1 **NOTES ON THE BIOMETRY, ORIENTATION AND SPATIAL**
2 **LOCALIZATION OF THE NESTS OF THE GLOBALLY NEAR-**
3 **THREATENED STRAIGHT-BILLED REEDHAUNTER (*LIMNOCTITES***
4 ***RECTIROSTRIS*)**

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6 Maycon S. S. Gonçalves^{1,2}, Priscila dos S. Pons^{1,2}, Christian B. Andretti^{1,3}, Felipe C.
7 Bonow¹

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9 ¹Instituto Pró-Pampa (IPPampa), Laboratório de Ornitologia, Rua Uruguai, 1242, CEP-96010-630,
10 Pelotas, Rio Grande do Sul, Brazil

11 ²Instituto Cavanilles de Biodiversidad y Biología Evolutiva, Universidad de Valencia, Polígono La Coma,
12 s/n, 46980 Paterna, Valencia, Spain

13 ³Laboratório de Ornitologia, Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio
14 Grande do Sul, PUCRS, Caixa Postal: 1429. 90619-900, Porto Alegre, RS, Brazil

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16 **Corresponding author:** mayconsanyvan@gmail.com

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18 **Abstract**

19 We report the records of three nests of Straight-billed Reedhaunter, *Limnoctites*
20 *rectirostris*, in southernmost Brazil. For each nest, we collected information about the
21 biometry, spatial localization within the patch (border or inland) and cardinal orientation
22 of the incubation chamber. Information on number of eggs and reproductive success is
23 also presented. All nests were found early in September. The three nests were situated

24 on the edge of patches and guided incubation chamber opening between north and east.
 25 All results are discussed. The information presented herein extends the scarce
 26 knowledge about the breeding biology of the Straight-billed Reedhaunter.

27 **Key words:** breeding biology, inland wetlands, *Eryngium pandanifolium*, Passeriform

28

29 **Introduction**

30 The Straight-billed Reedhaunter (*Limnortyx rectirostris*) is an aquatic
 31 Passeriform that inhabits humid ecosystems dominated by *Eryngo Eryngium*
 32 *pandanifolium* Cham. & Schldl. (Apiaceae) of South America. This ecosystem is
 33 popularly called “gravatazal”, “caraguatal” or “gravatá-do-banhado” (in Portuguese)
 34 and, due to the close relationship of the Straight-billed Reedhaunter with this
 35 ecosystem, its popular scientific name has been recently changed from “junqueiro-do-
 36 bico-reto” to “arredio-do-gravatá” (Bencke et al. 2010). The species has no known
 37 migratory movements and its geographical distribution is limited to southernmost Brazil
 38 –in the Santa Catarina (Fontana et al. 2008) and Rio Grande do Sul states– and in
 39 neighboring countries; e.g., Uruguay (Aldabe et al. 2009) and Argentina (Chebez et al
 40 2011). In all these countries, the Straight-billed Reedhaunter is commonly included in
 41 Red Lists and the species are globally classified as near-threatened (Aldabe et al. 2009;
 42 Chebez et al. 2011; BirdLife International 2012; MMA 2014; Rio Grande do Sul 2014).
 43 Very little information on the biometry of nests has been reported for the species
 44 (López-Lanús 2016). Furthermore, there no up-to-date reflections exist on the factors
 45 that determine the orientation of the opening of this species’ nests and their spatial
 46 location within patches. In this work, we present information on the biometry, cardinal

orientation and spatial distribution of three Straight-billed Reedhaunter nests in southernmost Brazil, along with comments on this species' ecology.

Methods

Study area and data collection. Nests were located in the municipality of Bagé, southernmost Brazil (S 31° 17' 26,4' and W 54° 09' 32,7'). This region faithfully represents the Pampa Biome landscape and livestock is the main economic activity there (Pimentel 1940; Rambo 1959; IBGE 2014). In September 2012 we searched nests in the wetlands dominated by Eryngo located on the "Arvorezinha" stream border. Three nests were recorded. For each nest, information about biometrics, location within the patch (border or inland) and the cardinal orientation of chamber opening was collected. Nest measurements were: 1) plant species and height of support plant; 2) distance from the ground to the bottom base nest; 3) vertical and horizontal diameter of the chamber opening; 4) depth egg chamber. After 20 days, nests were reassessed, and information about abandonment and number of eggs and individuals was obtained.

Results

All nests were located on the edge of patches, on higher and dry sections of the ground (transition between patch and adjacent fields). Two nests were oriented to the north and one was oriented to the east. All nests had two eggs each. In the next month, juveniles in the proximity of two nests, and a nest abandoned with intact two eggs, were observed. Interestingly, the habitat of one of the successfully reproductive nests was totally destroyed in the incubation phase, but the parents remained until juveniles became independent. The mean and standard error ($\pm$ SE) of the nests measures were:

71 support plant height (108 ± 10.5); distance from ground to bottom of nests (48.1 ± 12.8);
 72 vertical outer diameter (17.7 ± 1.5); horizontal outer diameter (12.7 ± 3.7); incubation
 73 chamber depth (10.6 ± 2.5); horizontal inner diameter (4.2 ± 0.7) (Table 1).

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75 **Discussion**

76 *Biometry, number of eggs and reproductive success.* Overall the information
 77 found for our three study nests is consistent with the limited information available in the
 78 literature (Daguerre 1933; Ricci and Ricci 1984; Barbarskas and Fraga 1998; López-
 79 Lanús et al. 1999, López-Lanús 2016). Although the breeding season of Straight-billed
 80 Reedhaunter has been documented to fall between September and January (Belton
 81 1994), two of the three recorded nests were found early in September (two eggs in
 82 each), which indicates that the breeding period began at least in August.

83 *Spatial distribution of nests.* The three nests were located on the edge of patches.
 84 These observations are consistent with four other nests observed in southern Brazil (C.
 85 B. ANDRETTI & R. A. DIAS pers. com. to GONÇALVES, March 2015). It is known
 86 that wide microclimate variations exist between the interior and the edge of humid
 87 ecosystems (Raney et al. 2014), and that relative humidity strongly affects development
 88 of eggs (Ar and Sedis 2002). Once the breeding period of Straight-billed Reedhaunter
 89 begins in winter months, when the interiors of wetlands are usually flooded, the strategy
 90 adopted to build nests on the edge of patches might indicate the effect of factors like
 91 relative humidity and temperature. It is also possible that the nests located on the edge
 92 of patches constitutes a strategy to avoid the attention of predators during nesting as
 93 adults use the dense vegetation in the interior of patches to hunt insects.

94 *Cardinal orientation of nests.* Information about the cardinal orientation of nests
 95 in Straight-billed Reedhaunters is scarce. To date, only Barbarskas and Fraga (1998)
 96 have reported information on this species' cardinal orientation (northwardly oriented).
 97 However, it is known that the phylogenetic proximity between species is also reflected
 98 in the structural similarity of nests, especially in Furnariidae (Zyskowsky and Prum
 99 1999; Irestedt et al 2006; Ohlson et al 2013). Some studies conducted with Furnariidae
 100 nests have indicated that incubation chamber orientation does not always follow the
 101 same pattern, and that the same species may show structural changes according to the
 102 habitat conditions of each breeding season (Mezquida 2004; Greeney 2009). Of the
 103 three nests observed in our study, two oriented chamber opening to the north and east.
 104 Two other nests observed in southern Brazil in December 2005 were oriented to the
 105 south and north-northeast (R. A. Dias pers. com. to GONÇALVES, March 2015). It is
 106 known that nest orientation is interpreted as a response to microclimate conditions,
 107 especially wind direction and solar radiation (Yanes et al. 1996; Mezquida 2004; Burton
 108 2006; Greeney 2009). Overall, the collected information showed that Straight-billed
 109 Reedhaunter's nest orientation tended to lie between north and east. However, more
 110 information by comparing habitat structure and chamber orientation in different habitat
 111 situations would clarify the orientation pattern of this species' nests.

112 The results presented herein extend the scarce knowledge available about the
 113 reproductive biology of the Straight-billed Reedhaunter. This species is distributed in
 114 the form of metapopulations (patches spatially separated and connected by biological
 115 flows), and no information on the mechanisms that affect this species' abundance and
 116 distribution in areas under anthropic influence is available. Thus we finalize our
 117 contribution by encouraging research to measure the negative effects of different

anthropic activities on its population dynamics, which will provide better information for the conservation of this species.

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Table 1. Description of the characteristics of the nests observed in our study.

Characteristic	Nest 1	Nest 2	Nest 3
Support plant	<i>E. pandanifolium</i>	<i>E. pandanifolium</i>	<i>E. pandanifolium</i>
Support plant height (cm)	100	120	104
Distance from ground to bottom of nests (cm)	60	50	34.5
Vertical outer diameter (cm)	16	19	18.2
Horizontal outer diameter (cm)	16.9	11.7	9.6
Incubation chamber depth (cm)	13	8	10.8
Horizontal inner diameter (cm)	4.2	5	3.5
Number of eggs	2	2	2
Reproductive success	2	Abandoned	2
Cardinal orientation	North	East	North
Location	Border	Border	Border

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