

## Nests, vocalizations, and conservation status of endangered Cochabamba Mountain-Finches (*Compsospiza garleppi*)

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**ABSTRACT.** Cochabamba Mountain-Finches (*Compsospiza garleppi*) are endangered residents of semihumid shrublands in the high Andes, with a range restricted to a few high valleys surrounding the city of Cochabamba, Bolivia. We examined the breeding behavior, feeding ecology, habitat requirements, vocalizations, and conservation status of Cochabamba Mountain-Finches from November 2006 to April 2007. We observed 10 nests of eight pairs, with nests found in a variety of small woody shrubs as well as bunchgrass and a ground bromeliad. Clutches ( $N = 2$ ) consisted of one or two eggs, and all broods ( $N = 4$ ) included one or two young. Our observations suggest that Cochabamba Mountain-Finches are not *Polylepis* specialists as previously thought, and use a diversity of native shrubs often associated with *Polylepis* woodlands for foraging and nesting. Pairs inhabited modified habitats where native vegetation and woodland edge persisted, but were not observed in closed canopy woodlands. Cochabamba Mountain-Finches frequently foraged on the edges of potato fields in a rural community and, at least occasionally, consumed parts of unearthed tubers. We recorded two previously unknown song types and three types of calls, and one song type was found to be useful for playback surveys. We recommend that future research and conservation actions include thorough surveys using playback to determine population sizes, and that habitat restoration projects focus on maintaining a diversity of native shrubs rather than only *Polylepis* trees.

### SINOPSIS. Nidos, vocalizaciones y estado de conservación de la especie en peligro *Compsospiza garleppi*

*Compsospiza garleppi* es una especie residente en peligro de las tierras arbustivas semihúmedas de los altos Andes, con un rango restringido a unos pocos valles en los alrededores de la ciudad de Cochabamba, Bolivia. Nosotros examinamos el comportamiento reproductivo, la ecología alimentaria, los requerimientos de hábitat, vocalizaciones y estado de conservación de *Compsospiza garleppi* desde Noviembre 2006 hasta Abril 2007. Observamos 10 nidos de ocho parejas, los nidos fueron encontrados en una variedad de pequeños arbustos al igual que en montones de pastos y bromelias de suelo. La nidadas ( $N = 2$ ) consistieron de uno o dos huevos y uno o dos polluelos ( $N = 4$ ). Nuestras observaciones sugieren que *Compsospiza garleppi* no es un especialista de *Polylepis* como se había pensado anteriormente, y usa una diversidad de arbustos nativos asociados con bosques de *Polylepis* para buscar alimento y anidar. Se encontraron parejas en hábitat modificado en donde la vegetación nativa y los bordes de bosque persistieron, pero no fueron observadas en bosques con un dosel cerrado. *Compsospiza garleppi* busco alimento frecuentemente en los bordes de plantaciones de papa en una comunidad rural y, ocasionalmente, consumió partes de tubérculos desenterrados. Nosotros grabamos dos cantos no descritos anteriormente y tres tipos de llamados, un tipo de los cantos fue beneficioso para estudios de playback. Nosotros recomendamos que futuros estudios y acciones de conservación usen playback como herramienta para realizar censos minuciosos para determinar tamaños poblacionales, y que proyectos de restauración de hábitat se enfoquen en el mantenimiento de la diversidad de arbustos nativos en vez de únicamente mantener árboles de *Polylepis*.

**Key words:** breeding behavior, Cochabamba Mountain-Finch, *Compsospiza garleppi*, conservation, nest, vocalizations

Cochabamba Mountain-Finches (*Compsospiza garleppi*; Berlepsch 1893) are a poorly known species endemic to high elevations in the inter-Andean valleys surrounding the city of

Cochabamba, Bolivia. They are generally found in relatively humid inter-Andean valleys with watered ravines near tree-line in the narrow transitional zone between the dry Valle and Puna life zones from 3000 to 3800 m (Ridgely and Tudor 1989, Fjeldsø and Krabbe 1990), but have been observed at elevations ranging

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from 2700 to 4200 m (Hennessey et al. 2003). Although observed over a wide range of elevations, suitable transitional zone habitat for Cochabamba Mountain-Finches in most valleys appears to be limited to a narrow elevation range of a few hundred meters (pers. obs.). Native vegetation characteristic of these areas includes sparse semihumid *Polylepis besseri* and *Alnus acuminata* woodlands, a variety of woody shrubs (*Gynoxys*, *Ribes*, *Baccharis*, *Festuca*, and *Berberis*), and *Cortaderia* bunchgrass (Fernandez 1997).

The breeding behavior, feeding ecology, habitat requirements, and vocalizations of Cochabamba Mountain-Finches are all poorly documented. Individuals or pairs forage low in shrubs and on the ground, are shy and secretive, and are difficult to detect either by sight or voice (Ridgely and Tudor 1989, Fjelds  and Krabbe 1990). Fledglings have been observed in April and May, and juveniles in June and July (Fjelds  and Krabbe 1990). Until recently (Remsen et al. 2008), Cochabamba Mountain-Finches have been included in the phenotypically similar genus *Poospiza*, but recent molecular phylogenies have shown that *Poospiza* is paraphyletic with respect to several thraupine genera. Thus, *Compsospiza* tentatively falls within a "Poospiza group" along with *Hemispingus*, *Cypsnagra*, *Nephelornis*, *Cnemoscopus*, *Thlypopsis*, and *Pyrrhocoma* (Lougheed et al. 2000, Klicka et al. 2007).

Originally classified as threatened (Collar and Andrew 1988), Cochabamba Mountain-Finches were listed as endangered by Birdlife International and the International Union for the Conservation of Nature (IUCN) in 1994 because of a lack of current data and the absence of recent sightings (Collar et al. 1992, Birdlife International 2004, 2008). Parker et al. (1996) also considered the species poorly known, and a high research and conservation priority. Stattersfield et al. (1998) included the species in Endemic Bird Area 56 (the Bolivian-Argentine High Andes), an area considered a critical conservation priority.

The status of endangered is justified for Cochabamba Mountain-Finches because of the low-estimated population (400–4000 individuals), suspected population decline, limited known range, and habitat destruction within its limited range (Birdlife International 2004). However, population estimates are based pri-

marily on unpublished and unreviewed sources, and a rigorous assessment is needed. In addition, reasons for and rates of the perceived decline are unknown. The only protected area where Cochabamba Mountain-Finches occur is Parqu  National Tunari, much of which has been converted to *Pinus* plantations and lacks protection. The area is also politically unstable, and the park's future protection is uncertain (Dinnerstien et al. 1995, Wege and Long 1995).

Our objectives were to examine the breeding behavior, feeding ecology, habitat requirements, vocalizations, and conservation status of Cochabamba Mountain-Finches. Specifically, we wanted to (1) determine how reliant the species is on intact *Polylepis* woodland for foraging and nesting, (2) determine if areas modified by humans are used for foraging or nesting, (3) identify and document their songs to increase the effectiveness of future surveys, and (4) identify possible threats to the Cochabamba Mountain-Finch population in this and other rural communities.

## METHODS

**Study area.** The Rio Llave Valley, Department of Cochabamba, Prov. Quillacollo, is located approximately 25 km west of the city of Cochabamba. The valley runs southwest from the Rio Llave's source in the Cordillera Tunari down to the city of Quillacollo, and contains the communities of Palcapampa, Potrero, Y Grande, and Y Chico. The areas studied included all suitable habitats in the valley, ranging from the upper section of the community Palcapampa (17° 19' 30" S, 66° 24' 14" W; 3800 m) down to below Potrero (17° 20' 0" S, 66° 22' 38" W; 3200 m). In addition, limited surveys were conducted in Y Grande and Y Chico where no suitable habitat remains. Surveys were conducted from November 2006 to April 2007.

The Rio Llave River runs south from its source in humid montane Puna grasslands into the semiarid Cochabamba valley. There is a strong humidity gradient along the river valley, with semiarid desert-like terrain at 2500 m transitioning to semiarid montane scrub up to about 3200 m. Above 3200 m, humidity increases and larger *Alnus acuminata* replace *Schinus molinae* in watered ravines. Originally, the valley was probably mostly forested with sparse *Polylepis* woodland on the drier slopes and dense *Alnus*

forests in the ravines, but all reasonably flat land was cleared long ago for subsistence agriculture (mostly potato). Extensive open *Polylepis* woodland remains on the steep southwestern slope of the valley up to 3800–4000 m, but small areas have been cleared for agriculture and small *Eucalyptus* and *Pinus* plantations. *Polylepis besseri* and *Alnus acuminata* woodlands remain in several large steep ravines on the northeastern slope from 3000 to 4000 m and on one steep slope adjacent to Potrero. The remaining steep slopes of the valley are covered by drier scrub and bunchgrass (*Cortaderia* sp.). The shallower sections of the valley floor are completely modified and inhabited by people, mostly a mix of agricultural land with some small houses. Rows of native shrubs (*Gynoxys*, *Ribes*, *Baccharis*, *Festuca*, and *Berberis*) persist between the many small agricultural fields and in the many small ravines. *Polylepis* trees are rare in the valley floor, and there is much evidence (stumps) of their removal. A few *Eucalyptus* and *Pinus* have been planted around Palcapampa and Potrero, but, in general, only single trees or small groups of trees are present. In addition, there is one extensive *Eucalyptus* planting near Potrero and one extensive *Pinus* planting in Palcapampa.

**Survey methods.** The area was surveyed on foot to locate, observe, and delineate territories of pairs of Cochabamba Mountain-Finches in the valley. Encountered pairs were observed as long as possible, and locations determined using GPS points and written notes to map and delineate territories. Information about habitat use, foraging behavior, interactions between adjacent pairs, and breeding behavior was recorded when observed, and suitable areas frequented by pairs were searched for nests. Adults were followed when observed with nesting material and food for young. General methods follow Martin and Geupel (1993) and Oppel et al. (2003). Nest descriptions follow Hansell (2000).

Vocalizations were recorded using a recorder (PMD660, Marantz, Mahwah, New Jersey) with a unidirectional microphone (MKH20, Sennheisser, Old Lyme, Connecticut) in a parabola (Telinga Microphones, Tobo, Sweden), and all recordings were archived at the Macaulay Library of Natural Sounds at Cornell University (ML). Spectrograms of songs and calls were created using Raven Pro 1.3 (Cornell Lab of Ornithology 2008). All recordings can be accessed at <http://macaulaylibrary.org>.

## RESULTS

**Nest descriptions.** Ten nests were found in the territories of eight different pairs. Renesting occurred twice after earlier nests failed (once due to human disturbance and once due to a hail storm). Nests were constructed in a variety of shrubs, including *Gynoxys* sp. ( $N = 3$ ; Compositae), *Baccharis* ( $N = 2$ ; Compositae), *Berberis* ( $N = 2$ ; Berberidaceae), *Polylepis besseri* ( $N = 1$ ; Rosaceae), and one nest each was located in bunchgrass (*Cortaderia* sp., Poaceae) and a ground bromeliad (*Puya* sp., Bromeliaceae). Nests were generally placed in the forks of branches and hidden under the leaves of the shrubs (Fig. 1). The nest in bunchgrass was well hidden in the side of the grass clump, with stems overhanging and covering the nest to form a small entrance tunnel.

Nests were simple cups (Fig. 2) with three layers and exhibited little variation. On average, nests ( $N = 5$ ) were  $14.8 \pm 1.1$  (SD) cm long,  $14.2 \pm 0.4$  cm wide,  $10.0 \pm 1.0$  cm high, and weighed  $110.9 \pm 5.6$  g. The mean inside diameter of nests was  $7.1 \pm 0.9$  cm, with a mean cup depth of  $5.4 \pm 0.5$  cm, mean wall thickness of  $3.1 \pm 0.2$  cm, and mean bottom thickness of  $4.8 \pm 0.8$  cm. The inner layer holding the eggs and chicks was thin and soft, and composed of young green grass stems, animal hair, and rootlets. The thick middle layer of the nest provided structural support and was composed entirely of long, thin stems of *Cortaderia* bunchgrass woven around the inner layer. The thin, decorative outer layer consisted of mosses, except for the nest constructed in *Polylepis besseri*,



Fig. 1. Placement of a Cochabamba Mountain-Finch nest with two nestlings in a *Polylepis* shrub.



Fig. 2. Nest of a Cochabamba Mountain-Finch with a single egg.

where moss was replaced with the distinctive red-brown papery bark of *Polylepis*. The base of the cup that secured all three layers was a mixture of moss held together with thick stems of bunchgrass, rootlets, leaves of shrubs, small sticks, and *Polylepis* bark.

**Breeding behavior.** Cochabamba Mountain-Finches were most frequently observed in pairs. We assumed throughout our study that the dominant bird of a pair that sang, lead the pair, and was more aggressive in territorial disputes was the male. Even though the species is monomorphic, we found that identifying males based on these behavioral cues was reliable and repeatable.

Breeding occurred during the rainy season. The first nest found was under construction on 5 January 2007, nests with eggs were found on 14 January 2007 and 3 February 2007, and nests with nestlings were found from 18 February 2007 to 3 April 2007.

For 7 of 10 nests observed, only females constructed the nests and males spent most of their time singing near the nest. Among pairs where males did assist in nest building, females were still responsible for most of the nest construction. Nest building was frequent in the morning (06:30–10:00 am) and occasional in the afternoon (16:00–20:00 pm), depending on weather. During nest construction, females generally arrived with nest material every 15–60 min, usually followed by the male who then sang from an exposed perch while the female added new material to the nest.

Females appeared to perform most, if not all, of the incubation. As during nest building, males often sang above or near nests while females incubated. Two nests were found during incubation, one with one egg and the other with two. Eggs were off-white and heavily marked with small, densely distributed, blurry, dark brown spots (Fig. 2). Both of these nests were monitored from egg laying until fledging. The mean dimensions ( $\pm$  SE) of the eggs ( $N = 3$ ) were  $25.36 \pm 0.37$  mm  $\times$   $17.10 \pm 0.13$  mm, and the mean weight was  $4.2 \pm 0.2$  g. Both nests where the entire incubation period was observed had incubation periods lasting 14 d. In addition to nests with eggs, all nests with chicks ( $N = 2$ ) or pairs observed with recently fledged young ( $N = 2$ ) had broods of one or two offspring.

Both sexes fed nestlings. Adults apparently fed chicks predominately insect larvae, but one pair was observed feeding potatoes to nestlings 16 times in 2 h. For both nests observed until fledging, the nestling period was 18 d. Both adults accompanied chicks after fledging ( $N = 4$ ), feeding them and foraging in shrubs, on the ground, and in potato fields. Although the birds stayed in family groups and pairs, they generally did not join other mixed flocks of birds.

The foraging behavior of Cochabamba Mountain-Finches was difficult to observe because they usually foraged while hidden in thick shrubs or on the ground obscured by potato plants. Feeding in these areas was usually confirmed by observing the birds flying to an open branch and cleaning their bills, wiping them on a twig or branch. On several occasions, we observed adult Cochabamba Mountain-Finches feeding on potato tubers that had become unearthed, taking small chunks of potato with their bills.

**Vocalizations.** Two different song types were recorded. The first (Macaulay Library [ML] #132 518, 132 522, 132 523; Fig. 3A) was given by males from perches near nest sites, while females were nest building. This song type consisted of a series of three to five stereotypical notes, generally increasing slightly in pitch. The order and pitch of individual notes varied slightly. Song bouts usually ranged in the duration from a few minutes to up to 30 min, with males occasionally stopping to change perches before starting again. This song type was used by males in all territories, and always within 10–20 m of nest sites. Males sang incessantly

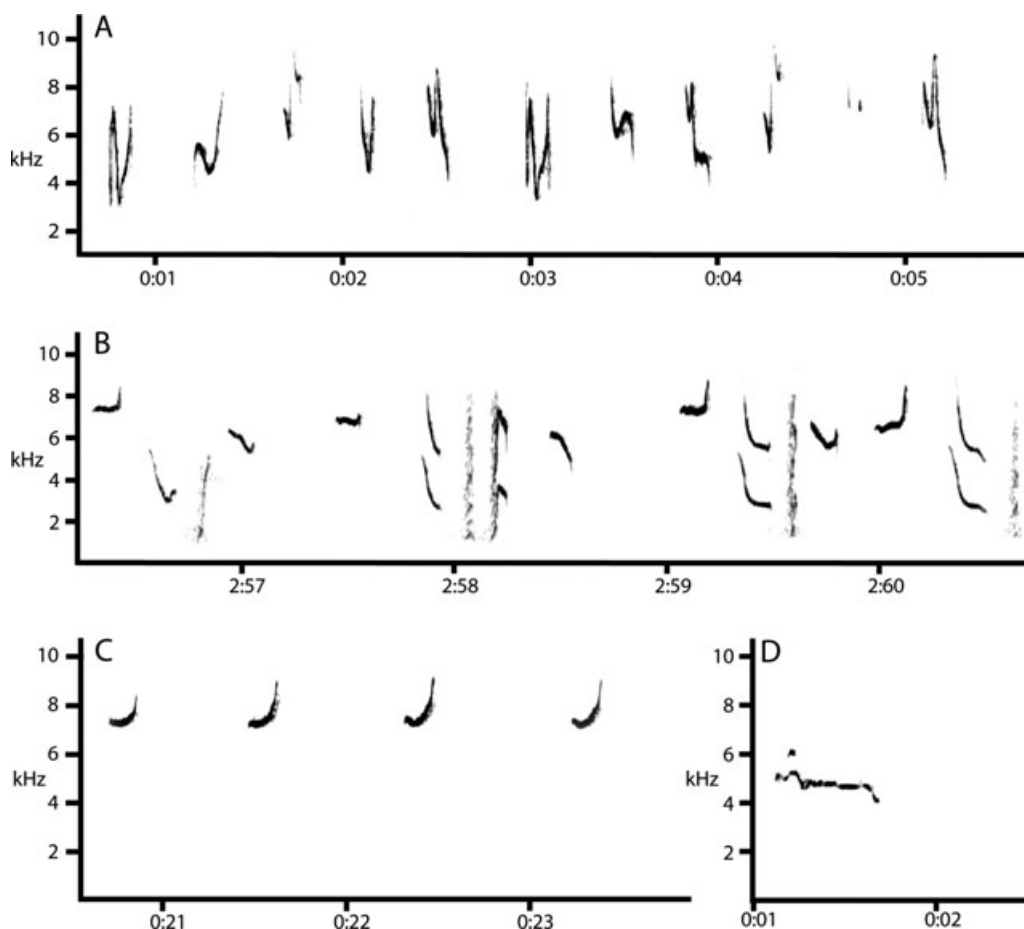


Fig. 3. Spectrograms of Cochabamba Mountain-Finch vocalizations: (A) song type 1 MLNS#132522, (B) song type 2 MLNS#132519, (C) call 1 MLNS#132519, and (D) call 2 MLNS#132520. Axes represent frequency (kHz) and time (s) corresponding to the actual cut archived at the Macaulay Library.

from 06:00–10:30, gradually tapering off into the afternoon, and also sang from about 16:00–18:30, but infrequently and with less vigor. Males sang at the highest rates during nest building; rates declined during incubation and no singing was heard after eggs hatched. When we played back recordings of this song type in other territories (multiple playback to six different pairs), pairs did not respond either vocally or by approaching the source.

A variant of this song type was recorded once (ML #132 502). It was given during an interaction near a territory boundary, with three adults present. One pair successfully chased off the intruder, and the male then gave a series of notes from the first song type, but much more

rapidly, apparently agitated, and without long pauses.

A second song type was only heard and recorded once (ML #132 519; Fig. 3B). This song type also consisted of a series of stereotyped notes with pauses, but covered a much wider range of frequencies and was more variable, including a broad frequency, buzzy note. This song type was given during an apparent territorial dispute between pairs. When this song type was played back to pairs, they approached the playback speaker, gave agitated call notes, and occasionally responded with a weak version of the same song (ML #132 521).

The most commonly heard vocalization of Cochabamba Mountain-Finches was a simple

call note (ML #132 519, Fig. 3C) given by paired males and females as well as by individuals, both perched and in flight. It is a distinctive, short, slightly ascending, high-frequency note, low volume, but carrying a long distance, and easily heard above the noise of rushing streams in the ravines they inhabit. This was the only vocalization we heard that was given year round.

A second call note given by a female apparently soliciting copulation was recorded once (ML #132520, Fig. 3D). After the call was given, the other member of the pair flew directly into the bush where the calling bird was located and they copulated. This was during the period when the female was nest building and the male was singing frequently. Another call type was heard only once during the investigation, but we were unable to record it. This vocalization consisted of a series of five notes, much lower in frequency than the typical call note, and was given in flight once by one member of a pair.

**Habitat.** In the Llave valley, all territories of Cochabamba Mountain-Finches were in areas of mixed agricultural land and native shrubs. Extensive surveys of less disturbed, unbroken dry *Polylepis* woodland on the slopes, and denser more humid *Alnus* woodland in the larger ravines yielded no observations of Cochabamba Mountain-Finches. Edge habitats appeared to be the most frequently used areas, particularly the 2–3 m thick hedgerows of native shrubs between potato fields and edge habitats of small ravines (5–10 m) with native shrubs between potato fields. The territories of three pairs included edges of larger groves of *Polylepis* and *Alnus*. Five pairs were found among houses in the communities of Palcapampa and Portrero. When present in territories, *Polylepis* and *Alnus* were used as perches and occasionally for vocalizing, but these trees did not seem to be preferred over the other woody shrubs. When single or small clumps of exotic *Pinus* or *Eucalyptus* were present in territories, they were also frequently used as perches. Occasionally, pairs also foraged in potato fields. However, Cochabamba Mountain-Finches were not present in the degraded lower areas around Y Grande and Y Chico. These communities are located in a less steep area of the valley just below Palcapampa and Portreo, but otherwise the topography and climate is similar. The vegetation differs drastically because almost all native vegetation has been removed. The terraces lack

the native shrub edge found in Palcapampa and Portrero, and adjacent hillsides and ravines have been completely cleared of *Alnus* and *Polylepis*.

## DISCUSSION

**Nests and behavior.** The nesting behavior of Cochabamba Mountain-Finches in our study was apparently similar to that of Tucumán Mountain-Finches (*C. baeri*; Peris 1997) and other *Poospiza* species (De la Peña 1997, Mezquida and Marone 2003). As with Tucumán Mountain-Finches in Tucumán, Argentina (Peris 1997), the breeding season of Cochabamba Mountain-Finches in Cochabamba coincides with the rainy season and the warmer months of the year, possibly to take advantage of the greater abundance of arthropods and avoid cold temperatures. Like one nest of a pair of Cochabamba Mountain-Finches in our study, the only described nest of a Tucumán Mountain-Finch was located in a clump of grass (Peris 1997). However, descriptions of the structure of the nest cup of Tucumán Mountain-Finches are lacking (Peris 1997) for comparison.

The decorative outer layer of Cochabamba Mountain-Finch nests appears to be for camouflage because the mossy exteriors made the nests resemble the hanging balls of moss that are common in shrubs at our study site. The single nest found in a *Polylepis* shrub decorated in *Polylepis* bark supports this hypothesis because the nest exterior matched the distinctive reddish papery bark of the trunk of the tree.

The eggs of Cochabamba Mountain-Finches in our study were slightly larger than those reported of Tucumán Mountain-Finches (Peris 1997). The clutch and brood sizes of Cochabamba Mountain-Finches in our study (1–2) were smaller than those reported for Tucumán Mountain-Finches (2–3; Peris 1997), following a general pattern of latitudinal variation in the clutch size (Morton and Stutchbury 2001).

**Vocalizations.** We found song type 1 to be useful in finding nests of Cochabamba Mountain-Finches because it was only heard near nests under construction and during the incubation period. The function of this song type is unknown. However, playback of this song type in the territories of conspecifics elicited no apparent response, suggesting that it does

not serve a territorial or aggressive function. Song type 2 may be more important in territorial disputes or during aggressive encounters because playback of this song provoked aggressive responses from pairs, and we found this response to be extremely useful in surveying new areas. We recommend that investigators surveying historical sites and unsurveyed areas use playback of this song during the breeding season to detect the presence of Cochabamba Mountain-Finches.

**Conservation implications.** The diversity of shrubs and the area of shrub edge appear to be important factors in determining the presence of Cochabamba Mountain-Finches. Large areas of undisturbed *Polylepis* and *Alnus* forest were not used, but areas of thick shrub growth on the edge of these woodlands and hedgerows between agricultural fields were used. Our observations indicate that, contrary to some sources (Fjeldså and Krabbe 1990, Birdlife International 2004), Cochabamba Mountain-Finches are not *Polylepis* specialists and pairs need no *Polylepis* in their territories to persist and successfully raise young. However, *Polylepis* represents the typical climax vegetation in this narrow climactic zone, and Cochabamba Mountain-Finches will, therefore, often be associated with habitat mosaics that include *Polylepis* woodland. Conservation measures suggested for this species include replanting *Polylepis* forests (Birdlife International 2004). Although this would help a number of other species, our observations suggest that planting *Polylepis* monocultures may have little direct effect on Cochabamba Mountain-Finches. A more effective strategy would be to replant a diversity of native shrubs (rather than only *Polylepis*), especially those shrubs used for nesting. Using a diversity of native plant species in habitat restoration will also be a more expedient method of habitat recovery because *Polylepis* is a very slow growing tree (Renison et al. 2005).

Territories and nests of Cochabamba Mountain-Finches were found only in areas modified by humans. As such, it seems unlikely that small-scale anthropogenic alterations to habitat or habitat loss, as in Palcapampa or Portrero, are primary causes of the rarity or suspected decline in populations of Cochabamba Mountain-Finches. Many territories included houses, livestock, and exotic trees (*Eucalyptus* and *Pinus*) that were used as singing perches

by the males, and nests were built in shrubs under those trees. However, we never encountered Cochabamba Mountain-Finches in highly degraded areas completely devoid of native vegetation, such as in the communities of Y Grande and Y Chico. Although Fjeldså and Krabbe (1990) also observed that Cochabamba Mountain-Finches can be found on the edges of agricultural areas, our observations indicate that these birds will forage for insects in potato fields and will also, at least occasionally, consume and feed potatoes to their fledglings. Few songbirds eat plant material other than seeds (exceptions include *Phytotoma* spp. and *Saltator* spp. that eat leaves or flower parts). Golden-billed Saltators (*Saltator aurantiirostris*) are abundant at our study sites and eat potatoes so commonly that they are locally considered an agricultural pest.

Cochabamba Mountain-Finches can coexist with humans. However, disadvantages of coexisting with humans include habitat degradation, disturbance, and possible exposure to pesticides. We recommend that conservation measures focus on these issues. If the shrubby areas nearby Palcapampa and Portrero are eliminated, the areas may no longer be suitable for Cochabamba Mountain-Finches. In addition, pesticides are heavily used on the potato fields, and farmers reported finding dead birds, notably Golden-billed Saltators, after spraying. Because Cochabamba Mountain-Finches also feed in potato fields, some level of mortality is suspected. In addition, one of the nests we monitored failed due to human disturbance, and a villager in Palcapampa reported seeing a freshly dead Cochabamba Mountain-Finch in a field, probably shot with a slingshot. Children in the area frequently carry slingshots for the sport of shooting songbirds. There is no reason to suspect that Cochabamba Mountain-Finches would be specifically targeted for sport, but some level of mortality from this activity is also suspected.

Just as in Parque Nacional Tunari, there is political unrest throughout much of the range of Cochabamba Mountain-Finches and most areas are inaccessible to biologists. Whether populations in other valleys are similar to the one in Rio Llave in their size, densities, and habitat preferences is unknown, but there is no reason to suspect a great difference. To survey these areas, much patience is required in building relationships between biologists and indigenous communities. Humans inhabit all

available habitats within the very restricted geographical range of Cochabamba Mountain-Finches. Given the close association between these birds and humans, public education and public relations in the rural communities are critical in terms of allowing access to the area by biologists.

The reasons why populations of Cochabamba Mountain-Finches are low and possibly declining remain unknown, and additional study is clearly needed. Most importantly, exhaustive surveys are needed at all known localities to determine if the hypothesized decline in numbers is real. This is feasible now that we better understand their vocal behavior and know that pairs respond well to song playback (song type 2). Surveys should also be designed to determine population densities where Cochabamba Mountain-Finches are found and combined with density estimates for more rigorous estimates of the population size and the extent of their range. After these information gaps are filled, the conservation status of Cochabamba Mountain-Finches should be reassessed and appropriate conservation measures taken.

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