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STATUS OF THE CERULEAN WARBLER (*DENDROICA CERULEA*) AT THE SOUTHERN TERMINUS OF ITS NON-BREEDING RANGE, WITH A REVIEW OF OTHER NEARCTIC-NEOTROPICAL MIGRANT PARULIDAE IN BOLIVIA

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Resumen. – Estado de la Reinita Cerúlea (*Dendroica cerulea*) al extremo sur de su rango no reproductivo, con una revisión de otros parulidos migratorios neárticos neotropicales en Bolivia. – La Reinita Cerúlea (*Dendroica cerulea*) es considerada globalmente vulnerable a la extinción y es pobremente conocida en sus áreas no reproductivas neotropicales, las cuales se extienden hacia el sur hasta el norte de Bolivia. En este país, la especie es conocida por tener muy pocos registros, siendo la mayoría de ellos históricos. Para aclarar el estado de la Reinita Cerúlea al extremo sur de su rango no reproductivo, realizamos relevamientos de campo durante el verano austral 2005 y 2006 en cuatro localidades en los Andes del norte de Bolivia y en una en el área adyacente del sudeste del Perú, enfocándose específicamente en áreas con plantaciones de café bajo sombra. Encontramos a la especie solamente en la localidad peruana a altitudes de 1050–1150 m, donde posiblemente existe una pequeña población no reproductiva de la Reinita Cerúlea en plantaciones de café con árboles de sombra nativos de *Inga*. Los individuos observados eran solitarios y no emitían vocalizaciones, ni respondieron a la emisión de grabaciones de referencia de sus áreas de reproducción. Por tanto, relevamientos futuros de la Reinita Cerúlea deberían enfocarse en la detección visual de la especie, lo cual tiene implicancias para la evaluación de sus preferencias de hábitat debido a diferencias en la detectabilidad de individuos entre tipos de hábitat. Además, revisamos el estado de seis otras especies de reinitas migratorias neárticas neotropicales registradas de Bolivia, una de las cuales (Reinita Estriada, *D. striata*) es reportada por primera vez para el país. Sólo dos especies (Reinita Ojianillada, *Oporornis agilis*; Reinita Collareja, *Wilsonia canadensis*) parecen llegar a Bolivia de manera regular, aunque con bajos números de individuos.

Abstract. – The globally vulnerable Cerulean Warbler (*Dendroica cerulea*) is poorly known from its Neotropical wintering grounds, which extend as far south as northern Bolivia. Here, the species is known from only a handful of mostly historical records. To clarify the status of the Cerulean Warbler at the southern terminus of its non-breeding range we conducted field surveys during Austral summer in 2005 and 2006 at four localities in the northern Bolivian Andes and one site in immediately adjacent southeast Peru, specifically focusing on areas with rustic shade coffee plantations. We encountered the species only at the Peruvian locality at 1050–1150 m altitude, where a small non-breeding Cerulean Warbler population may occur in coffee plantations with native *Inga* shade trees. Individuals were found singly and did not vocalize, nor did they respond to playback of reference recordings from the breeding grounds. Future Cerulean Warbler surveys thus should focus on visual detection of the species, which has implications for assessing its habitat preferences due to habitat-based differences in detectability. Additionally, we review the status of six other Nearctic-Neotropical migrant wood-warblers recorded in Bolivia, one of which (Blackpoll Warbler, *D. striata*) is reported for the country for the first time. Only two species (Connecticut Warbler, *Oporornis agilis*; Canada Warbler, *Wilsonia canadensis*) may occur in Bolivia on a regular basis, albeit in small numbers. *Accepted 11 December 2008.*

Key words: Cerulean Warbler, *Dendroica cerulea*, Connecticut Warbler, *Oporornis agilis*, Canada Warbler, *Wilsonia canadensis*, Nearctic-Neotropical migrant, Yungas, Bolivia.

INTRODUCTION

The Cerulean Warbler (*Dendroica cerulea*) breeds in central and eastern North America and winters in northwestern South America, where it is largely confined to a narrow altitudinal band on lower slopes of the eastern Andes from western Venezuela south to northern Bolivia and on both slopes of all three Andean ranges in Colombia (Ridgely & Tudor 1989, Hamel 2000). The species has suffered severe declines in population size across the breeding range over the past 40 years (Robbins *et al.* 1992, Link & Sauer 2002, Hamel & Rosenberg 2007) and is currently listed as globally vulnerable under IUCN criteria (BirdLife International 2008). Whereas its breeding ecology and conservation problems have been fairly well studied in North America (e.g., Hamel 2000, Jones & Robertson 2001, Veit *et al.* 2005, Hamel & Rosenberg 2007, but see Hamel *et al.* 2004 for knowledge gaps), very little is known about the Cerulean Warbler outside the breeding season, and an increasing amount of attention is being focused on the species' non-breeding distribution and ecology in South America (Robbins *et al.* 1992; Parker 1994; Jones *et al.* 2000, 2002; Hamel *et al.* 2004).

Although Bolivia contains the southern terminus of the Cerulean Warbler's non-breeding range, virtually nothing is know about the status of the species in this area. Specimens were collected during the 19th century at Nairapi and Tilotilo (altitudes uncertain, probably around 1300 m) in the Yungas of depto. La Paz (Sclater & Salvin 1879, Bond & Meyer de Schauensee 1942), although the latter locality is of uncertain reliability (see Herzog & Kessler 2002). Additionally, it was collected on 2 December 1937 at Puerto Salinas (altitude 300 m) in depto. Beni (Gyldenstolpe 1945), on the basis of which the species was listed as a Nearctic-Neotropical migrant in Amazonian Bolivia by Pearson (1980). The only recent record is a male photographed on 7 February 2005 near Tunquini (altitude 1500 m) in the Yungas of depto. La Paz, which accompanied a large canopy mixed-species flock of frugivores and insectivores (Tobias & Seddon 2007). Localities are shown in Fig. 1 (except Tilotilo, which presumably lies in the immediate vicinity of Tunquini).

To clarify the status of the Cerulean Warbler in the northern Bolivian Andes and immediately adjacent areas in depto. Puno in southeast Peru, SKH and VHGS carried out surveys during Austral summer 2005 and 2006 (the rainy season) as part of the Cerulean Warbler Conservation Initiative, an activity of El Grupo Cerúleo (see http://www.srs.fs.usda.gov/egc/). Here we report on the results and conclusions of these surveys, including observations of other species of Nearctic-Neotropical migrants encountered. We further comment on the occurrence of other Nearctic-Neotropical migrant wood-warblers in Bolivia.

METHODS

We surveyed four localities in depto. La Paz, Bolivia, and one locality in depto. Puno, Peru (Fig. 1). Given the Cerulean Warbler's apparent preference for shade coffee plantations in northern South America (Jones *et al.* 2000, 2002), surveys specifically targeted areas with rustic shade coffee plantations. Bolivian localities were: (1) Río Cocos 2–4 km east of Lanza in Madidi National Park (14°04'S, 68°50–51'W, 900–1280 m altitude; primary foothill and lower montane evergreen forest in largely pristine state; 20–28 February 2005,

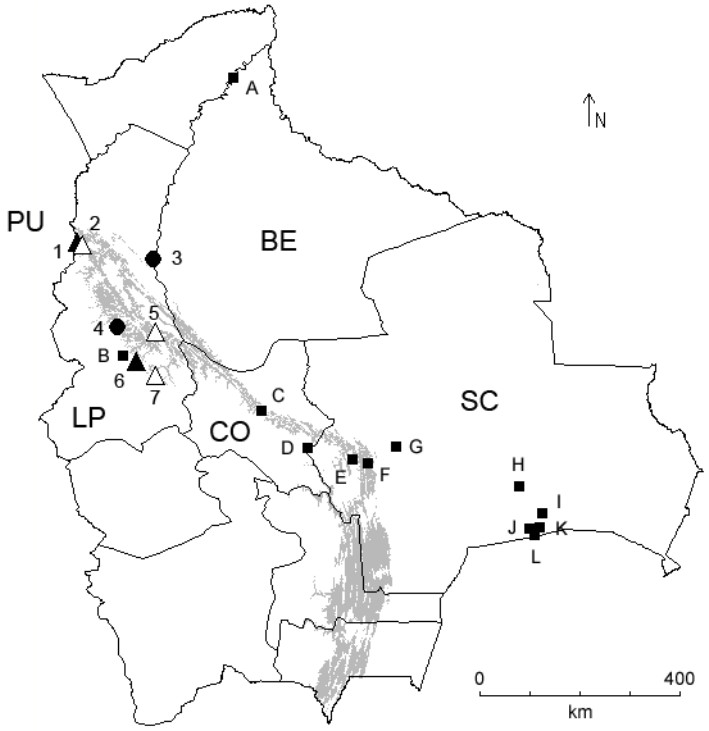

FIG. 1. Survey sites and locality records of Cerulean Warbler (*Dendroica cerulea*) and six additional species of Nearctic-Neotropical migrant wood-warblers (see text) recorded in Bolivia (LP = depto. La Paz, BE = depto. Beni, CO = depto. Cochabamba, SC = depto. Santa Cruz) and extreme southeast Peru (PU = depto. Puno). Light grey shading denotes Andean areas within the main altitudinal range of Cerulean Warbler in Bolivia (850-1,500 m). Filled triangles indicate recent sight records of Cerulean Warbler (1 = Palmerani-Urubamba; 6 = Tunquini), filled circles historical specimen records of Cerulean Warbler (3 = Puerto Salinas; 4 = Nairapi), open triangles localities of specific Cerulean Warbler surveys that did not encounter the species (2 = Río Cocos; 5 = Serranía Bellavista; 7 = Maticuni; also 6 = Tunquini, but a recent sight record exists from this site, see above), and filled squares records of six additional species of Nearctic-Neotropical migrant wood-warblers (A = Riberalta; B = Zongo Valley; C = El Palmar; D = Serranía Siberia; E = Río San Rafael; F = Refugio Los Volcanes; G = Santa Cruz Botanical Garden; H = Tucavaca; I = Estancia El Cañon; J = Fortín Ravelo; K = Dunas Fósiles; L = Palmar de las Islas).

SKH, VHGS, and T. Perkins); (2) El Choro and Colonia Cultural Unidos on Serranía Bellavista (15°40'S, 67°30'W, 1230–1450 m; mostly primary montane evergreen forest at El Choro, traditional polyculture shade coffee plantations with native shade trees and degraded remnant forest patches at Colonia Cultural Unidos; 14 November to 1 December 2005, VHGS and D. Barja Manriquez); (3) Tunquini-El Chairo (16°12'S, 67°50–52'W, 1290–2060 m; mostly primary montane evergreen forest mixed with some patches of secondary forest, traditional polyculture shade coffee plantations with native shade trees at the lowest altitudes around the village of El Chairo; 6–23 December 2005, VHGS and D. Barja Manriquez); (4) Maticuni near Chicaloma (16°28'S, 67°29'W, 1380–1930 m; coca

and traditional polyculture shade coffee plantations with native shade trees and degraded remnant forest patches, one of them with degraded primary evergreen forest at the upper altitudinal end of the survey area; 10–26 February 2006, VHGS and R. Soto Terrazas). In Peru, we surveyed the Palmerani-Urubamba area about 6–10 km west-northwest of the Río Cocos (14°02'S, 68°56'W to 14°03'S, 68°54'W, 1020–1440 m; traditional polyculture shade coffee plantations with native shade trees, degraded remnant forest patches, and early stages of secondary vegetation; 18 February and 1–2 March 2005, SKH, VHGS, and T. Perkins; 13–30 January 2006, VHGS and D. Barja Manriquez). Trees of the native genus *Inga* were used predominantly as shade trees in all coffee plantation areas.

Surveys were conducted along existing trails and narrow dirt roads from just before dawn (starting at a new spot on most mornings) until early afternoon and were resumed in late afternoon on most days. We searched for Cerulean Warblers using binoculars and frequent playback of reference recordings of over 10 song types from the breeding grounds (recordings provided by the Borror Laboratory of Bioacoustics, Ohio State University). We paid particular attention to canopy mixed-species foraging flocks, observing and following each flock for as long as possible while broadcasting Cerulean Warbler reference recordings. To facilitate visual recognition and identification of Cerulean Warblers, all observers carried an enlarged, high-quality color photocopy of the species' illustrations (basic plumage) in Ridgely & Greenfield (2001). Additionally, we made extensive sound recordings of dawn choruses and mixed-species flocks.

RESULTS AND DISCUSSION

Cerulean Warbler surveys. We encountered Cerulean Warblers at Palmerani-Urubamba in extreme southeast Peru, but none at any of the Bolivian sites surveyed (Fig. 1). During our brief initial survey of the Palmerani-Urubamba area in February and March 2005, none were seen, but on 18 February, during opportunistic observations while hiking to the Río Cocos study site, SKH heard a single song in secondary forest at 800–850 m altitude at 09:20 h (Peruvian time) that very likely was given by a Cerulean Warbler. The first visual observation was made of a solitary adult male on 13 January 2006 by VHGS (14°02'S, 68°56'W, 1100 m). The bird was detected without playback of reference recordings approximately 3 m above ground on the lowermost branch of a tall, emergent *Inga* shade tree at the edge of a coffee plantation on the side of a narrow dirt road. During the following 4–5 min, the foliage-gleaning bird worked its way up to the crown of the same tree to a height of about 20 m above ground. It was silent and did not show the slightest response to the playback of reference recordings. Presumably the same male was observed exhibiting similar behavior in the same and adjacent *Inga* shade trees on several subsequent days.

A second solitary bird with female plumage characteristics was first observed on 19 January 2006 by VHGS, about 3 km from the first site. The foliage-gleaning bird was initially detected about 3–4 m above ground in a bush at the side of the road and, after a few minutes of observation, it flew into the crown of an *Inga* tree in a shade coffee plantation. Presumably the same individual was observed exclusively in *Inga* trees at the same site on subsequent days. On 20 January 2006, a solitary adult male was observed by D. Barja Manriquez (pers. com.), approximately 1 km from the location of the first male, possibly representing a different individual. The foliage-gleaning bird was observed 6–8 m above ground in a small tree at the edge of a shade coffee plantation along a road side. No addi-

tional Cerulean Warbler observations were made at this particular site.

Cerulean Warbler observations at Palmerani-Urubamba were made between altitudes of 1050 m and 1150 m at various times of day, ranging from about 07:30–16:00 h. Inclement weather did not appear to represent an obstacle for the foraging activity of Cerulean Warblers as birds were active despite frequent rain and fog. Although mixed-species foraging flocks were common in the area, no Cerulean Warbler was detected in any of the flocks observed. Altogether we observed an additional seven species of Nearctic-Neotropical migrants during surveys at five localities (Table 1).

In conclusion, a small non-breeding Cerulean Warbler population may occur at Palmerani-Urubamba, but whether the species is a regular Austral summer resident in this lower Yungas area is unknown. According to the species' range map in Schulenberg *et al.* (2007), in Peru the Cerulean Warbler was previously known (or expected) to occur only as far south as depto. Cuzco, and our observations appear to be the first report for depto. Puno. As at the northern terminus of its South American range (Jones *et al.* 2000, 2002), at Palmerani-Urubamba the Cerulean Warbler has an affinity for rustic shade coffee plantations with species of the native genus *Inga* as the dominant trees, whose flowers attract an abundance of insects (authors pers. obs.). This apparent preference for *Inga*-dominated shade coffee plantations is further supported by the fact that we did not find Cerulean Warblers in pristine lower montane forest at similar altitudes less than 10 km from Palmerani-Urubamba, although this could have been an artifact of habitat-based differences in Cerulean Warbler detectability (see next paragraph). The failure to record the Cerulean Warbler in Bolivia despite intensive survey effort (62 survey days) in very similar habitats as at Palmerani-Urubamba, combined with the general scarcity of records from Bolivia, indicates that the species occurs only irregularly and in very small numbers in the country. Contrary to Tobias & Seddon (2007) who hypothesized that a small but significant population may occur seasonally in foothill forests of the northern Bolivian Yungas, our data indicate that perhaps only a few individuals reach the country in some years.

The fact that Cerulean Warblers at Palmerani-Urubamba did not respond to playback of reference recordings and appeared to be largely silent has significant implications for non-breeding surveys of the species. The use of sound recordings and playback is a frequently used, reliable, and highly efficient method for detecting, surveying, documenting, and identifying the great majority of Neotropical forest birds (e.g., Parker 1991, Haselmayer & Quinn 2000, Herzog *et al.* 2002). However, it is unlikely to produce representative results for Cerulean Warbler, at least towards the southern distributional limits of its South American range. Future surveys therefore should focus on visual detection of the species, which implies greater survey efforts in terms of numbers of trained observers and survey duration than if Cerulean Warblers vocalized regularly or responded to playback.

Relying on visual detection also has implications for assessing the species' habitat preferences due to habitat-based differences in detectability. Primary forest on lower Yungas slopes usually has a much greater canopy height and denser vegetation structure in the canopy and subcanopy than rustic shade coffee plantations at the same altitudes. For example, at the Río Cocos study site canopy height was 30–35 m (except on ridges), whereas *Inga* shade trees at Palmerani-Urubamba did not exceed 15–20 m. In addition, roads, trails, and plantation edges in shade coffee areas facilitate visibility of the

TABLE 1. Eight species of Nearctic-Neotropical migrants observed during Austral summer 2005 and 2006 at four localities in the Yungas of northwest Bolivia (depto. La Paz) and at one adjacent locality in extreme southeast Peru (depto. Puno). Localities: 1 = Río Cocos; 2 = El Choro and Colonia Cultural Unidos, Serranía Bellavista; 3 = Tunquini; 4 = Maticuni near Chicaloma; 5 = Palmerani-Urubamba (Peru). Relative abundance (Rel. abund., each letter refers to the respective locality): A = abundant (observed daily in moderate to large numbers); C = common (observed daily or almost daily in small numbers); F = fairly common (observed on most days in small numbers) U = uncommon (observed only on some days in small numbers); R = rare (observed only once or twice). Date range specifies the earliest and latest Austral summer calendar date on which each species was observed.

Species	Localities	Rel. abundance	Date range
Western Wood-Pewee (*Contopus sordidulus*)[1]	1, 5	C, F	20 Feb–2 Mar
Eastern Wood-Pewee (*C. virens*)[1]	1	C	20–28 Feb
Olive-sided Flycatcher (*C. cooperi*)[2]	5	R	28 Feb–2 Mar
Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*)	1, 5	F, U	17 Jan–2 Mar
Red-eyed Vireo (*Vireo olivaceus*)[3]	1, 2, 5	A, U, R	14 Nov–2 Mar
Swainson's Thrush (*Catharus ustulatus*)	1, 2, 3, 4, 5	A, C, C, C, A	14 Nov–2 Mar
Scarlet Tanager (*Piranga olivacea*)[4]	1, 2, 3, 5	C, R, R, C	27 Nov–2 Mar
Cerulean Warbler (*Dendroica cerulea*)	5	U	13–26 Jan

[1]Identified exclusively by their distinctive, tape-recorded vocalizations; the typical call of Eastern Wood-Pewee is a clear, whistled "pee-weé", that of Western Wood-Pewee a burry "peerr".

[2]Only two visual observations in 2005.

[3]Based on iris color, all birds observed belonged to the North American *olivaceus* group.

[4]Most birds seen at the Río Cocos were after second-year males in nearly complete alternate plumage.

canopy. Therefore, detectability of Cerulean Warblers can be expected to be greater in shade coffee plantations than in primary forest.

Other Nearctic-Neotropical migrant Parulidae in Bolivia. Five additional species of Nearctic-Neotropical migrant wood-warblers have been reported from Bolivia (Hennessey *et al.* 2003), most of which appear to have the same status of irregular occurrence in very small numbers as the Cerulean Warbler. According to Asociación Armonía's distributional bird data base, the Yellow Warbler (*Dendroica petechia*) has been reported only from two observations each of a solitary male on 30 December 1976 and 14 January 1977 at a single locality near Riberalta (ca. 150 m altitude) in northern depto. Beni (Fig. 1; Remsen & Ridgely 1980). The Blackburnian Warbler (*Dendroica fusca*) also is known only from sight records of single males at 2250 m in the Zongo Valley, depto. La Paz (Fig. 1), northeast of the city of La Paz, on 17 March 1979 (Parker *et al.* 1980) and 19 January 1980 (Remsen & Traylor 1983). In addition, a single male Blackburnian Warbler was observed in a large mixed-species flock at 2150 m on Serranía Siberia, depto. Santa Cruz (Fig. 1), on 16 February 1992 (Whitney 1994). Similarly, the Black-and-white Warbler (*Mniotilta varia*) is known from a single sight record, on 13 September 1996, by S. N. G. Howell and S. Webb (pers. com. to SKH in September 1996; see also Sagot 1998) of a bird with immature female plumage characters at 900 m near El

Palmar (17°07'S, 65°33'W; Fig. 1) in Carrasco National Park, depto. Cochabamba.

The remaining two species appear to be somewhat more regular non-breeding residents in Bolivia. The first record of the Connecticut Warbler (*Oporornis agilis*) was an adult male on 1 April 1997, followed by an adult female (with heavy fat deposition) on 8 April 1997, both of which were mist-netted by SED in open deciduous woodland in the Santa Cruz Botanical Garden (17°47'S, 63°04'W, 350 m; Fig. 1), depto. Santa Cruz. The male was banded and photographed (photo published in Sagot 1998), and the female was collected and deposited in the Museo de Historia Natural Noel Kempff Mercado in Santa Cruz (MNKM 2012). There are also observations of the species from several localities in the Bolivian Chaco. Asociación Armonía's distributional bird data base contains an observation of two birds (sex and age not specified) by J. Guerrero on 14 February 1998 at Dunas Fósiles (19°16'S, 60°26'W, 300–350 m; Fig. 1), about 15 km north of the Paraguayan border. According to Guyra Paraguay (2004), the Connecticut Warbler has not been reported from Paraguay. Two unpublished technical reports (Navarro *et al*. 1998, 2002) mention the species from four additional localities in the Bolivian Chaco (Tucavaca, 18°31'S, 60°49'W, 300 m; Estancia El Cañon, 19°01'S, 60°23'W, 300 m; Fortín Ravelo, 19°17'S, 60°37'W, 370 m; Palmar de las Islas, 19°25'S, 60°32'W, 220 m; Fig. 1) but provide no further details.

The first documented record of Canada Warbler (*Wilsonia canadensis*) was obtained by SED in deciduous forest in the Santa Cruz Botanical Garden, where she photographed (photo published in Sagot 1998) and banded an adult on 11 October 1995. Previous but undocumented records include a single adult male observed by F. Sagot on 27 February 1995 at about 1,000 m in the Refugio Los Volcanes (18°06'S, 63°36'W; Fig. 1) in the Serranía de los Volcanes, depto. Santa Cruz and, subsequently, another one on 16 March 1996 at 1600 m at Río San Rafael (18°02'S, 63°52'W, 1600 m; Fig. 1) in Amboró National Park, depto. Santa Cruz, where it participated in a mixed-species flock in tall humid montane forest (Sagot 1998). Additional observations of single individuals in the Refugio Los Volcanes were made by D. Nash on 28 December 1995 (adult male; Sagot 1998) and by SKH on 19 November 2000 (1100 m, adult male) and 24 March 2005 (1150 m, weak chest markings suggested the bird was a female). Both birds observed by SKH participated in mixed-species flocks in upper understory and mid-story, the first in fairly dry evergreen forest, the second in deciduous forest. Additionally, during a mist-netting study (12 days per month) from February 2003 to November 2005 at the Refugio Los Volcanes, two Canada Warblers were captured and banded, an adult male in deciduous forest at 1200 m on 12 February 2004, and a second adult (presumably a female based on weak chest markings) in open ridge-top forest at 1100–1150 m on 24 October 2004 (SKH, unpubl.).

A sixth species of Nearctic-Neotropical migrant wood-warbler, the Blackpoll Warbler (*Dendroica striata*), has not previously been reported from Bolivia. It winters mainly in Amazonia, but occasionally overshoots far to the south of its usual winter range (Ridgely & Tudor 1989). We here report on the first observation of this species in Bolivia. On 26 November 2003, SKH observed an unfamiliar bird in a canopy mixed-species flock at 1150 m in deciduous forest of the Refugio Los Volcanes. Without previous consultation of a field guide, SKH made the following description of the bird: at first sight somewhat similar in shape and posture to the Chestnut-vented Conebill (*Conirostrum speciosum*) but slightly larger; underparts mostly dull yellowish-green, slightly streaked on breast; bill very thin,

tapered, and relatively long; supralorals and line through upper eye light contrasting with dark median eyeline, iris dark; dark wings with two light wing bars; upperparts not seen. The bird gave high-pitched 2- to 3-noted calls that were unfamiliar to SKH, and the same calls were given by an unseen second bird in the flock. Shortly afterwards the bird was observed from below at closer range, confirming the above characters and revealing white undertail coverts. Here it gave a simple, sharp "chip" call similar to that of Tropical Parula (*Parula pitiayumi*), but with a fuller tone. Compared with the illustrations of the Blackpoll Warbler in Sibley (2000), the bird probably was a first winter female. The first winter female of Bay-breasted Warbler (*Dendroica castanea*) has rather similar underparts, but it lacks streaking on the breast (Sibley 2000, Ridgely & Greenfield 2001).

The small number of Bolivian records for Nearctic-Neotropical migrant wood-warblers could be the result of two main factors. As in the Cerulean Warbler, these species may be genuinely rare and irregular in Bolivia, and the bulk of their non-breeding populations may occur farther north in the Andes from Venezuela to Peru or in northern and central Amazonia. Alternatively, the apparent rarity could be an artifact of low survey effort due to the relatively small number of resident ornithologists, inaccessibility of native wintering habitats, and a predominance of ornithological field work during Austral winter (the dry season). A comparison with the distribution and status of each species toward the north in neighboring Peru should be informative.

Schulenberg *et al.* (2007) consider the Yellow Warbler a rare and the Blackpoll Warbler an uncommon migrant to Amazonian northern Peru, with the former rarely extending as far south as depto. Junín, which is situated at similar latitudes as northern depto. Beni. Similarly, the Black-and-white Warbler is considered a vagrant or rare migrant to Amazonia and the northern Peruvian Andes (Schulenberg *et al.* 2007). Consequently, all three species probably are genuinely rare and irregular in Bolivia.

The Blackburnian Warbler, on the other hand, is regarded uncommon but probably regular in the eastern Andes of southern Peru (and fairly common in the northern Peruvian Andes) by Schulenberg *et al.* (2007), so it may be underrecorded and overlooked in the northern Bolivian Andes. The Canada Warbler is considered fairly common on the east Andean slope of Peru (Schulenberg *et al.* 2007), but like the Cerulean Warbler it has apparently not been reported from depto. Puno. However, the repeated observations from depto. Santa Cruz described above indicate that the species probably is distributed fairly continuously along the east Andean slope from southern Peru to central Bolivia, and that it could be a rare but regular non-breeding resident in this area.

The Connecticut Warbler is thought to be a rare passage migrant in Amazonian eastern Peru (Schulenberg *et al.* 2007). Ridgely & Tudor (1989) noted that the species is not well-known and easily overlooked in South America due to its skulking behavior, and they considered it to overwinter widely but thinly across Amazonia. However, Parker *et al.* (1996) stated that its non-breeding range and habitats are unknown. The reports from several Bolivian Chaco localities listed above are therefore noteworthy, and the species may have a preference for dry woodland habitats on the non-breeding grounds.

Finally, it is noteworthy that there is no overlap in non-breeding records between the Cerulean Warbler and the other migrant wood-warblers, and those six species also show little to no overlap in records. Although scant data do not allow firm conclusions, migrant wood-warblers may segregate by habitat, altitude, and/or ecoregion while wintering in Bolivia.

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