

The migration routes of the Tawny-throated Dotterel *Oreopholus ruficollis* in Chile: resolving a complex jigsaw puzzle

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Vilina, Y. A. & J. L. González 1998. The migration routes of the Tawny-throated Dotterel *Oreopholus ruficollis* in Chile: resolving a complex jigsaw puzzle. *Wader Study Group Bull.* 87: 59-65.

The Tawny-throated Dotterel *Oreopholus ruficollis* is a neotropical plover endemic of South America. There is a dearth of knowledge regarding its biology, distribution, and migration routes. The present study consists of information obtained by the authors at 21 sites in Chile and a bibliographical review of the literature of this species in the country. Although the Tawny-throated Dotterel's distribution includes all of Chile, there are some regions in the south of Chile for which there are no records. There are nesting sites in the extreme south of the continent, in the lowlands of the northern central zone of Chile, and in the highlands in the extreme north of the country (pune zone). During winter and spring the species can be observed in the lowlands of the northern and central zones of the country, and in the high 'cordillera' of the extreme north. During the summer months it nests in the extreme south of the country and disappears from the lowlands of the northern and central zones; it is also less frequent in the highlands of the extreme north. The authors postulate the existence of two populations: one southern, one northern. The southern population, part of which migrates to central and northern Chile, breeds during the summer months in Aysen and Magallanes, and migrates along the eastern fringe of the southern extreme of the continent towards Argentina and Uruguay. The northern population breeds in the highlands and lowlands in the north during the spring and beginning of the summer and migrates to unknown places between December and the beginning of April. Considering the tolerance of this species to high altitude environments, it is possible that part of this population crosses the Andes to Argentina and Peru, the other part remaining in the highlands of Chile during the summer.

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INTRODUCTION

The Tawny-throated Dotterel *Oreopholus ruficollis* is a neotropical plover found along the west of South America from Patagonia in the southern tip of the continent to the north of Peru and south of Ecuador, but only breeding as far north as an area south of Puno, Peru. It occurs both along the coast and along the Andes up to 4,500 m. The populations that breed in Patagonia migrate in late autumn to the eastern areas of South America i.e. the north-east of Argentina and the south of Uruguay. In Chile, the lowland populations in the north of the country are thought to be sedentary, and breed on plains or gentle hill slopes with pasture or bushes. The highland populations, including those in the pune zone i.e. the highlands of Arica and Antofagasta to the north of Copiapo, breed on semi-arid ridges of open heathlands and overgrazed grassland or sandy areas with sparse vegetation (Fjeldsa & Krabbe 1990; del Hoyo *et al.* 1996) and move to lower altitudes in winter (Hayman *et al.* 1986).

There is scant knowledge regarding the biology, seasonal distribution, migration routes and the status of populations of this species. The present study outlines the distribution of the Tawny-throated Dotterel and suggests the timing and location of possible migration routes that this species takes in Chile.

METHODS

The authors have visited 21 areas in central and northern Chile between 18°53'S and 34°29'S, and between 0 and 5,000 masl

(Table 1), 13 of these sites occasionally and eight in at least two seasons. The general characteristics of the habitats of these locations indicate suitability for the Tawny-throated Dotterel. Presence and abundance were determined by walking linear transects one km in length, with a 200 m wide sampling belt (Emlen 1971). In each case, seasonal presence, number of individuals, size of the flocks and habitat were recorded. This information as well as that obtained by game wardens from three protected areas was summarized.

In addition to this, a bibliographical review of knowledge of this species in Chile was undertaken. This review considered all publications reporting observations of this or other species of plover (in the assessment on negative records). Information about birds collected in Chile is also included, both from the published literature and from the collection of the "Museo Nacional de Historia Natural" of Santiago (MNHN).

RESULTS

The observations undertaken at the 21 sites considered in this study are summarized in Table 1. The species has recently been seen between autumn and spring in the highlands of Arica, in the Salar de Surire and the highlands of Iquique, and in the lowlands between Pan de Azúcar and Fray Jorge National Parks, in the north. During the same period, dotterels have only been observed once in the central region at Peñuelas Lake (Figure 1). In addition to these observations, there are occasional sightings from the rubbish dumps of Antofagasta



Table 1. Presence of the Tawny-throated Dotterel in the twenty one areas visited by the authors.

Site No.	Location	Coordinates	Date of visit	Comments
1	Salar de Surire	18°53'S-69°05'W	06.01.93 -02.20.95	Two adults in June. Two couples in Feb. One adult with two fledglings and another adult with one young.
2	Highlands of Oquique, between Salar de Coposa and source of Loa river	20°40'S - 68°40'W	01.20.93-01.16.94 08.12.94	Flocks of three specimens in winter.
3	El Salvador, from Quebrada Amarilla to Salar de Pedernales	26°15'S-69°30'W	07.19.90	Not found
4	Pan de Azucar National Park	26°08'S-70°40'W	J.Pinares pers.com.	Common in winter and spring
5	Outlet of the Copiapo river	27°40'S-71°10'W	02.09.88-08.13.88 12.02.91	Flocks of three and 20 in August
6	Bahia Salado	27°40'S-70°44'W	09.19.90	Flocks of four and ten plovers
7	Outlet of the Huasco river	28°25'S-71°10'W	05.06.88	Not found
8	Northern area of Vallenar	28°53'S-70°46'W	07.15.90-08.10.91	Flock of ten plovers. One adult with two chicks in August
9	Caleta Punta de Choros	29°15'S-71°26'W	04.20.91-07.20.91 12.03.91-03.17.19	Two individuals in April. Flocks of 16, 13, 12 and two specimens in July.
10	Recoleta Dam	30°28'S-71°07'W	09.01.87	Not found
11	Fray Jorge National Park	30°40'S-70°40'W	Gameswarden pers.com.	Winter visitor
12	Outlet of the Limari river	30°43'S-71°42'W	09.04.87-11.10.92	Not found
13	Culimo Dam	32°05'S-71°12'W	12.11.87	Not found
14	Outlet of Choapa river	31°36'S-71°35'W	10.01.87-20.12.92	Not found
15	Outlet of the La Ligua river	32°25'S-71°28'W	05.04.88	Not found
16	Lago Peñuelas National Reserve	31°10'S-71°32'W	J.Meza pers.com	Flocks of 10 in July
17	Lagoons Yeso, Lo Encañado and Negra	33°40'S-70°06'W	04.10.88	Not found
18	Outlet of El Yali river	33°47'S-71°32'W	Monthly between May 93 to Aug. 94	Not found
19	Salinas de Cauil	34°29'S-72°00'W	04.16.88	Not found
20	Mondaca Lagoon	35°27'S-70°47'W	01.13.88	Not found
21	Teno Lagoon	35°10'S-70°35'W	01.20.88	Not found

and Vallenar. Another interesting observation was made by biologist Ivan Diaz in the Salar de Surire (18°53'S, 69°05'W) in February 1995, where two pairs of adults with two and one fledglings respectively were seen.

Although there is a variety of published information regarding

this plover, previous reports generally include qualitative data only. This information is summarized in Table 2. Between autumn and spring the species was recorded in the highlands of the Andes mountains in the regions of Tarapacá and Antofagasta (Pune Zone). At the same time of year, the species was observed along the coast between the provinces of



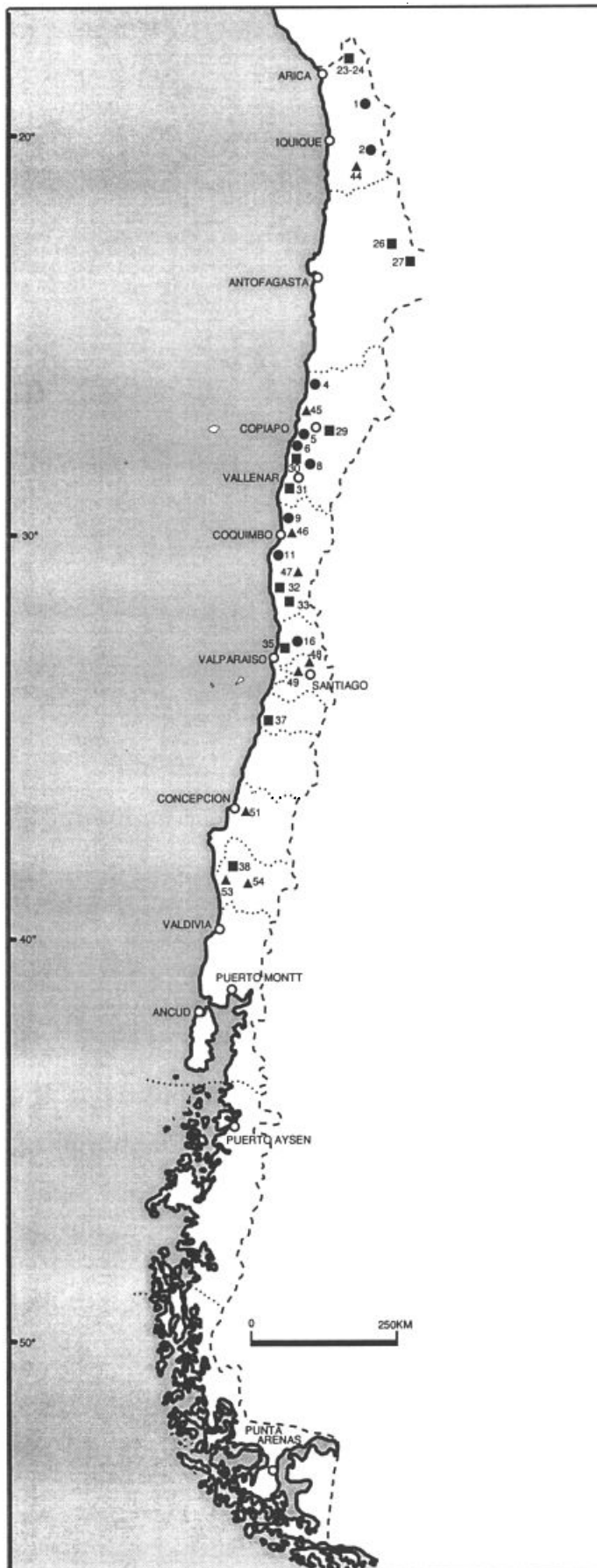


Figure 1. Distribution of the Tawny-throated Dotterel between autumn and spring. Within the diagram the squares represent sites where information was obtained from literature. Circles represent sites where this plovers were observed by the authors. The triangles signify locations of collected birds.

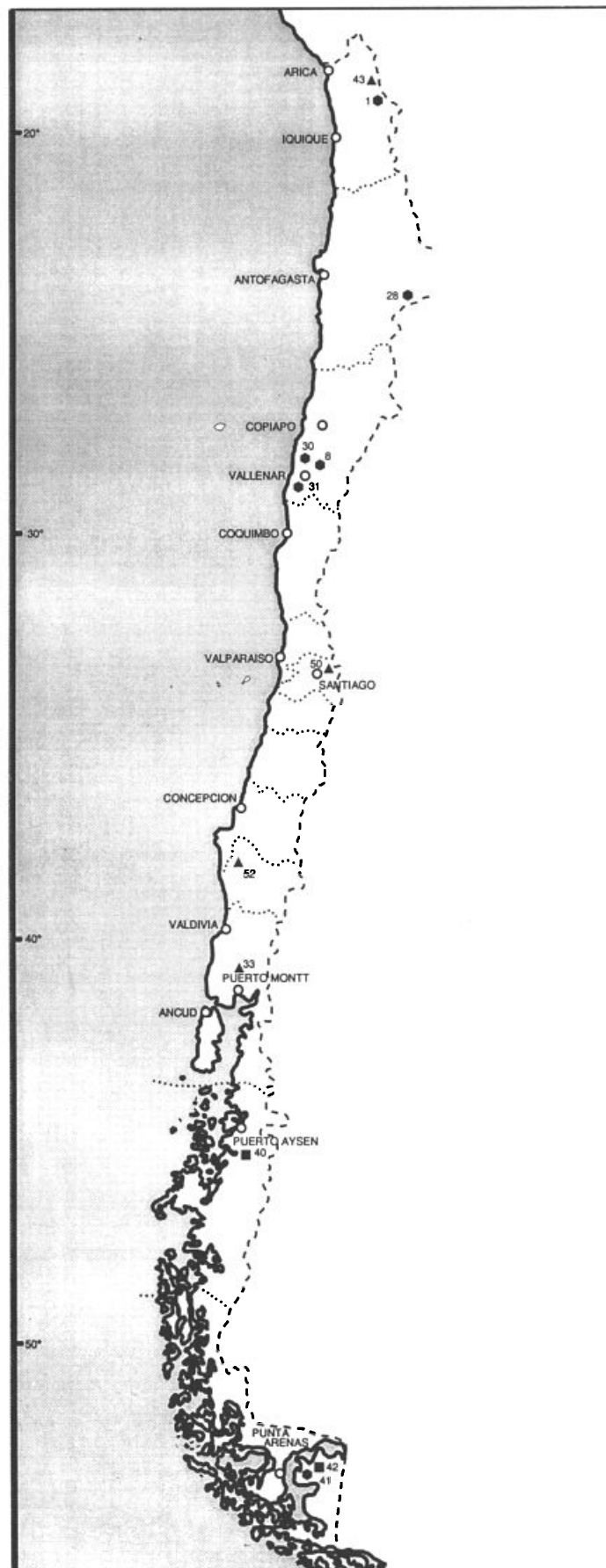


Figure 2. Summer distribution of the Tawny-throated Dotterel in Chile. Within the diagram the squares represent sites where information was obtained from literature. Circles represent sites where this plovers were observed by the authors. The triangles signify locations of collected birds. Nesting records were represented by a hexagon.



Table 2. Chilean records of the Tawny-throated Dotterel in the bibliography. Those cases in which there is no reference to the date on which the observations took place, correspond to observations that show the surveys of a year or more.

No.	Site	Place	Records	Reference
22		Highlands of Arica and Antofagasta (summer)	Absent	Behn <i>et al.</i> 1957
23		Highlands of Arica and Antofagasta (Autumn and winter)	Ten specimens in General Lagos (17°39'S - 69°38'W)	Rottmann & Kuschel 1970
24		Highlands of Arica (April - July)	Abundant	Kuschel 1970
25		Highlands of Iquique (December)	Absent	Phillipi-B 1941
26		Highlands of Antofagasta (June & July)	Found in Vegas de Turi (22°20'S)	Pena 1968
27		Highlands of Antofagasta (November)	Three specimens in Quebrada de Tumbre (22°30'S - 67°43')	Araya & Millie 1976
28		Highlands of Antofagasta (December)	A flock with 12 adults. One adult hatching a clutch of 4 eggs and a pair with two chicks	Torres-Mura 1993
29		Valle del Copiapo (All year round)	Common in spring	Gigoux 1942
30		Valle del Huasco (All year round)	Abundant in winter, they nest and stay in drought years.	Millie 1938
31		Chanaral Island and continental coast (All year round)	Visitors between May and January, in November and December.	Vilina & Tellier 1990
32		Valla del Choapa (May)	One specimen at 1000m	Rottmann 1969
33		Corral de Julio (end of March)	Flocks of three and seven specimens. arrive in May with chicks in late spring.	Schlatter 1972
34		Zapallar (February)	Absent	Bailey 1969
35		Valparaiso-Aconcagua	Winter visitor, abundant	Goodall <i>et al.</i> 1951
36		Estero El Yali (April 1969)	Absent	Johnson & Ewer 1969
37		Cahuil	One flock in winter	Housse 1945
38		Angol (All year round)	Found between April and September	Bullock 1929
39		Mauillin	Absent	Barros 1948
40		Provincia de Aysen	Common, migrates to the north in winter	Phillipi-B 1938
41		Tierra del Fuego (November)	Nesting	Phillipi-B <i>et al.</i> 1954
42		Isla grande de Tierra del Fuego (All year round)	Arrives by end of August and migrates late April. Some stay all year.	Humphrey <i>et al.</i> 1970

Copiapó and Aconcagua, being more abundant in winter. Records of observations also exist for south-central Chile, between the Salinas de Cahuil and the province of Angol (Figure 1). There are also records from the grasslands ("pampas") in the extreme south of the country, in the provinces of Aysen and Magallanes, from the end of spring and the latter part of summer (Figure 2). In December 1992, Torres-Mura (1993) made an interesting observation in Quebrada Agua Colorada (24°14'S; 68°30'W) in the puna zone of Antofagasta at 3800 m.a.s.l. where a flock of 12 adults, one

adult sitting on four eggs and a pair with two chicks were seen.

Table 3 summarizes information about collected plovers, both those mentioned in the bibliography and those in the collection of MNHN, which were collected by Carlos S. Reed in 1939. Two others were added recently following confiscation from hunters at the police checkpoint of Lampa (33°17'S, 71°08'W). According to these records, the Tawny-throated Dotterel was present in the 1930s in an area stretching from the highlands of Arica to the province of Llanquihue. There are no collections



Table 3. Specimens of the Tawny-throated Dotterel collected in Chile.

No.	Site	Place	Records	Reference
43		Highlands of Arica (January)	An adult male in Lalcalhuay	Hellmayr 1932
44		Highlands of Arica (May)	An immature female in Pica	Hellmayr 1932
45		Caldera (August)	Two adult male	Hellmayr 1932
46		Coquimbo (April)	An adult female	MNHN
47		Combarbalá (June)	An adult male	MNHN
48		Polpaico (June)	One male and two adult females	MNHN
49		Lampa (April)	Two adults	MNHN
50		Highlands of Santiago (December)	An adult female	Hellmayr 1932
51		Concepción (June)	An adult female in Cabrero	Hellmayr 1932
52		Angol (January)	An adult male	Hellmaye 1932
53		Traiguén (June)	a male and two females	MNHN
54		Carahue, lowlands of Temuco (Winter)	An adult	Basilio Guíñez
55		Llanquihue (March)	Three immature females in Arroyo Verde	Hellmayr 1932

from further south, although they have been collected in the highlands both in winter and in summer.

In general, our observations agree with the information included in the bibliography and with that from museum collections. Flocks of this species were seen at ten of the 21 researched locations. Flocks varied in size from two to 20 individuals. Observations were generally made between autumn and spring. In the lowlands, they were always found on scrubby plains and at six of these localities in the north of Chile, the species of bush forming the scrub was always *Frankenia chilensis*. Other species that were widespread in the same habitat, were Least Seedsnipe *Thinocorus rumicivorus* and Common Miners *Geositta cunicularia*. In the highlands, the breeding habitat was "pajonal", a grassland of *Stipa rupestris*, *Dejeuxia* sp. and *Adesmia* sp., where the dotterels coexisted instead with Puna Miners *Geositta punensis*. They were never observed in cultivated farmland.

Breeding has been observed in the lowlands of Magallanes province, in the extreme south of the country (Philippi-B. *et al.* 1954). Recently, there have been records of breeding in the highlands of the extreme north and the lowlands in northern Chile. Breeding takes place during spring and summer and the clutch size in the four nests observed was always four (Millie 1939; Philippi-B. *et al.* 1954; Vilina & Teillier 1990, Torres-Mura 1993) (Figure 2). In August 1991, two chicks were seen in the plains that surround the city of Vallenar, thus extending the breeding season of this species in the north of Chile from

the end of August to the end of December (Vilina & Teillier 1990).

DISCUSSION

Most of the available information is qualitative, which make the determination of trends in population size and status difficult. This study makes it possible to confirm that this species is continuously distributed throughout Chile, as stated by Goodall *et al.* (1951), Hayman *et al.* (1986), Fjeldsa & Krabbe (1990) and del Hoyo *et al.* (1996). However, there are still no records from the zone of Chiloé (Ancud). Nevertheless, the proposition made by Vilina & Teillier (1990) that the lowland populations in the northern Chile are not sedentary, as previously stated by Meyer de Schauensee (1982), Hayman *et al.* (1986) and Fjeldsa & Krabbe (1990), is confirmed. Records confirm the absence of the dotterel from the lowlands during the summer. However, Millie (1939) noted that, while most of the population leaves the region in summer, some isolated individuals stay during drought summers. It is also important to note that the species can be found fairly permanently in certain places of Puno in Peru, *e.g.* the coastal "lomas", and irrigated areas in the desert of Arequipa, where it nests (Fjeldsa & Krabbe 1990, Fjeldsa pers. comm.).

In Chile, there are no other records of the Tawny-throated Dotterel in the central and southern highlands during summer since Hellmayr's sighting (1932). Its scarcity in all seasons of the year in the Andean mountain range region from Atacama (Copiapo) to the south is probably due to the lack of high plain



areas. The observations of Torres-Mura (1993) in the pune zone of Antofagasta and of Diaz in the pune zone of Arica, confirm the other summer record of Hellmayr (1932), in the pune zone of Tarapaca (Arica). At same time, Torres-Mura (1993) and Diaz (pers. comm.) obtained the first breeding records from the highlands of Chile. All the previous breeding records, including some obtained by this study, have been from the lowlands.

There are few records of the plovers during summer in high Andean habitats. This indicates that the birds that visit the lowlands from Pan de Azúcar to the south-central region of Chile, from autumn until the beginning of summer, probably do not summer in the Chilean highlands. Part of the population breeding there during spring and beginning of summer, migrates in summer to unknown places between December and the beginning of April, which is the driest season. It is probable that part of this population migrates during this period to Tierra del Fuego. However, this migration probably does not include individuals that breed at the beginning of summer.

We postulate the existence of two populations of this species in Chile.

1) The southern population, that breeds during summer in Aysen and Tierra del Fuego, and migrates along the east of the southern extreme of the continent towards Argentina and Uruguay (Hayman *et al.* 1986); but part of which migrates to central and northern Chile. These birds leave the breeding ground in April and return in September.

2) The northern population, that breeds in the highlands and lowlands in the north during the spring and beginning of the summer and migrates to unknown places between December and the beginning of April. Considering the tolerance of this species to high altitude environments, it is possible that part of this population crosses the Andes to Argentina and Peru, the other part remaining in the highlands of Chile during the summer.

In the central provinces of Aconcagua, Santiago and Valparaíso, where according to Goodall *et al.* (1951) many individuals of this species used to winter, and in spite of frequent visits by biologists and bird watchers, there has been only one observation recently, (J. Meza pers. comm., Table 1). The Tawny-throated Dotterel does not seem to have adapted to farming activities in this area. Nevertheless, in southern Peru the plovers is often found in irrigated areas in the coastal desert (Fjeldsa in press). The farming activities in central Chile, together with the fact that it is still hunted could explain its disappearance from this region.

A banding program would provide valuable information that would more accurately determine migration routes as well as critical areas for conservation. The latter is especially

important because, at least in some regions of Chile, this plover is declining.

ACKNOWLEDGEMENTS

This work is dedicated to the father of the first author, Baldo M. Vilina, "the best hunters of Tawny-throated Dotterel ("pachurron" in local nominate) of the Huasco river basin, in the Atacama desert". We are grateful to A. Kuester, R. Pacheco, S. Teillier and J. Capella by the help in the field. To J. Meza, I. Diaz, J. Pinares and R. Schlatter provided valuable information. To Dr. J. Fjeldsa for critical comments of the first manuscript.

This study was partially supported by Manomet Bird Observatory/Manomet Birder's Exchange.

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