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## **Bioacoustic Characteristics and Population Numbers of Endemic *Cinclodes oustaleti baekstroemii* (Aves: Furnariidae) Lönnberg, 1921 of Alejandro Selkirk Island, Chile**

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**Abstract.** Two types of vocalisation of the endemic Masafuera Grey-flanked Cinclodes *Cinclodes oustaleti baekstroemii* Lönnberg, 1921 are distinguished: contact call and song. The call is a whistle-like “chic” similar to that of the mainland taxon *C. o. oustaleti*. The song is described for the first time and illustrated by sonagrams. It is a low, melodic series of pearling notes uttered early in the morning. Song sequences vary in duration, being about two to five seconds long. The frequency amplitude of elements ranges from 5.3 to 7.7 kHz, showing core frequencies from 5.8 to 6.8 kHz. Elements are usually separated by pauses of about 0.03 seconds. At the beginning and end of a sequence the song pauses are extended up to 0.15 seconds. The song is low and only heard for a short distance, maybe as it is addressed to the partner at one specific site. The first census counts of this endemic species were carried out using the line transect method. Both estimates of its population size (in the years 1994/95 and 2002) resulted in a total number of approximately 1500 individuals. Thus no negative population trend was detected; however, this small population confirms the “vulnerable” conservation status of the Masafuera Cinclodes. Conservation management should include further population monitoring and eradication of introduced mammals.

**Keywords.** Vocalisations, song, call, Masafuera Grey-flanked Cinclodes, Juan Fernandez, *Cinclodes oustaleti baekstroemii*, transect method, island census, conservation basis.

**Resumen.** Dos tipos de vocalización del endémico Churrete chico de Másafuera *Cinclodes oustaleti baekstroemii* Lönnberg, 1921 fueron distinguido, grito de contacto y canto. El grito es un gorjeo (“chic”) similar a eso del *C. o. oustaleti* en tierra firme. El canto ha sido descrito para primera vez y esta ilustrado por sonagrames. El canto es una serie de tonos bajos y melódicos cantado temprano en la mañana. Secuencias de canto pueden variar en su duración, por lo menos de dos a cinco segundos. La frecuencia de los elementos tiene un rango de 5,3 a 7,7 kHz con una frecuencia principal de 5,8 a 6,8 kHz. Elementos usualmente están separados por pausas de próximamente 0,03 segundos. En el inicio y fin del canto pausas están alongadas hasta 0,15 segundos. La rara y baja presentación del canto da indicación para la ausencia de una adaptación vocal compensativa a las condiciones isleñas ventosas. Usando el método de transectos lineares, dos censos de la población han sido realizados (en los años 1994/95 y 2002), que han sido resultados en un numero total de próximamente 1500 individuos en Isla Alejandro Selkirk. Por eso no tendencia critica de la población ha sido detectada, pero el Churrete chico de Másafuera es clasificado como vulnerable. Manejo de conservación debe incluir monitorio de su población e erradicación de mamíferos introducidos.

**Zusammenfassung.** Zwei Typen der Lautäußerung des endemischen Masafuera-Graufanken-Uferwippers (*Cinclodes oustaleti baekstroemii* Lönnberg, 1921) werden unterschieden: Kontaktruf und Gesang. Der Ruf ist ein pffifartiges „tschick“ ähnlich dem von *C. o. oustaleti* auf dem Festland. Der Gesang wird hier erstmals beschrieben und durch Sonagramme illustriert. Er ist eine leise und melodisch vorgetragene Serie perlender Töne, die am frühen Morgen geäußert wird. Gesangssequenzen können in der Länge von etwa zwei bis fünf Sekunden variieren. Die Frequenzamplitude von Elementen reicht von 5,3 bis 7,7 kHz bei einem Kernfrequenzbereich von 5,8 bis 6,8 kHz. Elemente werden durch kurze Gesangspausen von ca. 0,03 Sekunden voneinander getrennt. Am Anfang und Ende der Gesangsstrophe sind die Pausen bis zu 0,15 Sekunden verlängert. Der leise und nur in geringer Distanz vernehmbare Gesang ist möglicherweise an den Partner an einem bestimmten Ort adressiert. Mittels der Linien-Transect-Methode wurden die ersten Populationserfassungen dieses Endemiten durchgeführt. Die darauf basierenden Gesamtbestandszahlen führten in den Jahren 1994/95 sowie 2002 jeweils zu einer Anzahl von etwa 1500 Individuen auf Alejandro Selkirk. Demnach wurde zwar kein negativer Populationstrend festgestellt, aufgrund der kleinen Populationsgröße ist jedoch der Gefährdungsstatus („vulnerable“) für den Masafuera-Uferwipper zutreffend. Schutzmaßnahmen sollten ein weiteres Bestands-Monitoring und die Bekämpfung eingeschleppter Säugetiere beinhalten.

## 1. INTRODUCTION

The Juan Fernandez Islands are the most important endemic bird area of Chile and host more endemic bird taxa than any other region of this country (cf. WEGE & LONG 1995). However, they face severe conservation problems as for example seen by the low population size of another endemic landbird species, the Masafuera Rayadito *Aphrastura masafuerae* (Philippi & Landbeck, 1866) (PHILIPPI & LANDBECK 1866; BROOKE 1987; HAHN 1998). For the endemic Grey-flanked Cinclodes *Cinclodes oustaleti baeckstroemii* Lönnberg, 1921, a population census had never been carried out. Together with *Aphrastura masafuerae* it represents a biogeographical outpost of the Neotropical ovenbird family (Aves: Furnariidae), being limited to only Juan Fernandez in the South-east Pacific (cf. SCHLATTER 1987).

The collector Bäckström (LÖNNBERG 1921) and later observers (cf. JOHNSON 1967) reported *Cinclodes oustaleti baeckstroemii* from Alejandro Selkirk as well as from Robinson Crusoe islands. Interpreting these sources, the population on Robinson Crusoe appears to have been smaller and more oscillating than that of Alejandro Selkirk. However, probably due to lack of adequate data, recent reviews do not differ between islands, and simply state the entire Juan Fernandez Archipelago as the distribution area, therefore including also Santa Clara (JARAMILLO 2003; REMSEN 2003). Due to its insular distribution area and the general conservation problems of the archipelago, this endemic cinclodes was already classified as “vulnerable” in the red list of terrestrial vertebrates of Chile by GLADE (1993).

Little is known about its population and biology in general, partly in relation to the remoteness of the islands and the badly accessible terrain. An additional difficulty hampering any population census was the fact that its vocalisations had not been described. However, reliable census data are fundamental for any conservation management. Presenting the first description of vocalisations and the first population data, I aim to provide basic information for the endemic Masafuera Cinclodes. It may help researchers and managers to acoustically identify individuals in the field, and to monitor the population in the future.

## 2. METHODS

The study area is Isla Alejandro Selkirk (formerly Masafuera), the westernmost island of the Juan Fernández Archipelago (33°45'S and 80°45'W). Alejandro Selkirk is in the South-east Pacific 167 km west of the other major island Robinson Crusoe, and 769 km off the coast of Chile.

The archipelago is biogeographically isolated by lacking any neighbouring islands within a 500 km-zone, and the cool Humboldt Current separating it from the South American continent. Alejandro Selkirk (44.64 km<sup>2</sup>) is of young volcanic origin, shaped like a big rock dome and is one of the steepest islands worldwide. It is entirely part of the Juan Fernández national park founded in 1935, and UNESCO Biosphere Reserve since 1977. More detailed geographical descriptions may be taken from CASTILLA (1987) and SKOTTSBERG (1920–1956).

Field work was carried out on the island during the austral summers from 25 November 1992 to 1 February 1993, 15 December 1994 to 9 February 1995, and 23 January to 8 February 2002. Visual field identification of birds was straight foreword, basing on ARAYA et al. (1992; cf. also JARAMILLO 2003) and the original description (LÖNNBERG 1921). Acoustic identification was possible after learning the bird vocalisations while they were under visual observation and taping with a DAT-Recorder (Sony, Type HD-S100). An ordinary external microphone with additional wind protection was placed in suitable field position. Evaluation of the tape recordings was done with the program AVISOFT-SONAGRAPH PRO.

For the estimation of bird populations a number of methods have been developed during the past decades (overviews in RALPH & SCOTT 1981; BIBBY et al. 2000). The abundance data should reach a high level of comparability and cover a maximum area. Therefore the line transect method was chosen (description by EMLÉN 1971, 1977). Although a quantitative method is determined to be efficient if two-thirds of the present birds are recorded (EBERHARDT 1978), I aimed to record a significantly higher portion. Thus, I chose a small transect width, and tried to record birds by visual as well as vocal contact. On the Juan Fernandez Islands a total of 111 line transect counts were carried out from 1992 to 2002. Different transect areas and habitat types were covered (for details see HAHN 1998).

## 3. RESULTS

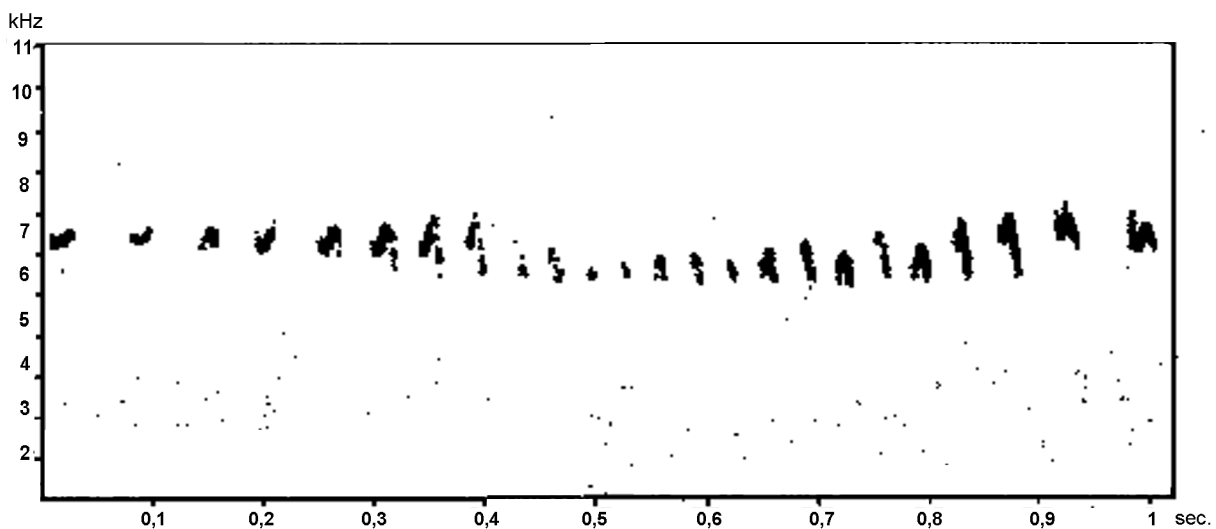
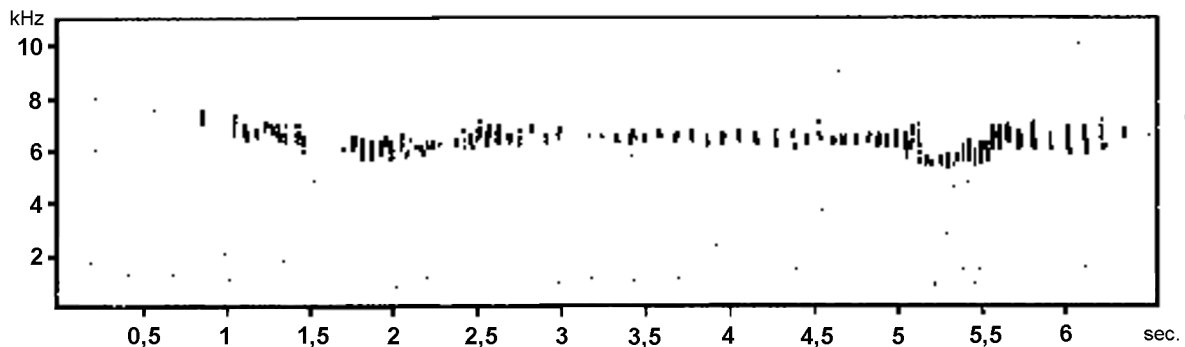
*Cinclodes oustaleti baeckstroemii* is a small brownish-grey bird of generally inconspicuous appearance, showing long white-framed tail feathers, a whitish supercilial stripe, and a small body size (cf. also FJELDSÅ & KRABBE 1990; RIDGELY & TUDOR 1994; REMSEN 2003). It flicks its tail up and down like a wagtail, often in the vicinity of water in a brook. It searches rocks, boulders, stone walls, mosses, and lichens for arthropod prey, flying mostly for short duration and distance only. Even in flight the bird reminds to wagtails (*Motacilla*), for example when dynamically manoeuvring with its long tail to follow a flying insect.

It mostly lands on top of stones, rocks or other open places. Only rarely it may land on ferns or other tall plants. No individuals were observed inside the vegetation.

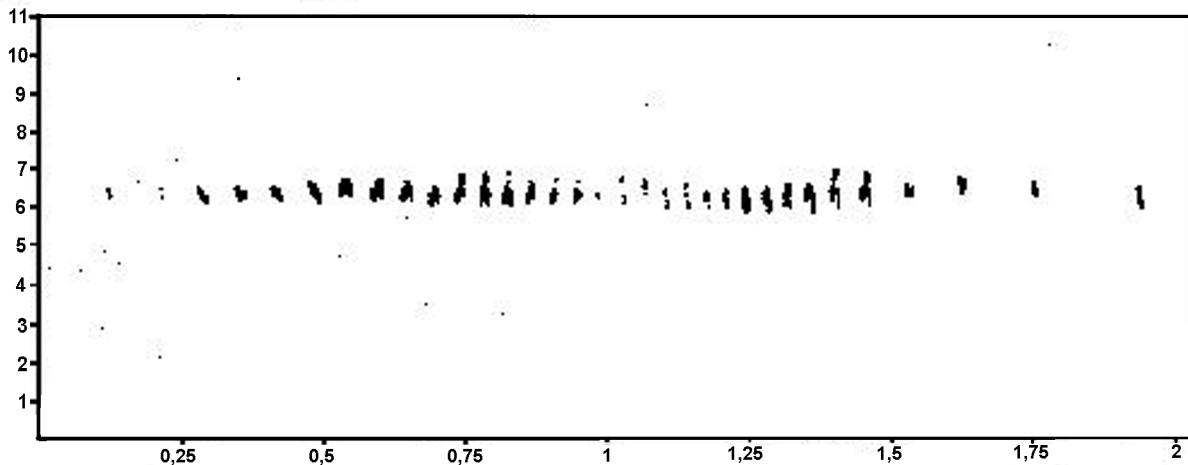
#### Description of vocalisation types

Two principal types of vocalisation were identified: call and song. The call is a monotonous “chic” or may also be titled a whistle-like call. It is uttered very similar throughout the whole genus, either single or in a loose series of calls. The song of this endemic taxon was recorded for the first time and is described here through sonagrams (Figs. 1 & 2). It is uttered in the early morning by only one individual of the pair (probably the male). The song is a melodic series of pearling notes.

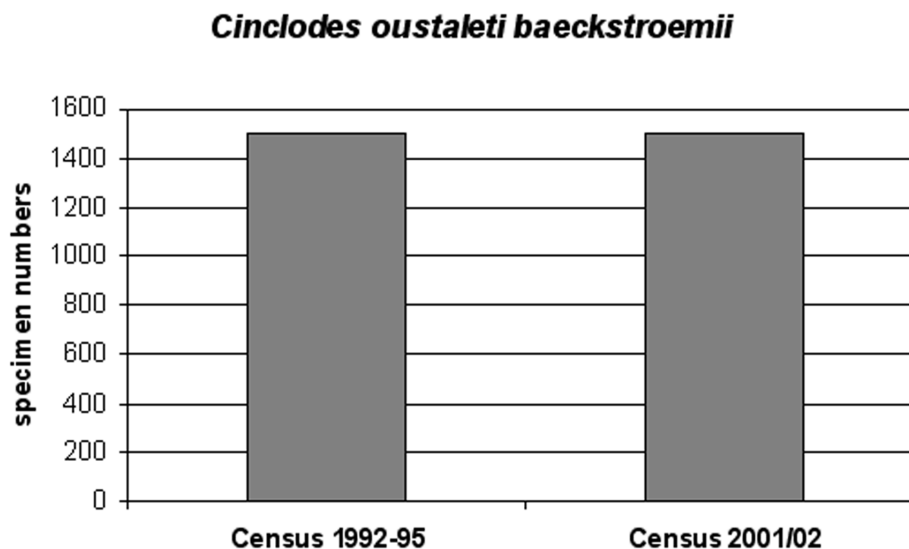
Song elements are limited to frequencies between 5.3 and 7.7 kHz (Fig. 1a). Within this amplitude the extension of elements varies and a wave-like structure is recognised. In Figure 1b it is visible that the frequency of song elements is slightly different. Single elements are mostly open below or sometimes have the structure of an “S” laid on its side (e.g., last element of Fig. 1b). The short sequence (Fig. 2) illustrates the most covered frequency level of 5.8 to 6.8 kHz. This corresponds to frequency amplitudes of single elements covering about one kilo hertz (kHz). At the beginning and end of the sequence single elements are arranged looser/slower (0.1–0.15 sec.), whereas in the central song elements are closer to each other, and thus following faster with pauses of approximately 0.03 seconds.



**Fig. 1 (a & b).** Song of the Másafuera Grey-flanked Cinclodes *Cinclodes oustaleti baeckstroemii* Lönnberg, 1921 on Alejandro Selkirk Island. A) Long sequence of 5.5 seconds (N=256, F=100, O=0, kHz =22); B) Section of A of 1 seconds duration (from 4.75 to 5.75 sec. on the time scale) (N=512, F=50, O=93.5, kHz =22.05); Evaluation levels of the program AVISOFT-SONAGRAPH PRO are given in parentheses.



**Fig. 2.** Song of the Máfufuera Grey-flanked Cinclodes *Cinclodes oustaleti baekstroemii* Lönnberg, 1921 on Alejandro Selkirk Island. Short sequence of 1.8 seconds duration (N=512, F=50, O=88, kHz =22).



**Fig. 3.** Total population numbers of the Máfufuera Grey-flanked Cinclodes *Cinclodes oustaleti baekstroemii* Lönnberg, 1921 on Alejandro Selkirk Island in comparison of two census periods. Censuses were carried out using a modified version of the line transect method (cf. HAHN 1998).

### Population numbers

During census counts and additional observations from 1992 to 2002 no Masafuera Cinclodes specimen was observed on the islands Robinson Crusoe and Santa Clara. This is an important result, as *C. o. baekstroemii* was repeatedly observed on Robinson Crusoe during the last century (LÖNNBERG 1921; JOHNSON 1967), and even recent reviews state the whole Juan Fernandez Archipelago as the distribution area (JARAMILLO 2003; REMSEN 2003). On Alejandro Selkirk they were recorded during eight transect counts with 49 specimens, and mapped during numer-

ous non-transect excursions. Thus the Masafuera Cinclodes is presently interpreted to be endemic only to Alejandro Selkirk, in spite of the fact that single individuals also have been seen on Robinson Crusoe in the past (LÖNNBERG 1921). They inhabit all elevation levels up to the top of the summit of Los Inocentes (1320 m) and may be found in all habitat types. Preferred landscape structures are the washes and V-shaped Quebradas, which also carry water in the summer; for example, the Quebradas Tongo, Varadero, Inocentes, Vacas, Casas, Sanchez, and Guaton. The rocky beaches are only occupied where fresh-

water is nearby, for example at the end of Quebrada Inocentes. However, *Másafuera Cinclodes* may be abundant in some upland regions too, where no permanent waters exist, namely in moist areas often covered with clouds. Few specimens were seen resting on the top of tall plants or visiting dry grasslands where no washes are nearby.

Only a very few indicators exist to reconstruct the population development of *Cinclodes oustaleti baeckstroemii*. In the year 1917, Bäckström (LÖNNBERG 1921) called them "common" in certain regions of Alejandro Selkirk. In the year 1986, BROOKE (1987) made a similar general statement. In 1994/95 I carried out the first census of this cinclodes, which resulted in an estimate of about 1500 individuals. On this set of data no population trend or any type of fluctuation can be reconstructed for historical times. It seems that this endemic taxon was widely distributed and quite common on Alejandro Selkirk during the last century. The 2002 census also led to a size of approximately 1500 specimens. Thus no changes in the population size have taken place within this seven year period. Also no significant differences were found by comparing exactly the same three transect routes on Alejandro Selkirk in 1994/95 (20 individuals) and in 2002 (19 individuals).

#### 4. DISCUSSION

The common call of *C. o. baeckstroemii* sounds very similar to that of *C. o. oustaleti*, and even to some other species of *Cinclodes* on the mainland. Its primer function seems to keep vocal contact between two partners or members of a family party. The song of *C. o. baeckstroemii* is a fine and rather low vocalisation type that is not heard beyond a distance of more than 100 m. Thus, no obvious audible adaptation to the harsh and windy conditions on this oceanic island can be identified. In contrast, two other endemic landbirds (*Aphrastura masafuerae* and *Sephanoides fernandensis*) have developed significantly louder and/or more intense vocalisations on the Juan Fernandez Islands (e.g., HAHN & MATTES 2000).

Another remarkable fact is that only a very few singing *C. o. baeckstroemii* were observed, and few songs were heard throughout the entire study time. This is remarkable as cinclodes were not rare on the island, present in many habitat types, and holding territories in most regions. Maybe singing is more frequent in early spring and largely decreased when males are bound in pairs. This represents a difference to the island's other endemic furnariid (*Aphrastura masafuerae*), which continues to sing every morning even during breeding and nestling time. Sonagram comparisons with mainland *C. o. oustaleti* are not yet possible, as tape-recordings of this form are lacking.

The total population size of about 1500 corresponds to an average density of 3.4 individuals per 10 hectares. This seems to represent a realistic value, taking into account that the well-watered canyon bottoms are the preferred habitat, and that pastures or other dry areas remain uninhabited. Through the impact of fires and introduced goats the open habitats increased on the island since discovery in 1574. Through such destruction of vegetation, several of the canyons in the North of the island carry no water during summer, but probably have done so when the vegetation was intact. Thus, many northern canyons presently are not inhabited by *C. o. baeckstroemii* due to lack of freshwater.

Another threat comes from introduced predators. Cats *Felis catus* f. *catus* (Linnaeus, 1758), Norway rats *Rattus norvegicus* (Berkenhout, 1769), Ship rats *R. rattus* (Linnaeus, 1758), and House mice *Mus musculus* (Linnaeus, 1758) have landed on Alejandro Selkirk, and have grown wild (HAHN & RÖMER 2002). At least cats and mature rats are able to prey on adult passerine birds (RÖMER 1995), but all four are known to prey on bird broods. The impacts of these pest species on the population of the Másafuera Cinclodes have not yet been investigated. Taking into account its small distribution range, especially the absence from Robinson Crusoe, this endemic species should be upgraded in the Chilean Red List from "vulnerable" (GLADE 1993) to "endangered". The population size shows no critical trend, but should be monitored for a five-year interval. The principal conservation goal must be the eradication of all introduced mammals, but for efficiency reasons campaigns should start with goats.

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#### REFERENCES

- ARAYA B., MILLIE, G. & BERNAL M. 1992. Guía de campo de las aves de Chile. Editorial Universitaria, Santiago de Chile.
- BIBBY, C. J., BURGESS, N. D., HILL, D. A. & MUSTOE, S. H. 2000. Bird census techniques. Academic Press, London & San Diego.
- BROOKE, M. de L. 1987. The Birds of the Juan Fernandez Islands, Chile. ICBP Study Report No. 16: 1–50.
- CASTILLA, J. C. 1987. Islas oceánicas Chilenas: conocimiento científico y necesidades de investigaciones. Ediciones Univ. Católica de Chile, Santiago de Chile.
- EBERHARDT, L. L. 1978. Transect methods for population studies. *Journal of Wildlife Management* 42: 1–31.
- EMLÉN, J. T. 1971. Population densities of birds derived from transect counts. *The Auk* 88: 323–342.

- EMLÉN, J. T. 1977. Estimating breeding season bird densities from transect counts. *The Auk* **94**: 455–468.
- GLADE, A. A. 1993. Libro rojo de los vertebrados terrestres de Chile. Impresora Creces Ltda., Santiago Chile.
- HAHN, I. 1998. Untersuchungen zur Ökologie und zum Lebensraum der Landvogelgemeinschaften des Juan Fernández-Archipels (Chile). WWU-Münster, Münster.
- HAHN, I. & MATTES, H. 2000. Vocalisations of the Másafuera Rayadito *Aphrastura masafuerae* on Isla Alejandro Selkirk, Chile. *Bioacoustics* **11**: 149–158.
- HAHN, I. & RÖMER, U. 2002. Threatened avifauna of the Juan Fernández Archipelago, Chile: the impact of introduced mammals and conservation priorities. *Cotinga* **17**: 56–62.
- JARAMILLO, A. 2003. Birds of Chile. Princeton Univ. Press, Princeton.
- JOHNSON, A. W. 1967. The birds of Chile and adjacent regions of Argentina, Bolivia and Peru. Volume 2. Platt Establecimientos Gráficos S. A., Buenos Aires.
- LÖNNBERG, E. 1921. The birds of Juan Fernandez Islands. Pp. 1–17 in: SKOTTSBERG, C. (ed.). The natural history of Juan Fernandez and Easter islands: Zoology, Vol. 3. Almqvist & Wiksells Boktryckeri, Uppsala.
- PHILIPPI, R. A. & LANDBECK, L. 1866. Beiträge zur Fauna Chiles. *Archiv für Naturgeschichte* **32**: 121–132.
- RALPH, C. J. & SCOTT, J. M. 1981. Estimating the number of terrestrial birds. *Studies in Avian Biology* **6**: 1–630.
- REMSÉN, J. V. 2003. Family Furnariidae (ovenbirds). Pp. 162–357 in: DEL HOYO, J., ELLIOTT, A. & CHRISTIE, D. (eds.) Handbook of the birds of the world: Broadbills to tapaculos, Vol. 8. Lynx Editions, Barcelona.
- RIDGELY, R. S. & TUDOR, G. 1994. The Birds of South America. Univ. Texas Press, Austin.
- RÖMER, U. 1995. Wanderratten (*Rattus norvegicus*) erbeuten Haussperlinge (*Passer domesticus*). *Charadrius* **31**: 175–180.
- SCHLATTER, R. P. 1987. Conocimiento y situación de la ornitofauna en las islas oceánicas Chilenas. Pp. 271–285 in: CASTILLA, J. C. (ed.) Islas oceánicas Chilenas: conocimiento científico y necesidades de investigaciones. Ediciones Univ. Católica de Chile, Santiago de Chile.
- SKOTTSBERG, C. 1920–1956. The natural history of Juan Fernandez and Easter islands, 3 Vols. Almqvist & Wiksells Boktryckeri, Uppsala.
- WEGE, D. C., & LONG, A. J. 1995. Key Areas for Threatened Birds in the Neotropics. Burlington Press, Cambridge.

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