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Bell-trap effectiveness to capture *Crypturellus obsoletus* and *Crypturellus tataupa* (Aves: Tinamidae) in southern Brazil

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ABSTRACT. Specific techniques for the efficient capture of forest tinamous in a short sampling time are yet poorly described in the literature. Here, we report the efficiency of the bell-trap in the capture of Brown Tinamou (*Crypturellus obsoletus*) and Tataupa Tinamou (*Crypturellus tataupa*), in southern Brazil. We used three bell-traps adapted with casting nets. In 80 hours of sampling effort, four adult individuals of *C. obsoletus* were captured, in a forest area in the Pampa Biome. This study area is located in the municipality of São Sepé, state of Rio Grande do Sul, Brazil. Subsequently, in 16 hours of sampling effort in a forest area of the Atlantic Forest domain, one individual of *C. obsoletus* and one of *C. tataupa* were captured. This other study area is located in the municipality of Passo do Sobrado, RS. The bell-trap method has already been reported as efficient in capturing Yellow-legged Tinamous (*Crypturellus noctivagus*), in southern Brazil. However, since forest tinamous are cryptical birds, field adaptations are often necessary to achieve success in sampling activities. The use of this method proved efficient in the capture of forest tinamous, generating an important tool for the collection of bioecological data of this group of birds, which still represents a lack of studies.

Keywords: Brown Tinamou; Tataupa Tinamou; Tinamous; Tinamiformes.

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Introduction

Tinamous are terrestrial birds endemic to the Neotropical region, inhabiting open or forested areas, depending on trophic requirements of each species. In the family Tinamidae, the genus *Crypturellus* is the most representative (Cabot, 1992; Sick, 1997). Due to its discreet behavior and coloring patterns, tinamous may go unnoticed by the researcher's eye even in their occurrence areas. However, these birds often vocalize during the breeding period, which facilitates their identification in the field due to the territorial behavior, being attracted by the reproduction of their calls (Cabot, 1992; Magalhães, 1994; Sick, 1997;). However, bioecological knowledge about this group still requires further studies (Cabot, 1992; Magalhães, 1994; Brennan, 2004, 2010; Corrêa & Petry, 2019; Corrêa, Finger, Benemann, Silva, & Petry, 2020).

Specific and effective techniques to capture forest tinamous are still scarce and generally lack specific adaptations for each species, in order to be successful in field activities (Brennan, 2004; Corrêa & Petry, 2018). For birds that move on the ground, Bub (1991) mentions some techniques that can be used in the capture of forest species. For birds of the genus *Crypturellus*, for instance, Silva, Freitas, & Momo (2013) reported the capture of the Small-billed Tinamou (*Crypturellus parvirostris*) using traps (Tomahawk). Accidental captures are also reported for *C. parvirostris* and Tataupa Tinamou (*Crypturellus tataupa*) with tomahawk traps (Freitas et al., 2013). However, for Yellow-legged Tinamou (*Crypturellus noctivagus*), the use of bell-traps showed effectiveness in the capture of a p

opulation in southern Brazil (Corrêa & Petry, 2018; Corrêa et al., 2020).

Brown Tinamou *Crypturellus obsoletus* (Temminck, 1815) (Tinamidae, Tinamiformes), is a forest bird occurring in Argentina, Brazil, Paraguay, Peru and Venezuela. Tataupa Tinamou *Crypturellus tataupa* (Temminck, 1815) is found in forest environments and areas adjacent to the forest, occurring in Argentina, Brazil, Paraguay and Peru. They are cryptic species to be viewed in the natural environment (Cabot, 1992;

Sick, 1997). However, its presence in nature is mostly recorded through auditory contact (Belton, 1994; Sick, 1997). Both species are not mentioned in the literature of the Brazilian territory with threat status (Instituto Chico Mendes de Conservação da Biodiversidade [ICMBIo], 2018), however, they are under pressure due to habitat fragmentation and hunting (Cabot, 1992; Belton, 1994).

Considering the lack of studies reporting effective methods in the capture of forest tinamous in short sampling periods, here we describe the effectiveness of bell-traps for the capture of *C. obsoletus* and *C. tataupa* in the field.

Material and methods

The study was initially conducted in a forest area (30° 05'35.3 "S, 53° 36'22.9" W) in the municipality of São Sepé, state of Rio Grande do Sul, Brazil. The fragment covers approximately 450 hectares (Corrêa, Silva, & Cappellari, 2010; Corrêa & Petry, 2019) inserted in the Pampa Biome (Instituto Brasileiro de Geografia e Estatística [IBGE], 2004). We concentrated efforts to test the capture of *C. obsoletus* in September 2015 (five samples) and later in October 2016 (five samples), using three bell-traps and three arapuca traps (i.e. a pyramidal trap made of branches, traditional from South American native populations). An additional study was carried out in January 2021 (two samples) in a forest area (29°47'21.7 "S 52°12'55.9" W) in the municipality of Passo do Sobrado, Rio Grande do Sul (Figure 1). The fragment covers approximately 400 hectares. The region is part of the Atlantic Forest Biome (IBGE, 2004). In this area, we used only three bell-traps, and we were able to capture an individual of *C. obsoletus* and one *C. tataupa*. Among the areas, each sampling effort lasted an average of eight hours, and the field activities started at 7 a.m.

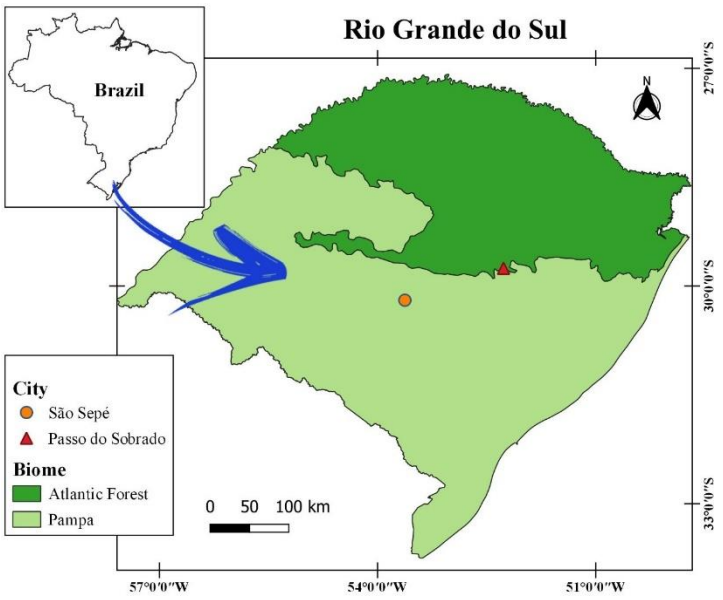

Figure 1. Location of study areas, municipality of São Sepé in a forest area of the Pampa Biome, and municipality of Passo do Sobrado in a forest area in the Atlantic Forest Biome, state of Rio Grande do Sul, Brazil.

The bell-trap is made using a 1.5mm mesh nylon fishing net, with an opening diameter of about 10 meters. To keep it open in the shape of an arc, a resistant and malleable plastic hose is used in its contour, forming a circle through the edges of the net (Corrêa & Petry, 2018). Nets were dyed dark green. To keep the bell-traps hanging at an average height of 1.5 to 2 meters from the ground, tree branches, stretched with a transparent, resistant nylon thread, were used as a base for fixing them (Figure 2). To maintain the nets stretched, three wooden poles (each about 40cm long) were used, fixed to the ground (Corrêa & Petry, 2018).

Arapuca traps were built using 6mm iron bars, in the shape of a rectangle (70x40x40cm) and covered with a heavyweight black plastic screen, fixed with plastic braces. An automatic trigger (adapted) at the center of the trap was designed to disarm when the bird enters the trap area (Figure 3). Rice and corn bran were used as bait, thrown on the ground under the trap area. Bell-traps were installed at random trails across the forest fragment, both on the edge and on the inside of the woods (Corrêa & Petry, 2018). The chosen sites presented appropriate visualization of the traps by the researcher, who was camouflaged within the vegetation (using jungle sniper clothes) and remained as quiet as possible beside the fixation poles. In the vicinity of the traps, a ceramic replica of similar coloration to the species was used to attract the birds (Figure 4).

Figure 2. Bell-trap model adapted with nylon net, used in the capture of Brown Tinamou (*Crypturellus obsoletus*) and Tataupa Tinamou (*Crypturellus tataupa*).
Source: Corrêa & Petry (2018).

Figure 3. Scheme of the procedures used in the field for capture. (a) Arapuca trap, adapted using iron bars instead of wood, and plastic braces. (b) Detail of the automatic trigger used.

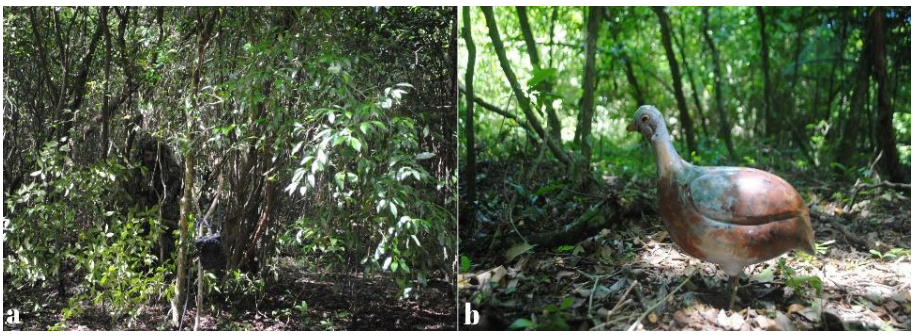

Figure 4. Scheme of the traps and of the procedures used in the field for capture. (a) Researcher in the forest using jungle clothes (sniper model), and speaker used to reproduce the playback of the species call. (b) Porcelain replica of a tinamou used.

The capture procedure on the trail was as follows: the first bell-trap was about five meters away from the researcher, the second 10 meters and the third up to 15 meters at most, considering the structure of the place for fixation, in such a way that they were arranged following a linear sequence. At a distance of about two meters from each bell-trap, a trap was inserted (Figure 5). The playback technique was used to attract the species. The playback was reproduced (using vocalization and calls) for up to two minutes on average, and with intervals of up to 20 minutes to start playback again. When the individual attracted in displacement was found in the range of any of the bell-traps, the researcher manually released the trigger and performed the capture (Corrêa & Petry, 2018).

Traps were installed the day before at the sampling site, which was also cleaned for capture activities. Cloudy or rainy days were not used for sampling because of the low light, which would make it difficult for

the researcher to see the traps from the observing point. The study was registered by the Biodiversity Authorization and Information System (SISBIO 47126-3 and 77043-1) and by the Animal Ethics Committee (CEUA PPECEUAI0.2014 and PPECEUA 01.2020, *Universidade do Vale do Rio dos Sinos*). The captured individuals were banded with a numbered aluminum ring, provided by the National Center for Research and Conservation of Wild Birds (CEMAVE) and released into the wild in the same place.

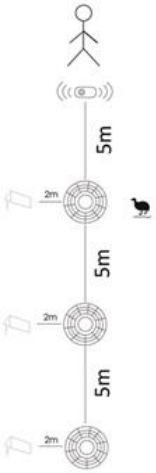

Figure 5. Scheme illustrating the capture procedure on trails, showing the linear arrangement of the traps. Arrangement of the replica, bell-traps and arapuca traps.
Source: Corrêa & Petry (2018).

Results and discussion

In 80 hours of sampling effort in the area in the Pampa biome, four adult *C. obsoletus* were captured using the bell-trap (two individuals in October 2015 and two others in September 2016, with no recapture). Arapuca traps in this study were not effective. In Corrêa & Petry (2018) the arapuca trap was also not effective in the capture of *C. noctivagus*. In a posterior study in an area of Atlantic Forest, in 16 hours of sampling effort in January 2021, an individual of *C. obsoletus* and one of *C. tataupa* were captured. Corrêa & Petry (2018) mention in their study on *C. noctivagus*, when attracted by the use of playback, moves slowly and cautiously around the traps. It seems to be predictable the exact moment to release the bell-trap. During capturing and handling *C. noctivagus*, the species was considerably quiet. However, attention is needed, as some individuals present thanatosis behavior at the time of handling (Corrêa & Petry, 2018). Similar behavior of thanatosis was reported for *Tinamus solitarius* (Tinamidae, Tinamiformes) (Brennan, 2004).

Individuals of *C. obsoletus* and *C. tataupa* captured in this study did not show thanatosis behavior. However, an apparent agitation was presented by both species at the time of capture. Different as mentioned in Corrêa & Petry (2018) for *C. noctivagus*. However, when attracted using playback, *C. obsoletus* and *C. tataupa* could take from 30 minutes to four hours to get close (responding to playback, vocalizing, and/or making brief calls). When their approach was detected at the capture site, they moved very quickly. Curiously, one individual (*C. obsoletus*) showed agonistic behavior and tried to attack the replica (in Pampa), crossing the trap area a few times and thus improving the capture success. Due to these fast displacements, in two moments, the bell-trap was triggered with delay, which caused capture failure (in Pampa). Both species that are the focus of the study, when attracted, may appear alone or in pairs, requiring the researcher's attention (Corrêa & Petry, 2018). Event already expected for forest tinamous (Cabot, 1992; Belton, 1994; Magalhães, 1994).

It is recommended to insert a piece of wood into the ground (at the center of the bell-trap's reach) and/or insert a portion of dry leaves (maximum 10 cm high), in order to facilitate the observation by the researcher, at the exact moment (when the bird reaches few centimeters close to this indicator), to manually release the trap at this moment. To avoid errors in the capture, the individual must be practically at the center of the trap. If the bird is not close enough to the center of the circle, we recommend not to release the bell-trap, as it may compromise the success of capture or even scare the individuals away. When noticed that the bird was close (suspicious) and did not move between the traps, a nylon thread was fixed on the replica and the researcher carefully pulled the thread, thus moving the replica. This movement is important because the attracted individual

seeks to approach the replica, making the capture successive. However, it is important to record the vocalization and/or calls of the individual and sometimes reproduce it, as mentioned in Corrêa & Petry (2018).

Considering that tinamous forests are cryptic in field studies (Cabot, 1992; Magalhães, 1994; Sick, 1997; Brennan, 2004, 2010; Corrêa & Petry, 2019; Corrêa et al., 2020), the bell-trap proved to be an efficient method for the capture of *C. noctivagus* (Corrêa & Petry, 2018; Corrêa et al., 2020) and *C. obsoletus* and *C. tataupa* (this study). This method is low cost and requires only two researchers to carry out field activities (Corrêa & Petry, 2018). Arapuca traps are mentioned in the literature as important means of capturing ground birds. However, the bell-trap has the advantage of being easily carried in a backpack, practicality for transport, and installation in the field - even if it needs the researcher to be actively involved in the captures.

Conclusion

We expect that the capture procedures using bell-traps are successful for other species of the genus *Crypturellus*, and possibly for other tinamous species. However, knowledge about the target species and the study area is required for adaptations. Finally, we expect the methodological procedures described above will contribute to the knowledge of bioecological information about this group, for instance, by allowing the collection of biological material, for ecological and/or taxonomic studies, of these cryptic forest birds.

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References

Belton, W. (1994). *Aves do Rio Grande do Sul: distribuição e biologia*. São Leopoldo, RS: Unisinos.

Brennan, P. L. R. (2004). Techniques for studying the behavioral ecology of forest-dwelling Tinamous (Tinamidae). *Ornitologia Neotropical*, *15*, 329-337.

Brennan, P. L. R. (2010). Clutch predation in great tinamous *Tinamus major* and implications for the evolution of egg color. *Journal of Avian Biology*, *41*(4), 419-426. DOI: https://doi.org/10.1111/j.1600-048X.2010.04999.x

Bub, H. (1991). *Bird trapping and bird banding: a handbook for trapping methods all over the world*. New York, NY: Cornell University Press.

Cabot, J. (1992). Tinamous (Tinamidae). In: J. Del Hoyo; A. Elliot, & J. Sargatal (Eds.). *Handbook of the Birds of the World* (p. 112-125). Barcelona, Lynx Editions.

Corrêa, L. L. C., & Petry, M. V. (2018). Testing capturing methods for the Yellow-legged Tinamou *Crypturellus noctivagus* (Wied, 1820) (Aves, Tinamidae) in southern Brazil. *Papéis Avulsos de Zoologia, 58*, e20185807. DOI: https://doi.org/10.11606/1807-0205/2018.58.07

Corrêa, L. L. C., & Petry, M. V. (2019). Stomach content analysis of *Crypturellus noctivagus noctivagus* (Tinamiformes: Tinamidae) in southern Brazil. *Oecologia Australis*, *23*(1),145-149. DOI: https://doi.org/10.4257/oeco.2019.2301.13

Corrêa, L. L. C., Silva, D. E., & Cappellari, L. H. (2010). Aves, Tinamidae, *Crypturellus noctivagus noctivagus* (Wied, 1820): southward range extension and rediscovery in Rio Grande do Sul, Brazil. *ChekList, 6*(4), 485-486. DOI: https://doi.org/10.15560/6.4.585

Corrêa, L. L. C., Finger, J. V., Benemann, V. R. F., Silva, D. E., & Petry, M, V. (2020). Morphometry and sexual dimorphism in the Yellow-Legged Tinamou *Crypturellus noctivagus noctivagus* in southern Brazil. *Oecologia Australis*, *24*(1),101-108. DOI: https://doi.org/10.4257/oeco.2020.2401.08

Freitas, M. A., Miranda, T. F., França, D. P. F., Abraão, J., Oliveira, L., Silva, D. C. ... Silva, T. F. S. (2013). Registros de capturas acidentais de aves e répteis em armadilhas para mamíferos no estado da Bahia, Brasil. *Atualidades Ornitológicas*, *175*, 33-39.

Instituto Brasileiro de Geografia e Estatística [IBGE]. (2004). *Mapa de Vegetaçã o do Brasil,Esc. 1:5.000.000. Primeira aproximação*. Brasília, DF: Instituto Brasileiro de Geografia e Estatística e Ministério do Meio Ambiente. Retrieved from ftp://ftp.ibge,gov.br/Cartas_e_Mapas/Mapas_Murais/Vegetação_pdf.zip

Instituto Chico Mendes de Conservação da Biodiversidade [ICMBIo]. (2018). *Livro Vermelho da Fauna Brasileira Ameaçada de Extinção: Volume III - Aves*. Retrieved from https://www.icmbio.gov.br/portal/images/stories/comunicacao/publicacoes/publicacoes-diversas/livro_vermelho_2018_vol3.pdf

Magalhães, J. C. R. (1994). Sobre alguns tinamídeos florestais brasileiros. *Boletim Centro de Estudos Ornitológicos, 10*, 16-24.

Sick, H. (1997). *Ornitologia Brasileira*. Rio de Janeiro, RJ: Nova Fronteira.

Silva, V. B. C., Freitas, F. L. C., & Momo, C. (2013). Aspectos morfológicos do proventrículo e ventrículo gástrico de *Crypturellus parvirostris* (Wagler, 1827). *Ciência Animal Brasileira*,*14*(1), 106-112. DOI: https://doi.org/10.5216/cab.v14i1.17331