sampling areas. The identification was based on the song structure ("kee-krrr" of *P. spiloptera* vs. "keek-kee-kee krrr" of *L. jamaicensis salinasi*), using expert criteria and comparing to available literature (López-Lanús et al. 2012a, Maureira et al. 2019) and recordings of both species (xeno-canto.org). After a long process of visual inspection of sound recordings' spectrograms and the application of the algorithm on the complete set of recordings in the three sampling areas, we detected the species only at the Miraflores wetland, both in 2019 and 2020 (spring and summer), reaching a peak of activity in January. The species was detected in 108 recordings where they vocalized between 1 and 20 times, adding to 1,140 detections. Their vocal routine began at dusk (30% of detections at dusk and dawn combined), continuing throughout the night (66% of detections) and tapering off considerably after dawn (4% of detections during the day). Only the territorial song was detected. No detections of the "pw" contact signal was reported. It was usual to detect the occurrence of this territorial call in series that can last more than five minutes. Within each series, a regularity was observed in the vocalizations when the rhythmic pulse was close to two seconds. The analyzed vocalizations indicate a stereotyped structure of two notes (Figure 3), like a "kií-kerrrr" (see López-Lanús et al. 2012a). The first is a note with at least five harmonics, with the highest energy on the third one, around 4 kHz. The second note is a brief and descending trill in no more than three musical semitones, from 2.1 to 1.7 kHz. In some cases, the call is truncated to just the

Table 2. Morphological measurements (mm, except for weight) of *Porzana spiloptera* recorded in different studies (modified from Chatellenaz & Zaninovich, 2009).

Measurement	Navas (1991)	Chebez (2008)	Chatellenaz & Zaninovich (2009)	Fariña et al. (2021)	This Study
Wing chord	74—75	—	76	74	77
Tarsus	23—23	25	23	24.6	22.6
Weight (g)					32.7

Figure 2. Juvenile of *P. spiloptera* captured in the Cruces River wetland (February 2021).

first note (Figure 4). We did not find a syntax pattern between the whole call and the truncated one. A sample of the *P. spiloptera* recordings used in this study can be found in xeno-canto.org (Morales 2022).

DISCUSSION

Our capture of a juvenile *P. spiloptera* proved the reproduction of the species and confirmed its status as resident for Chile. Moreover, the numerous confirmed vocalizations of the species from passive acoustic recordings, in a site located five kilometers away from the capture location during consecutive seasons, suggests its possible presence in different wetlands near the city of Valdivia city in the southern continental Pacific area of South America.

The great similarity between *P. spiloptera* and *L. jamaicensis* has certainly led to confusion and somehow cover-ups for both species. In Argentina, *L. jamaicensis* was described as a species inhabiting an extense area through Mendoza, San Juan, La Rioja and Bariloche (Fjeldså & Krabbe 1990, Straneck 1999). However, after identifying and knowing the acoustic repertoire of *P. spiloptera*, unknown until 2010 (López-Lanús et al 2012a), it was verified that most, if not all, those records correspond to *P. spiloptera* (Pagano et al. 2011). Thus, the subspecies *L. j. salinasi* could be endemic from Peru and Chile, as some authors suggested (Lucero 2013). In the same way, the evidence suggests that the presence of *P. spiloptera* in Chile (central and southern regions) has been confused with *L. jamaicensis* (Maureira et al. 2019), and that the Pacific population of the species went unnoticed for decades. For example, during acoustic surveys carried out between 2000 and 2002 in Valdivia (Ruiz 2002), heard and recorded songs were attributed, at the time, to variations of Black Rail's vocalizations. However, one corresponded to the "kee-krrr" song and others

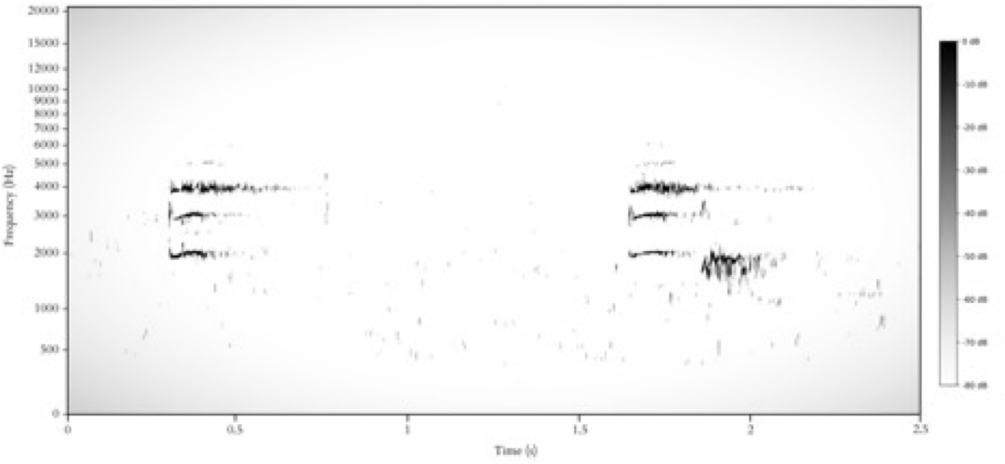

Figure 3. Spectrogram of the acoustic form and structure of the territorial ('kee – krrrr') call of *Porzana spiloptera*.

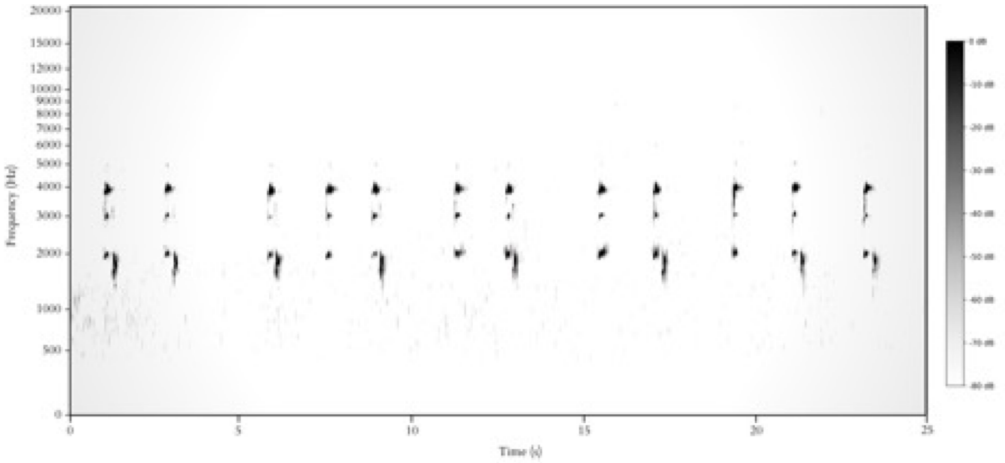

Figure 4. Spectrogram of a series of territorial calls of *Porzana spiloptera* intermixed with calls without the second note. (Full 5-minutes version available at Xeno-canto.org: XC696732 and at eBird.org: ML405532961/S100692542)

to the "pw" call of *P. spiloptera* (J. Ruiz pers. observ.). In the same context, after noticing our findings, other records have recently appeared for Los Ríos region (eBird 2022).

Currently, rails seem to be undergoing continuous population declines, mainly due to invasive predators, natural system modifications (Lévêque et al. 2021), or habitat loss (Lehnert 2019). Two decades ago, Taylor & van Perlo (1998) stated that palustrine wetlands, where most rails inhabit, were threatened throughout the world and were disappearing at an alarming rate. In addition, many species of Rallidae have limited flight capacities and low dispersal abilities mainly due to their low hand-wing index (Sheard et al. 2020) aggravating the problem of habitat fragmentation. However, some records of *P. spiloptera* in different habitat types and outside its known distribution area (Fariña et al. 2021, López-Lanús et al. 2012b, Maureira et al. 2019) suggest that this species may have a good dispersal capacity (Stervander et al. 2019) or make seasonal movements like other rails (*Laterallus jamaicensis*, *Porzana carolina*, *Coturnicops noveboracensis*, *Porphyrio porphyrio*) (Tsao et al. 2009, Garcia-R & Trewick 2015, Vallejos et al. 2017, Garcia-R & Matzke 2021).

Like those of other small rails, populations of *P. spiloptera* appear to be small, fragmented, and undergoing continuous decreases, being classified as 'Vulnerable' by the IUCN (BirdLife International 2022). In Chile, pollution, dredging to create grasslands or agricultural areas, and especially rapid residential and commercial development near wetland-cities such as Valdivia (Correa et al. 2018), are some of the threats that are causing the decline or disappearance of essential habitat for rails (Taylor & van Perlo 1998). Furthermore, the widespread presence of the American mink (*Neovison vison*) in Chilean wetlands (Mora et al. 2018, Fasola et al. 2021) entails an overall threat for ground-nesting rails. Based on our results, the vagueness (Prato 2005) about *P. spiloptera* and *L. jamaicensis* in Chile add urgent needs if we are to protect small austral rails.

In conclusion, our results show that two (rather than one) species of small rails are present in Los Ríos Region, southern Chile, effectively expanding the distribution of *P. spiloptera* c. 330 km south from the previous observations of the species in the country (Maureira et al. 2019). Our finding of a juvenile individual confirms that the species is not only present, but that it is breeding in the area, therefore remarking the need of revisiting the status of Pacific populations of *P. spiloptera* and, concomitantly, of *L. j. salinasi*. Also, our description of the activity patterns and vocalizations that can help guide efforts to detect the species in other wetlands where it may be present. We consider that *P. spiloptera* should be included for evaluation within the current conservation strategies and programs by the Chilean government. Finally, comprehensive surveys at different wetland types and dedicated research that could provide fundamental biological aspects, such as the current

distribution, population abundance, habitat requirements, detailed systematics, and main threats for these secretive rails are mandatory for their conservation. In this light, using passive sound recordings at known and potential habitats, analyzed with signal detection algorithms or neural networks (i.e. machine learning) that perform the task of automatic identification in a large volume of recordings, can provide the most critical information about the current distribution of the species in the country.

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