Population densities of the Black-faced Cotinga *Conioptilon mcilhennyi* in south-east Peru

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Summary

Population densities of the near-threatened Black-faced Cotinga *Conioptilon mcilhennyi* were investigated during a 21-month survey of lowland rainforest bird communities in Madre de Dios, south-east Peru. Surveys for the species were conducted at two locations along the Río Madre de Dios. *C. mcilhennyi* is more abundant in old floodplain/seasonally flooded swamp forest mosaic habitat than in seasonally flooded swamp forest. Regional population estimates along the Río Madre de Dios, Río Parramanu and Río de las Piedras range from 1,153 to 2,178 individuals. Current threats to this species and its habitat are discussed along with several conservation recommendations, including the proposal that the newly designated Parc Nacional Bahuaja-Sonene or existing Zona Reservada de Tambopata-Candamo are expanded to encompass suitable Black-faced Cotinga habitat.

Introduction

The Black-faced Cotinga *Conioptilon mcilhennyi* is a near-threatened arboreal frugivore confined to the lowland forests of south-east Peru and extreme western Brazil (Terborgh *et al.* 1990, Collar *et al.* 1994, Whittaker and Oren in press). This highly vocal and monotypic genus was until recently known only from one site (Balta) in southern Ucayali (Lowery and O'Neil 1966) and a very small number of sites in Madre de Dios (Ridgely and Tudor 1994). Other recent records of *C. mcilhennyi* are from along the Río Caimisea (Alto Urubamba), in Department of Cuzco (B. Walker pers. comm., G. Angehr pers. comm.). In Madre de Dios, the Black-faced Cotinga has been recorded along the Río Manu at the Estación Biológica Cocha Cashu (Terborgh *et al.* 1990) with sightings of the species continuing to the mouth of the river but it appears to be absent from upriver of Boca Manu (B. Walker pers. comm.). There are also no confirmed reports of this species south of the Río Madre de Dios, which probably represents the southern limit of its small distribution and thus explaining its absence from the nearby Zona Reservada de Tambopata-Candamo (see Ridgely and Tudor 1994). In 1996 it was recorded at two locations on the upper and central Río Tejo and Río Juruá, near Taumaturgo, Acre, in extreme western Brazil (Whittaker and Oren in press). J. Minns (pers. comm.) also recorded the species at Lago Ceara, on the Río Juruá, in 1998.

Where found, the species is reportedly fairly common in the subcanopy of river-edge forest habitat, swampy or seasonally flooded forest habitats, and along

lake or river margins at elevations up to 350 m, rarely to 450m (Collar *et al.* 1992, 1994, Ridgely and Tudor 1994). However, G. Angehr (pers. comm.) recorded this species at 700 m elevation along the Río Caimisea in 1997, but Whittaker and Oren (in press) did not record it toward 800 m elevation near the crest of the Serra do Divisor. These last two authors recorded the species along streamside habitat and at the edge of clearings, but more importantly also in the canopy of *terra firme* forest some 4 km from the Río Juruá, a forest type from which it is reportedly absent (Ridgely and Tudor 1994). J. Minns (pers. comm.) recorded this species in ''transitional forest'' around tree-fall gaps within 2 km of the Río Juruá.

Although some of the lowland forest habitats in Madre de Dios, south-east Peru are relatively intact, e.g. the upper Río Manu is protected by Manu National Park (Kratter 1995a), the region has recently been subject to some selective logging, while other areas of Madre de Dios are being opened up for development schemes, such as oil/gas extraction, road construction, human colonization, agriculture, ecotourism and gold mining (Collar *et al.*1994, Kratter 1995b). Currently the forest habitats in close proximity to all the main river tributaries in Madre de Dios are among the most threatened habitats in south-east Peru (Phillips *et al.* 1994).

In this paper I examine the population densities of the Black-faced Cotinga in two forest habitat types at two locations along the lower Río Madre de Dios in south-east Peru and calculate regional population estimates for the species.

Study sites

The research was conducted between January 1997 and September 1998. The following descriptions of the study sites are summarized from Lloyd and Palomino (in press). Forest habitats were classified using the system derived by Phillips (1993), and tested by Nicholson and Edwards (1994).

EcoAmazonia Lodge

EcoAmazonia (EA) is an ecotourist lodge situated on the north bank of the lower region of the Río Madre de Dios (12°31'S, 68°55'W; elevation 205 m) approximately 28 km east of the frontier town of Puerto Maldonado (Figure 1). The lodge is located north of the Parc Nacional Bahuaja-Sonene, and some three hours travel west of the Bolivian frontier. The principle habitat at the EA is primary seasonally flooded swamp forest characterized by an abundance of tree palms, e.g. *Scheelea buytyracea*, *Euterpe precatoria* and *Socratea exorrhiza*. Broad-leaved tree species occur at low frequency. The canopy is normally less than 20 m and broken, with a dense understorey of shrubs and small palms. Vines and scandent herbs are moderately abundant but large lianas are rare. Ground vegetation is restricted to drier areas atop low hummocks.

Cuzco Amazonico Reserve

The Cuzco Amazonico Reserve (CA) is also situated on the north bank of the Río Madre de Dios (Figure 1), approximately 15 km east of Puerto Maldonado
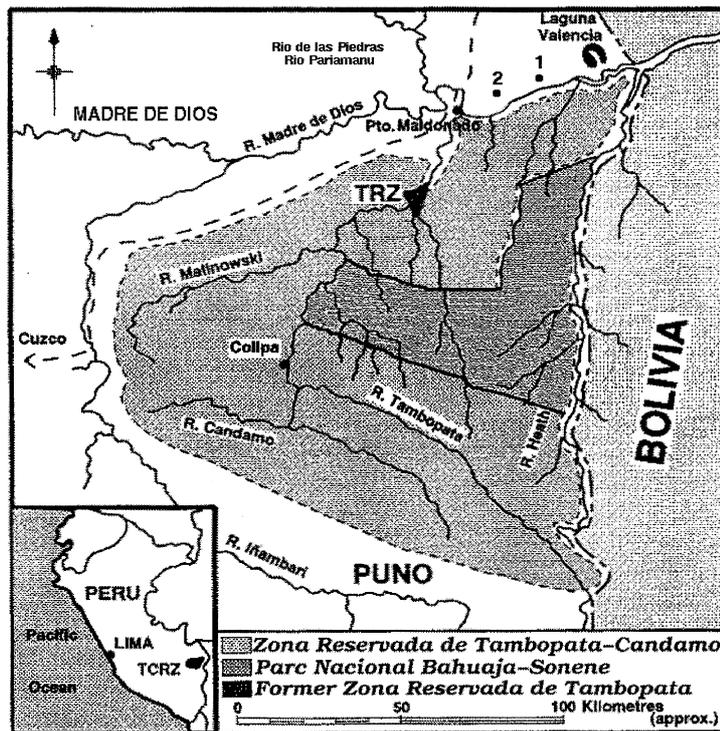
Figure 1. Approximate location of both study sites and the newly established Parc Nacional Bahuaja-Sonene. 1, EcoAmazonia Lodge; 2, Cuzco Amazonico Reserve.

(12°32'S, 69°3'W; elevation 210 m). This lodge has been established as an ecotourist and research reserve since 1977 (Davies *et al.* 1991). The predominant forest type at CA is a mosaic of old floodplain forest with seasonally flooded swamp forest. The canopy is tall (> 30 m) and more continuous than seasonally flooded swamp forest. The palm *Iriartea deltoidea* is particularly abundant in this forest type. Large emergent trees are common. The understorey is relatively open owing to the dense shade cast by the more closed canopy. The fern *Adiantum latifolium* dominates the ground vegetation.

Methods

Bird census

Bird censuses were conducted using the variable circular plot (VCP) method (Reynolds *et al.* 1980). A total of 63 census stations were established along 12 transects. EA had 39 census stations located along six transects in seasonally flooded swamp forest, while 24 stations were established along six transects in old floodplain/seasonally flooded swamp forest at CA. All transects were located within 5 km of the river's edge. Census stations were located 200 m apart, while transects were also located at a minimal distance of 200 m apart. Transects were established either perpendicularly across existing trails, along existing trails, or

in areas where there were no trail systems. Transects located perpendicularly across trails had a central census station placed directly on the trail, with the remainder of the transect continuing 400 m either side of the trail. The number of census stations and length of each transect were dependent on the amount of available habitat at each site.

During January and September of each year, VCP surveys began at 05h30 and were concluded by 08h30, after which time vocal activity decreased significantly. During September–December first light occurs earlier in the morning. Thus VCP surveys had to begin at 04h45 in order to census adequately birds that sing during the predawn chorus (Terborgh *et al.* 1990). Two observers spent 10 minutes at each census station recording all bird contacts. These contacts were assigned to one of three categories; seen, heard or seen and heard. Observers noted the time of the contact, species, and the number of individuals. Observers then estimated horizontal distance from the centre of the census station to each individual contact. Finally each bird contact was assigned to one of five height categories: 1, ground level (< 1 m); 2, understorey (1–5 m); 3, mid-canopy (5–15 m); 4, canopy; 5, flying above the canopy.

A total of six repeat surveys (each survey lasting 18 days) was made at EA while five repeat surveys were made at CA, the number at each site being determined by the permission of the lodge owners. Two repeats of each transect were made per visit to each site. The direction of the surveys along each transect was rotated to counter the bias of bird activity and the time of day. Distance data were then analysed using the program DISTANCE version 3.5 (Thomas *et al.* 1998).

An estimation of the total area of suitable forest habitat in the region was made from a Landsat satellite image of the region (Earth Observation Satellite Company 1991, Foster *et al.* 1994, Kratter 1995b). The satellite image covers approximately 12°15′–13°32′S and 68°10′–69°40′W of lowland south-east Peru (Departments of Madre de Dios and Puno) and northern Bolivia (Kratter 1995b).

Results

Population densities

A total of 44 individual birds was recorded on circular plots. *C. mcilhennyi* was often recorded with other frugivores including Cobalt-winged Parakeets *Brotogeris cyanoptera*, Plumbeous Pigeon *Columba plumbea*, Black-spotted Barbet *Capito niger* and Purple-throated Fruitcrow *Querula purpurata*. Outside VCP sampling, the species was regularly encountered foraging in pairs or in groups of up to six individuals. At EA the species was often seen foraging with mixed-species flocks at the forest edge of the lodge clearing, perched and plucking fruits from *Pourouma* spp. Pairs were also observed roosting in the subcanopy of large broadleaved trees from 16h00. Pairs would call consistently to one another once they had landed in the subcanopy, and would begin several minutes of allo-preening before settling down (Lloyd and Palomino in press).

Population density estimates are shown in Table 1. The density estimate for the forest habitat at CA is almost twice that for the species in the forest at EA. The overall population estimates correspond to the region portrayed from the

Table 1. Population density of *Conioptilon mcilhennyi* in both forest habitats

Location	Forest habitat	Density (no. individuals/ km²)	SD	Total population estimate for region (no. individuals)[a]
EcoAmazonia	Seasonally flooded swamp forest	0.9	± 1.0	1,153
Cuzco Amazonico	Old floodplain/ seasonally flooded swamp forest	1.7	± 1.0	2,178

[a] Total population size was calculated from the amount of available forest habitat, estimated from a Landsat satellite image of lowland south-east Peru and adjacent north-west Bolivia (Earth Observation Satellite Company 1991, Foster *et al.* 1994, Kratter, 1995b). Total area of available forest habitat estimated as 1,278 km².

satellite image. Areas of suitable forest are distinguishable from the Landsat image as areas of diffuse purplish green (Hill and Foody 1994, Nicholson and Edwards 1994). From this image, and assuming that the species is not found on the south bank and beyond on the Río Madre de Dios, the total amount of available habitat in the region was estimated as 1,278 km² (along three major rivers; Ríos Madre de Dios, de las Piedras and Parramanu). The overall population estimates for *C. mcilhennyi* are therefore expressed as a range using the two local density estimates as minimum and maximum values (Table 1).

Discussion

Conioptilon mcilhennyi occurs at low population densities in lowland forest habitat and at higher population density in old floodplain/seasonally flooded swamp forest mosaic, compared with seasonally flooded swamp forest habitats. The density estimates for both locations are thought to be reasonably accurate for two reasons. First, the SD for each estimate is relatively small (Table 1). Second, the estimates are comparable to those calculated by Terborgh *et al.* (1990) in the only other bird census to calculate absolute densities for bird species in lowland rainforest habitat in Peru. Using spot-mapping methodology, an estimate of one individual per square kilometre of ''mature floodplain forest'' was obtained from a census of a 97 ha plot at the Estación Biológica Cocha Cashu (Terborgh *et al.* 1990). The study also emphasized the restricted habitat occupancy of the species, since it was recorded in just 10% of the 97 ha plot (Terborgh *et al.* 1990).

The population estimate for the species in the region (Table 1) is likely to be too low because I have assumed that the species is not found south of the Río Madre de Dios. Recently, however, there has been an unconfirmed record for the species found in ''varzea'' forest at Lago Sandoval (12°37'S, 69°5'W) situated 20 km east of Puerto Maldonado and 3 km south-east of the river (P. Champlin pers. comm.).

Robinson and Terborgh (1995) suggested that interspecific competition with *Querula purpurata* restricts *C. mcilhennyi* to the early end of a primary successional gradient generated by the meandering action of white-water rivers at Estación Biológica Cocha Cashu, in Parc Nacional Manu. During 21 months of surveys I

saw no aggressive interactions between these two species. In fact, *Q. purpurata* is more abundant at these two locations (density estimate for EA = 11.9 ± 6.4; CA = 17.8 ± 8.9) than in three other forest types found within the nearby ZRTC (middle/upper floodplain forest = 4.7 ± 0.4; old floodplain forest = 5.1 ± 39.1; *terra firme* sandy-clay forest = 7.6 ± 1.8; H.L. unpubl. data). *C. mcilhennyi* is often referred to as an ''edge'' species (Terborgh *et al.* 1990) or as a river-edge habitat indicator species (Stotz *et al.* 1996) because it has often been located in river-edge forest (corresponding to lower floodplain forest, using Phillips's (1993) forest classification scheme), or at the edge of clearings and around tree-falls. The results of this study and other recent sightings confirm that the Black-faced Cotinga appears not to be a river-edge species or even an edge species but in fact a seasonally flooded swamp/floodplain forest species that can occasionally be found in edge habitats, tree-falls or in *terra firme* forests up to 5 km from major rivers.

Current threats to the Black-faced Cotinga

All known sightings of Black-faced Cotinga have been made within 4–5 km of the river's edge. Currently the species is classified as Near-threatened by Collar *et al.* (1994) and Vulnerable by Stotz *et al.* (1996) since its habitat is the most threatened forest type in the region (Phillips *et al.* 1994). From the Landsat satellite image, suitable forest habitat totalling 1,278 km^2 can be identified along the Ríos Madre de Dios, de las Piedras and Parramanu, extending to approximately 10 km at most from the rivers' edge. Although suitable habitat can be identified along all three rivers, currently no populations of this species have been found along the Río de las Piedras or Río Parramanu.

Along the Río Madre de Dios, the greatest pressure on this species's habitat is human colonization, since the human population in and around the Puerto Maldonado area continues to expand (Kratter 1995b). Most development in the region occurs along rivers (Foster *et al.* 1994) and it is probable that the amount of available habitat shown on the Landsat image of the region has been reduced in the years since the image was acquired. Currently there are *c*. 700–1,000 people living along the Río Madre de Dios from Puerto Maldonado east to EA including the area around Lago Sandoval (C. Kirkby pers. comm.).

Small-scale logging operations such as those along the lower Río de las Piedras also pose a major threat to this species. Logging operations currently can proceed to more than 20 km inland from the river's edge (C. Kirkby pers. comm.). This places any cotinga population at great risk. Normally these logging operations, which have been under way since the 1960s, target four important timber species, mahogany *Sweitenia* spp., Spanish Cedar *Cedrela* spp., cedromacho *Cedrelinga* spp. and ishpingo *Amburana* spp., all of which are more characteristic of middle, upper and old floodplain forests, and *terra firme* sandy-clay forests. *C. mcilhennyi* is more abundant in floodplain forest mosaics with primary seasonally flooded swamp forests bordering the rivers. It is not found in areas of low scrubby secondary growth with dense vines and lianas, typical of highly disturbed areas (pers. obs.). This suggests that the species cannot tolerate high levels of logging such as those currently under way in the lower Río de las Piedras region, which has currently lost all of its mahogany trees and 90% of Spanish cedar (C. Kirkby pers. comm.).

Of the 12 tree species most important to mestizo people of the region, six are palms (Phillips *et al.* 1994). The importance of seasonally flooded swamp forests to local people will probably increase in years to come given the moderate abundance of palms and its proximity to the river's edge, in comparison to the *terra firme* sandy-clay forests (Phillips *et al.* 1994). This would further increase the pressure on the Black-faced Cotinga.

Conservation

Effective measures must be taken to preserve both floodplain and seasonally flooded swamp forests, which are considered globally significant cornerstone habitats (Stotz *et al.* 1996), and the bird communities they hold. Part of the Black-faced Cotinga's range has already been protected within Parc Nacional Manu. The nearby Zona Reservada de Tambopata-Candamo (currently being reviewed for territorial zoning) or the newly created Parc Nacional Bahuaja-Sonene (PNBS) should be expanded to incorporate the floodplain of the Río Madre de Dios, from (and including) the location of EA, east to the frontier with Bolivia, and extending some 10 km inland on both the north and south banks of the river (Figure 1). Families that have settled in this region, e.g. the Lago Valencia community, must be allowed to remain in the area and encouraged to play an active role in its conservation. This would help conserve suitable habitat not only for the Black-faced Cotinga, but also a full complement of river-edge and flooded-forest bird species, including other threatened species such as the Rufous-fronted Antthrush *Formicarius rufifrons* which has also recently been found at the site (Lloyd and Palomino in press).

The conservation of the CA reserve poses a different problem. Recent research has shown that the bird community and the habitat here are disturbed (Lloyd and Palomino in press). The lodge itself is in the process of reconstruction, which already threatens two newly discovered territories of *F. rufifrons* (Lloyd and Palomino in press). I do not advocate the inclusion of this Reserve within an expanded ZRTC or PNBS on the basis of its bird community, or on the basis of the high population density of *C. mcilhennyi* here, or because of the conservation status of one or two other threatened bird species found at this site (see Lloyd and Palomino in press). Probably the most sensible reason for the inclusion of the CA reserve within an expanded ZRTC would be its importance for long-term tropical botanical studies from established 1 ha permanent plots (Phillips *et al.* 1998).

Following these measures suitable habitat along all the major rivers in the region must be identified. Rapid and urgent surveys are required, with priority given to surveys along the Río de la Piedras (along with the establishment of a protected area in the headwaters), Río Parramanu and the Río Tahuamanu, since logging concessions for the remainder of this area are to be sold off in the near future (C. Kirkby pers. comm.).

Acknowledgements

References

Collar, N. J., Gonzaga, L. P., Krabbe, N., Madrono Nieto, A., Naranjo, L. G., Parker III, T. A. and Wege, D. C. (1992) *Threatened birds of the Americas. The ICBP/IUCN red data book. Part 2.* Cambridge, U.K.: International Council for Bird Preservation and International Union for Conservation of Natural Resources.

Collar, N. J., Crosby, M. J. and Stattersfield, A. J. (1994) *Birds to watch 2: the world list of threatened birds*. Cambridge, U.K.: BirdLife International (BirdLife Conservation Series 4).

Davies, T. J., Fox, C., Salinas, L., Ballon, G. and Arana, C. (1991) Annotated checklist of the birds of Cuzco Amazonico, Peru. *Occas. Pap. Mus. Nat. Hist.* (University of Kansas) 144: 1–19.

Earth Observation Satellite Company (1991) Landsat thematic mapper scene 432981356410809. Path 002, row 069. Colour bands 3, 4, 5. Image date: 27 July 1991. Lanham, Maryland, USA.

Foster, R. B., Parker III, T. A., Gentry, A. H., Emmons, L. H., Chicchon, A., Schulenberg, T., Rodrieguez, L., Lamas, G., Ortega, H., Icochea, J., Wust, W., Rono, M., Castillo, J. A., Phillips, O. L., Reynel, C., Kratter, A., Donahue, P. K. and Barkley, L. J. (1994) The Tambopata-Candamo Reserve Zone of south-eastern Peru: a biological assessment. Washington, D.C.: Conservation International (RAP working papers 6).

Hill, R. A. and Foody, G. M. (1994) Separability of tropical rain-forest types in the Tambopata-Candamo Reserved Zone, Peru. *Int. J. Remote Sensing* 15: 2687–2693.

Kratter, A. W. (1995a) Status, habitat and conservation of the Rufous-fronted Antthrush, *Formicarius rufifrons. Bird Conserv. Internatn.* 5: 391–404.

Kratter, A. W. (1995b) Bamboo specialisation in Amazonian birds. PhD dissertation, Louisiana State University, Baton Rouge, Louisiana.

Lloyd, H. and Palomino, A. (in press) Bird communities of five ecotourist locations in the Tambopata province, Madre de Dios, south-east Peru. In C. A. Kirkby, T. M. Doan, H. Lloyd, A. Cornejo, W. Arizabal and A. Palomino, eds. *Tourism development and the status of Neotropical lowland wildlife in Tambopata, southeastern Peru: recommendations for tourism and conservation*. London: Tambopata Reserve Society (TReeS).

Lowery, G. H. and O'Neil, J. P. (1966) A new genus and species of cotinga from eastern Peru. *Auk* 83: 1–9.

Nicholson, B. and Edwards, J. (1994) Forest Classification Project: section A – vegetation analysis and ground truthing. In *Report of the TReeS Tambopata-Candamo Expedition: a biological survey in the Tambopata-Candamo Reserve Zone, south-east Peru*. London: Tambopata Reserve Society.

Phillips, O. L. (1993) Comparative valuation of tropical forests in Amazonian Peru. PhD dissertation, Washington University, St Louis, Missouri.

Phillips, O. L., Gentry, A. H., Reynel, C., Wilkin, P. and Glavez-Durand, B. C. (1994) Quantitative ethnobotany and Amazonian conservation. *Conserv. Biol.* 8: 225–248.

Phillips, O. L., Malhi, Y., Higuchi, N., Laurance, W. F., Nunez, P., Vasquez, M. R., Laurance, S. G., Ferriera, L. V., Stern, M., Brown, S. and Grace, J. (1998) Changes in the carbon balance of tropical forests: evidence from long-term plots. *Science* 282: 439–442.

Reynolds, R. T., Scott, J. M. and Nussbaum, R. A. (1980) A variable circular plot method for estimating bird numbers. *Condor* 82: 309–313.

Ridgely, R. and Tudor, G. (1994) *The birds of South America*. II. *The suboscine passerines*. Austin, Texas: University of Texas Press.

Robinson, S. K. and Terborgh, J. (1995) Interspecific aggression and habitat selection by Amazonian birds. *J. Anim. Ecol.* 64: 1–11.

Stotz, D. F., Fitzpatrick, J. W., Parker, T. A. III and Moskovits, D. K. (1996) *Neotropical birds: ecology and conservation*. Chicago: University of Chicago Press.

Terborg, J. W., Robinson, S. K., Parker, T. A. III, Munn, C. A. and Pierpont, N. (1990) The structure and organisation of an Amazonian forest bird community. *Ecol. Monogr.* 60: 213–328.

Thomas, L., Laake, J. L., Derry, J. F., Buckland, S. T., Borchers, D. L., Marques, F., Pollard, J. H. and Fewster, R. M. (1998) DISTANCE 3.5. University of St Andrews, U.K.: Research Unit for Wildlife Population Assessment.

Whittaker, A. and Oren, D. (in press) Important ornithological records from the Rio Juruá, western Amazonia, including twelve additions to the Brazilian avifauna. *Bull. Br. Orn. Club*.

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