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Significant ornithological observations from the Rio São Francisco Valley, Minas Gerais, Brazil, with notes on conservation and biogeography

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RESUMO. **Observações ornitológicas de importância no vale do Rio São Francisco, Minas Gerais, Brasil, com notas sobre conservação e bioegoegrafia.** Chama-se a atenção para a importância das florestas tropicais decíduas do vale do Rio São Francisco, com referência especial a uma área pouco explorada, mas protegida, o Parque Nacional Cavernas do Peruaçu, que contém duas espécies globalmente ameaçadas (*Aratinga auricapilla* e *Xiphocolaptes falcirostris*) e cinco quase-ameaçadas (*Crypturellus noctivagus*, *Herpsilochmus sellowi*, *Hylopezus ochroleucus*, *Megaxenops parnaguae* e *Arremon franciscanus*). São relatadas observações ornitológicas relevantes, incluindo várias extensões de distribuição (*Sakesphorus cristatus*, *Arremon franciscanus* e *Molothrus rufoaxillaris*) e dois novos registros estaduais (*Penelope jacucaca* e *Stigmatura budytoides*), assim como observações da história natural e informação que aumentam o conhecimento das relações ecológicas de várias espécies pouco conhecidas. São apresentadas evidências sobre uma aparente relação próxima entre *Phyllomyias reiseri* e *P. sclateri*. Finalmente são apresentadas algumas recomendações para trabalhos de campo futuros e ações conservacionistas.
PALAVRAS-CHAVE: Rio São Francisco, registros de aves, florestas decíduas, conservação, Brasil.

ABSTRACT. Further attention is drawn to the ornithological importance of the tropical deciduous forests of the São Francisco Valley, with particular reference to a little-explored, but protected, area, Cavernas do Peruaçu National Park, which supports two Globally Threatened (*Aratinga auricapilla* and *Xiphocolaptes falcirostris*) and five Near Threatened bird species (*Crypturellus noctivagus*, *Herpsilochmus sellowi*, *Hylopezus ochroleucus*, *Megaxenops parnaguae* and *Arremon franciscanus*). Significant ornithological observations, including several range extensions (*Sakesphorus cristatus*, *Arremon franciscanus* and *Molothrus rufoaxillaris*) and two new state records (*Penelope jacucaca* and *Stigmatura budytoides*), as well as natural history observations and information that increases our knowledge of the ecological relationships of a number of poorly known taxa, are reported. Evidence is presented for an apparent close relationship between *Phyllomyias reiseri* and *P. sclateri*. Finally some recommendations for future field work and conservation action are presented.
KEY WORDS: São Francisco River, bird records, tropical deciduous forests, conservation, Brazil.

Neotropical dry forests have been relatively little studied and remain poorly known (Pennington *et al*. 2000). The dry forests of central Brazil are one of the more neglected habitats in terms of conservation initiatives, given little recognition even at national level (Silva and Oren 1992). These deciduous forests grow on fertile soils, associated with limestone, and reach up to 25 m tall, with characteristic species including *Astronium urundeuva* (Anacardiaceae), *Piptadenia macrocarpa* (Leguminosae), *Cedrella fissilis* (Meliaceae) and sometimes *Cavanillesia arborea* (Bombacaceae) (Ratter *et al*. 1978, Silva and Oren 1992, see also Willis and Oniki 1991).

Current plant species' distributions support the hypothesis of a historical link between the present-day disjunct centres of seasonally dry forests (Pennington *et al*. 2000). The dry forests of the São Francisco depression conform to this pattern, as their floral composition is associated with that of other Neotropical dry forests (Prado and Gibbs 1993, Silva 1997), being considered vestiges of a formerly continuous seasonal woodland formation (Ratter *et al*. 1988, Prado and Gibbs 1993). Pennington *et al*. (2000) considered that all, currently disjunct, areas of Neotropical seasonally dry forests should be treated as a unit in biogeographic analyses, and proposed to study their relationships via a cladistic biogeographical approach. The region's avifauna, however, has varied origins and affinities and some taxa have their closest relatives in (or even extend their distribution to) other domains, e.g. the caatinga or Atlantic Forest (Silva 1989).

The conservation importance of the tropical deciduous forests of the valley and its surroundings have been highlighted elsewhere (e.g. Silva 1989, Silva and Oren 1992, 1997, Silva and Straube 1996, Silva 1997). The main threats consist of clearance for agriculture, charcoal and timber extraction, and limestone quarrying (Ratter *et al*. 1988, Silva and Oren 1992), while Silva and Oren (1997) estimated that less than 5% of these forests would survive more than five years given current levels of destruction.

The area of Jaíba, on the right bank of the São Francisco, is also being cleared of its native vegetation, in order to open land for one of the largest irrigation projects in Latin America (Raposo 1997, Pimentel 1997, R. Ribon *in litt*. 2001 and information presented by R. Ribon and J. Simon at the VI Congresso Brasileiro de Ornitologia).

Here, we report significant ornithological observations made during visits to the region and, in addition, highlight the importance to several threatened bird species of a little-explored protected area, Parque Nacional Cavernas do Peruaçu. We also evaluate the possible relationships of Reiser's Tyrannulet *Phyllomyias reiseri* in light of our observations. Records of two other interesting and little-known species - caatinga Nighthawk *Chordeiles vielliardi* and Minas Gerais Tyrannulet *Phylloscartes roquettei* - will be presented elsewhere. Our observations serve to underscore earlier reports, to draw attention to the opportunities available to field workers within this area and to sound an alarm that infrastructural development increases apace.

METHODS

Between February 1997 and December 1999, co-workers (Mark Elwonger *et al*., Marco della Seta and Robert Williams) and ourselves made three short visits to the middle reaches of the Rio São Francisco, in central and northern Minas Gerais, Brazil. We surveyed a number of localities, consisting largely of tropical dry forests and gallery forest, at the junction of three main biomes, the Atlantic Forest, Cerrado and Caatinga. Details of the principal localities visited are presented below. At each site we walked existing roads and trails, at a speed of c. 4 km/h, observing and tape-recording as many individual birds as we could. Species identifications were made using binoculars and a telescope, on the basis of extensive previous field experience of virtually all observed taxa and with key reference works, e.g. Ridgely and Tudor (1989, 1994) for passerines, and to published and unpublished sound-recordings of certain key taxa. We did not aim to conduct thorough surveys or a formal census. Appendix 1 presents a complete species list from our visits. Given the brief nature of these, we do not provide more than the minimal data of a species' presence at the principal study localities, with an additional column for other sites visited, including observations in transit through the region.

Voucher tape-recordings, made by J. M. B. and J. M., have been or will be deposited at the Library of Natural Sounds, Cornell Laboratory of Ornithology, Ithaca, New York, U.S.A., the National Sound Archive, London, U.K. and the Arquivo Sonoro Elías Coelho, Universidade Federal do Rio de Janeiro, Brazil (see Appendix 1). J. M. B. used a Sony TCM-5000 tape-recorder and a Sennheiser ME-66 microphone. J. M. used Sony TCM-5000 and Sony TCD-D10PROII tape-recorders and Sennheiser ME-62 and ME-67 microphones, the former with a 25" reflector. Unless otherwise stated observations in 1997 are by G. M. K. and J. M. B. with Robert Williams, those in 1998 pertain to G. M. K. *et al*., while those in 1999 are by all three authors, together with Marco della Seta.

STUDY AREAS

Pirapora. The area visited between 16 and 18 December 1999 is c. 11 km south-east of the town, at c. 17°23'S 44°48'W, and consists of patches of gallery forest within low caatinga scrub and agriculture, adjacent to the Rio das Velhas, a major tributary of the São Francisco. The area previously possessed varied landscapes, with rich forests being described from the lower Rio das Velhas (Hartt 1870), but these have obviously suffered notable destruction, as we found woodland to be restricted to the fringes of waterways.

Parque Nacional Cavernas do Peruaçu. Visited on 10-11 March 1997, 8 November 1998, and 19 and 21 December 1999. The protected area lies 5 km south of Itacarambi and the section visited is centred on c. 15°09'S 44°15'W. It consists of 56,800 ha of the watershed of the Peruaçu stream, which flows into the São Francisco. The principal habitat is tall deciduous forest within high limestone outcrops and walls. We also found dense patches of "mata de Jaíba" adjacent to some woodlands. Elsewhere, relatively large areas have been cleared for cattle grazing, but it was unclear if these fields are within the reserve. The protected area is under the stewardship of IBAMA, but we lack further details as to the boundaries of the reserve or the degree of formal protection it receives. Some tracts of forest appear to have been subject to small-scale clearance.

Fazenda Olho d'Água. Visited on 18-19 December 1999. The fazenda is now divided between two owners, with the larger area now within Fazenda Nossa Senhora Aparecida. We visited patches of woodland and limestone outcrops close to the headquarters of both. Dry forest occurs within both, especially the last-named fazenda, which is situated further west of the main road. Unfortunately, we found few access roads and were thus unable to explore the area more thoroughly.

Mocambinho. Centred on 15°03'S 44°02'W, this area is on the right bank of the São Francisco and was visited on 8-9 November 1998, and 20 December 1999. The habitat consists of patches of secondary deciduous woodland, dense caatinga forest, or "mata de Jaíba", and more open scrubby caatinga fringing the São Francisco. Taller woodland persists only as patches within a largely agricultural landscape, related to the Jaíba irrigation project.

Other localities were visited, such as Manga and patches of habitat beside the main road between Januária and the state of Bahia. However, only brief stops were made en route between main sites and fuller details are provided in the relevant species accounts.

RESULTS AND DISCUSSION

We recorded a total of 292 species at the four principal study sites and a number of subsidiary localities visited only briefly (see Appendix 1). Details of our observations of 11 species are presented below, where these add to our knowledge of the avifauna of the region; these include several range extensions, more detailed behavioural information than previously existed for some poorly known forms, new localities for several globally threatened species and two first state records.

White-browed Guan *Penelope jacucaca*. Three were seen on 8-9 November 1998, in low caatinga scrub on the right bank of the São Francisco, by the road to Mocambinho. They were not wary, permitting close approach in a vehicle on the second date, perching atop the low caatinga scrub and feeding on the road. This locality appears to represent the southernmost limit of its range; it was not mentioned for the state by Sick (1997). Recently considered Near Threatened (BirdLife International 2000), due to habitat loss and fragmentation, trade and hunting. The habitat in the region continues to deteriorate (see below) and we noted evidence of hunting.

Silvery-cheeked Antshrike *Sakesphorus cristatus*. Several pairs were observed and tape-recorded, on 16-18 December 1999, in degraded caatinga scrub by the Rio das Velhas, southeast of Pirapora. This appears to be the most southerly and western record of the species as, for Minas Gerais, Sick (1997) mentioned it only for Almenara, further north. It is however numerous at Mocambinho (R. Ribon *in litt*. 2001; pers. obs. 1998). We also found it between Itacarambi and Manga, on 10 November 1998, and at PN Cavernas do Peruaçu, on 21 December 1999. The species is probably locally not uncommon in the middle reaches of the São Francisco Valley.

Red-shouldered Spinetail *Gyalophylax hellmayri*. One observed and tape-recorded in dense, thorny low caatinga scrub between Itacarambi and Manga, on 10 November 1998. The habitat in this area is typical of the species, e.g. at Canudos, Bahia (pers. obs.) This area appears to be the southernmost limit of its distribution; it had previously been recorded in Minas Gerais at Mocambinho (R. Ribon *in litt*. 2001). Considered Near Threatened (BirdLife International 2000), further details of its ecology and vocalizations can be found in Whitney and Pacheco (1994).

Caatinga (Rufous) Cacholote *Pseudoseisura cristata*. A pair was observed in scrubby caatinga southeast of Pirapora, on 17 December 1999. We also tape-recorded several individuals, on 8-9 November 1998 and 18 and 20 December 1999, on the right bank of the São Francisco, by the road to Mocambinho; on 19 December 1999 at PN Cavernas do Peruaçu and on 21 December 1999 at Fazenda Nossa Senhora Aparecida. All were in low-lying caatinga woodland and scrub adjacent to the river. Pairs were separated from their nearest neighbours by c. 300-400 m, as reported by Zimmer and Whittaker (2000) to be typical of this form. Several nests were also noted. These appear to be only the third and fourth localities in the state, after the lower Serra do Cipó (Willis and Oniki 1991) and Mocambinho (R. Ribon *in litt*. 2001); Zimmer and Whittaker (2000) knew of no specimen records for Minas Gerais. Given our observations, it may be assumed to be locally common within its preferred habitat.

Great Xenops *Megaxenops parnaguae*. One was attracted to playback, on 9 March 1997, in dense and partially degraded caatinga woodland (similar to "mata de Jaíba"), c. 15 km north of Itacarambi. On 9 November 1998, one was attracted to playback in "mata de Jaíba" near Mocambinho, close to the type locality of *Arremon franciscanus*, where Raposo (1997) and R. Ribon (*in litt*. 2001) also recorded the species. Interestingly, this individual did not respond vocally to playback. Another was noted feeding in dense caatinga woodland at PN Cavernas do Peruaçu, in the same area as the first *Arremon* (see below). It searched its surroundings rather passively and investigated a termite nest, sometimes hanging upside-down. Andrade (1998) listed five localities in Minas Gerais, including Mocambinho, but our other localities are new for the species. Recently classified as Near Threatened (BirdLife International 2000), Whitney and Pacheco (1994) provided a detailed review of the distribution, ecology and relationships of the species.

Moustached Woodcreeper *Xiphocolaptes falcirostris*. On 10 March 1997, three were observed in a dry woodlot, c. 5 km north of Itacarambi, beside the main road to Bahia. However, in early November 1998, when G. M. K. revisited this area with the specific intention of searching for the species, this woodland had largely been cleared through road widening and improvement work. A pair was attracted to playback of the song of *X. albicollis* early in the morning of 19 December 1999 at PN Cavernas do Peruaçu. Though they approached relatively swiftly, they did not respond very vigorously, moving through the tall dry forest at mid-heights around trunks and main branches. They appeared not to be associated with a mixed-species flock in the same area. A lone individual was subsequently observed nearby. At Fazenda Nossa Senhora Aparecida, south of Itacarambi, we discovered a pair later the same day. One vocalized with typical dawn and dusk calls, similar to those of *X. albicollis*: *iíeiiiii-chjk*! Possibly the same pair was observed and heard at the same locality in the morning of 22 December 1999. Individuals in this region pertain to

franciscanus, which is restricted to the left margin of the São Francisco (Silva and Oren 1997), with previous records from Jaíba, on the right margin, now discarded (Ribon 2000). The species was recently classified as Vulnerable (BirdLife International 2000), and threats and conservation strategies were thoroughly reviewed by Silva and Oren (1997) and BirdLife International (2000). We suggest that the area between PN Cavernas do Peruaçu and Fazenda Nossa Senhora Aparecida be considered a prime area for additional field surveys and studies of the species, while conservation measures should concentrate on providing corridors of habitat between now largely isolated woodlots.

Wagler's (Scaled) Woodcreeper *Lepidocolaptes (squamatus) wagleri*. Observed on 19 and 21 December 1999 at PN Cavernas do Peruaçu, and in wooded patches at Fazenda Nossa Senhora Aparecida, on 19 and 22 December 1999, with up to eight seen daily. Also noted in patchy tall dry deciduous forest, north of Itacarambi, on 9 March 1997 and 10 November 1998. Much of this habitat has subsequently been cleared (see *Xiphocolaptes falcirostris*).

Individuals usually followed mixed-species flocks, moving through the upper half of tall trees, principally on narrower branches. Willis and Oniki (1991), who recorded it as common around Januária, observed similar behaviour there. Silva and Straube (1996), in reviewing taxonomy of the *squamatus* complex concluded, on the basis of morphological evidence, that *wagleri* demanded species status under the Phylogenetic Species Concept, but noted a lack of vocalization data. Though we did not specifically record any vocalizations, a prolonged woodcreeper-like whistle tape-recorded at Peruaçu may pertain to this taxon, as suggested by D. Buzzetti (pers. comm.). We remain uncertain as to its identity, but the call differs from a probably homologous vocalization in *squamatus*. However, Willis and Oniki (1991) reported call notes similar to those of *squamatus* from the Januária area and J. M. recorded one call, on 22 December 1999 at Fazenda Nossa Senhora Aparecida which sounds almost identical to the nominate. We heard and tape-recorded calls similar to individuals from São Paulo, delivered by birds observed south of Pirapora, on 17 December 1999. These individuals were faintly marked with buffy spots, at least on the neck-sides (the crown being concealed), and this voice and plumage pattern concords with Silva and Straube's (1996) analysis, who consider the individuals east of the Rio São Francisco within the nominate form.

Wagleri occurs west of the São Francisco and it was tentatively proposed that the formation of the river's present-day course represented the vicariant event leading to differentiation from *squamatus* (Silva and Straube 1996). The dating of mitochondrial DNA sequence divergence between the two forms supports this novel hypothesis (García-Moreno and Silva 1997).

Reiser's Tyrannulet *Phyllomyias reiseri*. At PN Cavernas do Peruaçu a pair was observed on 11 March 1997, three separate singles on 8 November 1998 and up to eight were seen and tape-recorded on 19 December 1999, including a solitary individual, a pair and an apparent family. They principally moved between 3 m and 7 m above ground, but occasionally down to 1 m, within tall dry deciduous forest and its edge. Rather active, they performed mostly upward sallies within branches to catch insects and appeared to prefer more open vegetation and thin branches, such as those found at mid-heights in taller trees or the canopy of medium Leguminosae-type trees with sparse foliage. They occasionally produced a short wing flicking. On 21 December 1999 up to four were noted high in the canopy at the same locality. At least one was observed in woodland north of Itacarambi, on 10 March 1997.

Phyllomyias reiseri has endured a controversial taxonomic history, elucidated by Silva (1996) who studied new specimen material. Though *P. reiseri* has usually been considered to form a superspecies with *P. virescens*, of the Atlantic Forest, and *P. urichi*, from lowland northern Venezuela (which has even been considered a subspecies of *virescens* by some), Silva (1996) had already suggested a possible relationship between this group and Sclater's Tyrannulet *Phyllomyias sclateri*, from the Andean foothills of southern Peru to northwest Argentina (for the distribution of these four taxa see Silva 1996).

The vocalizations of *P. reiseri* and *P. virescens* differ strikingly (Belton 1985, Willis and Oniki 1991, Silva 1996, pers. obs.), while the voice of *P. urichi* is unknown. We found the most common voice of *P. reiseri* to bear a strong resemblance to the principal similar vocalization given by *P. sclateri* (see Ridgely and Tudor 1994, Schulenberg 2000), which could indicate a closer link between *reiseri* and *sclateri* than previously realised, both being more closely related to each other than either is to *virescens* (*contra* e.g. Nores 1992). Vocalizations, especially within suboscine passerines, are increasingly used in taxonomic studies (e.g. Isler *et al*. 1998, 1999), but we are unaware of their use to infer inter-specific relationships (but see Whitney *et al*. 2000: 886-887). We also found that, structurally, these two species resemble one another, being shorter and stockier than *virescens*, and have less horizontal postures than the latter. In the field, their tails also appear shorter than *virescens* (see Silva 1996) and are not as frequently held half-cocked as in that species (see also Clay *et al*. 1998).

The suggested relationship also appears to be supported by the distribution of these species, which conforms to a known biogeographic pattern. Silva (1989, 1992) suggested two different processes for the origin of certain central Brazilian taxa. That hypothesised for *Knipolegus franciscanus* and *Phylloscartes roquettei* was based on the expansion of central Brazilian forests during

the Late Pleistocene (Ab'Saber 1977). Climate amelioration and a return to more humid regimes fragmented these forests during the early Holocene. Vegetation studies point to a close relationship between these currently isolated patches of deciduous forest, supporting this hypothesis (Pennington *et al.* 2000). *Phyllomyias reiseri* and *P. sclateri* currently occupy two such forested areas. For *Cercomacra* antbirds, Silva (1992) pointed to the importance of tectonism during the Plio-Pleistocene transition. The pattern of distribution and relationships of certain *Cercomacra* appear to parallel, to some extent, that of *reiseri-sclateri* (but see Zimmer *et al*. [1997] for arguments against the relationships proposed by Silva [1992]). Subsequently, Fjeldså (1994) suggested that this tectonism, and the subsidence of the unstable Chaco plain, interrupted the contact between a number of current sister taxa (with a circum-Amazonian distribution pattern, see Remsen *et al*. 1991). The distributions of these tyrannulets may have also resulted from such forces. We are unaware, however, of which other *Phyllomyias* could belong to the potential group, occupying the gap between south Peru and coastal Venezuela. These biogeographic hypotheses and the composition of the putative species group (as well as the validity of the genus *Xanthomyias*), should be tested using molecular data, which could provide the temporal perspective required to approximately date the separation between them and thus assign the vicariant event to one of the processes described above, or to elaborate a new hypothesis concerning their relationships.

Phyllomyias reiseri occurs in highland interior eastern Brazil, from southern Piauí, through southern Goiás, the Distrito Federal and eastern Mato Grosso do Sul, to northeast Paraguay (Ridgely and Tudor 1994). It is considered most frequent in gallery forest within Cerrado (Clay *et al*. 1998), though we consider that the subtropical, dry deciduous forests of northern Minas Gerais are also important to the species. No concerns have been raised as to its conservation status (BirdLife International 2000), presumably due to its comparatively broad geographical range. Nonetheless, ongoing and severe habitat destruction and fragmentation within the Cerrado and these deciduous forests must represent a threat. We advocate close attention be paid to the species and that it be considered a potential future candidate in the formulation of global and national red lists.

Greater Wagtail-tyrant *Stigmatura budytoides.* A pair observed and tape-recorded in low scrubby caatinga just south of Mocambinho, on 18 December 1999. Two forms in the genus inhabit northeastern Brazil, namely *Stigmatura budytoides gracilis* and *Stigmatura napensis bahiae*. This latter was described by Chapman (1926) within *budytoides*, but Zimmer (1940) subsequently placed it within *napensis*. Their distribution and relationships to each other and other *Stigmatura* taxa are poorly understood, but both taxa are recognisable in the field and may be separated by their ecological requirements (J. M. pers. obs., J. M. C. da Silva and B. M. Whitney pers. comm.). Those observed at Mocambinho reminded us of those from near Curaçá, northeastern Bahia, of which we have more ample experience and where we have only noted one taxon in the scrubby caatinga. Those at Mocambinho appear to belong to the same form. Based on the descriptions presented by Chapman (1926) and Zimmer (1940, 1955), a brief analysis of specimens housed at the American Museum of Natural History, by J. M. B., vocalizations and plumage pattern, as well as size, we conclude that we have encountered *S. b. gracilis*. Zimmer (1955) mentioned specimens of this form from Juazeiro, Barra and Remanso, in Bahia, and we have noted this form near Curaçá and Canudos, within the same area. We are unaware of records away from this region, and Ridgely and Tudor (1994) only map this restricted area. This would appear to be the first state record and a considerable southward range extension. Sick (1997) also mentioned the species only for Bahia.

A taxonomic revision of this group based on further specimens from throughout the caatinga and extensive analyses of vocalizations should endeavour to elucidate their status and several yet unanswered questions such as the origins and sympatry of *bahiae* and *gracilis*.

Ash-throated Casiornis *Casiornis fusca*. Near Mocambinho, on 9 November 1998, four lone individuals were observed, all but one closely associated with mixed-species flocks. All were in tall, largely leafless, dry deciduous forest, feeding in upper and mid levels. At PN Cavernas do Peruaçu, singles were seen on 19 and 21 December 1999 loosely following large mixed-species flocks. Perching mostly on exposed branches and performing long airborne sallies in mid and upper levels of tall dry forest, they generally behaved in a manner reminiscent of *C. rufa* but were perhaps less conspicuous. Another was observed nearby at Mocambinho, east of the São Francisco, in a patch of tall deciduous (apparently more humid) forest. This area was highly fragmented with only patchy forest remaining within an agricultural landscape. This individual also loosely associated with a mixed-species flock.

São Francisco Sparrow *Arremon franciscanus.* Only recently described, from the Mocambinho area (Raposo 1997), the species was subsequently found in caatinga just outside Parque Nacional Chapada Diamantina, Bahia (Parrini *et al*. 1999). On 9 November 1998, very near the type locality at Mocambinho, G. M. K. *et al*. observed a singing male (tape-recorded by Mark Elwonger) in taller (canopy height c. 5 m), more humid forest than the low caatinga described by Raposo (1997). On 21 December 1999, we observed and tape-recorded at least three individuals at PN Cavernas do Peruaçu, the first records west of the São Francisco. They were in the dense undergrowth of "mata de Jaíba" at the edge of tall caatinga woodland, moving nervously in the lower

branches of dense shrubs and small trees. This woodland, up to 3 m tall, has a rather open canopy, but very dense foliage and undergrowth up to 1.5 m. *A. franciscanus* is perhaps more widely distributed than might be inferred from its four published localities, but its habitat is under considerable threat, even within protected areas such as PN Cavernas do Peruaçu, where we noted that large areas had been cleared for cattle grazing, and which is one of only two protected areas where the species occurs (BirdLife International 2000). Such pressure was also noted at the type locality (Raposo 1997), leading to its classification as Near Threatened (BirdLife International 2000).

Screaming Cowbird *Molothrus rufoaxillaris.* On 16 December 1999, at least one was observed, perched atop tall, open gallery forest within an open caatinga landscape southeast of Pirapora. Though Shiny Cowbird *M. bonariensis* was also present here, the diagnostic short bill was noted. A group of approximately six was found, on 18 December 1999, at the entrance to Fazenda Olho d'Água, south of Itacarambi, and one at PN Cavernas do Peruaçu. We also recorded it near Januária, in December 1999. The species is currently spreading north through Minas Gerais, with observations since late 1993 in the region of Francisco Sá (D'Angelo Neto 2000). Our record near Itacarambi extends its range north by a further c.150 km. It will be extremely interesting to follow this process and record interactions between it and the distinctive local form of the Baywing *Agelaioides* (*badius*) *fringillarius*, which until now has not been exposed to parasitism by *Molothrus rufoaxillaris*, the specialized brood-parasite of nominate *badius* further south (Jaramillo and Burke 1999).

CONSERVATION

The Januária-Itacarambi area lies within an Endemic Bird Area (EBA 074) (Stattersfield *et al*. 1998). Our observations within PN Cavernas do Peruaçu have revealed the presence of two Globally Threatened species, Golden-capped Parakeet *Aratinga auricapilla* and Moustached Woodcreeper *Xiphocolaptes falcirostris*, as well as five Near Threatened species, Yellow-legged Tinamou *Crypturellus noctivagus*, caatinga Antwren *Herpsilochmus sellowi* (see Whitney *et al*. 2000), White-browed Antpitta *Hylopezus ochroleucus*, Great Xenops *Megaxenops parnaguae* and São Francisco Sparrow *Arremon franciscanus*. Additionally, we have noted other poorly known species that are to some extent restricted to this general area, e.g. Wagler's (Scaled) Woodcreeper *Lepidocolaptes* (*squamatus*) *wagleri*, Reiser's Tyrannulet *Phyllomyias reiseri* and Ash-throated Casiornis *Casiornis fusca*. The threatened Brazilian Black-tyrant *Knipolegus franciscanus* was recorded at Peruaçu (Andrade 1990), but we failed to find it during our visits.

Despite evidence of poor application of its protected status and some degradation within the reserve's boundaries, PN Cavernas do Peruaçu is of significant conservation importance for several rare and declining species (see Andrade 1990). It is also of key importance from the standpoint of conservation of the threatened dry forests, it representing the only protected area within EBA 074 (Stattersfield *et al*. 1998). No management plan exists for the national park, though this is clearly of critical importance: as broad guidelines, we suggest that its protected area status is more stringently enforced and its boundaries more effectively delimited. In the longer term, areas outside the current reserve should be surveyed to identify areas warranting annexation, though much of its hinterland is a designated Área de Proteção Ambiental ("Caverna do Peruaçu"). Approaches to landowners, whose properties encompass patches of dry forest, should be made in order to reach agreement as to the use of this habitat. Awareness and environmental education campaigns directed at schools in the region are desirable. Ecological research is required to establish sound conservation planning and management options for the region, as are studies of several of the threatened and poorly known species that occur in the area. Silva and Oren (1997) concluded that Moustached Woodcreeper represented an excellent indicator species of the habitat type and that future studies afford particular attention to this species. PN Cavernas do Peruaçu is an ideal location to focus such action.

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REFERENCES

Andrade, M. A. (1990) Importância ornitológica do vale do Peruaçu. *O Charão* 16: 18.

_____ (1998) *Megaxenops parnaguae* Reiser 1905. *In*:

A. B. M. Machado, G. A. B. da Fonseca, R. B. Machado, L. M. de S. Aguiar and L. V. Lins (eds.) *Livro vermelho das espécies ameaçadas de extinação da fauna de Minas Gerais*. Belo Horizonte: Fundação Biodiversitas.

Belton, W. (1985) Birds of Rio Grande do Sul, Brazil, Part 2. Formicariidae through Corvidae. *Bull. Amer. Mus. Nat. Hist.* 180:1-242.

BirdLife International (2000) *Threatened birds of the world*. Barcelona and Cambridge, UK: Lynx Edicions and BirdLife International.

Chapman, F. M. (1926) Description of new birds from Bolivia, Peru, Ecuador and Brazil. *Amer. Mus. Nov*. 231:1-7.

Clay, R. P., J. A. Tobias, J. C. Lowen and D. Beadle (1998) Field identification of *Phylloscartes* and *Phyllomyias* tyrannulets in the Atlantic forest region. *Cotinga* 10:82-95.

D'Angelo Neto, S. (2000) Ocorrência de *Molothrus rufoaxillaris* (Passeriformes: Emberizidae) na região de Francisco Sá, norte de Minas Gerais. *Melopsittacus* 3:134-136.

Fjeldså, J. (1994) Geographical patterns for relict and young species of birds in Africa and South America and implications for conservation priorities. *Biodiv. Conserv*. 3:207-226.

García-Moreno, J. and J. M. C. Silva (1997) An interplay between forest and non-forest South American avifaunas suggested by a phylogeny of *Lepidocolaptes* woodcreepers (Dendrocolaptinae). *Stud. Neotrop. Fauna Environ*. 32:164-173.

Harrt, C. F. (1870) Geology and physical geography of Brazil. *In*: L. Agassiz (ed.) *Scientific results of a journey in Brazil*. Boston: Fields, Osgood and Co.

Isler, M. L., P. R. Isler and B. M. Whitney (1997) Biogeography and systematics of the *Thamnophilus punctatus* (Thamnophilidae) complex. p. 355-381. *In*: J. V. Remsen (ed.) *Studies in Neotropical ornithology honoring Ted Parker*. Orn. Monogr. 48.

_____, _____ and _____ (1998) Use of vocalizations to establish species limits in antbirds (Passeriformes; Thamnophilidae). *Auk* 115:577-590.

_____ , _____ and _____ (1999) Species limits in antbirds (Passeriformes: Thamnophilidae): the *Myrmotherula surinamensis* complex. *Auk* 116:83-96.

Jaramillo, A. and P. Burke (1999) *New world blackbirds: the icterids*. London: Christopher Helm.

Nores, M. (1992) Bird speciation in subtropical South America in relation to forest expansion and retraction. *Auk* 109:346-357.

Pacheco, J. F. and B. M. Whitney (1998) Correction of the specific name of Long-trained Nightjar. *Bull. Brit. Orn. Club* 118:259-261.

Parker, T. A., D. F. Stotz and J. W. Fitzpatrick (1996) Ecological and distributional databases. p. 131-436. *In*: D. F. Stotz, J. W. Fitzpatrick, T. A. Parker and D. K. Moskovits *Neotropical birds: ecology and conservation*. Chicago: Univ. Chicago Press.

Parrini, R., M. A. Raposo, J. F. Pacheco, A. M. P. Carvalhães, T. A. M. Júnior, P. S. M. Fonseca and J. Minns (1999) Birds of the Chapada Diamantina, Bahia, Brazil. *Cotinga* 11:86-95.

Pennington, R. T., D. E. Prado and C. A. Pendry (2000) Neotropical seasonally dry forests and Quaternary vegetation changes. *J. Biogeogr*. 27:261-273.

Pimentel, M. (1997) Projeto Jaíba: onde o sertão começa a virar mar. *Manchete Rural* (Especial Março):24-30.

Prado, D. E. and P. E. Gibbs (1993) Patterns of species distributions in the dry seasonal forests of South America. *Ann. Miss. Bot. Gard*. 80:902-927.

Raposo, M. A. (1997) A new species of *Arremon* (Passeriformes: Emberizidae) from Brazil. *Ararajuba* 5:3-9.

Ratter, J. A., G. P. Askew, R. F. Montgomery and D. R. Gifford (1978) Observations on forests of some mesotrophic soils in central Brazil. *Rev. Bras. Bot*. 1:47-58.

_____, A. Pott, V. J. Pott, C. N. da Cunha and M. Haridasan (1988) Observations on woody vegetation types in the Pantanal and at Corumbá, Brazil. *Notes Royal Bot. Gard. Edinb*. 45:503-525.

Remsen, J. V., O. Rocha, C. G. Schmitt and D. C. Schmitt (1991) Zoogeography and geographic variation of *Platyrinchus mystaceus* in Bolivia and Peru, and the circum-Amazonian distribution pattern. *Orn. Neotrop.* 2:77-83.

Ribon, R. (2000) Até prova em contrário não há *Caprimulgus nigrescens* no sudeste do Brasil. E nem *Xiphocolaptes falcirostris franciscanus* na margem direita do rio São Francisco. *Bol. Soc. Bras. Ornitologia* 30:8-9.

Ridgely, R. S. and G. Tudor (1989) *The birds of South America*, v. 1. Oxford: Oxford Univ. Press.

_____ and _____ (1994) *The birds of South America*, v. 2. Oxford: Oxford Univ. Press.

Schulenberg, T. S. (2000) *Voices of Andean birds, v. 2*: *Birds of the cloud forest of southern Peru and Bolivia*. Ithaca: Library of Natural Sounds, Cornell Laboratory of Ornithology. Audio CD.

Sick, H. (1997) *Ornitologia brasileira*. Ed. Nova Fronteira, Rio de Janeiro.

Silva, J. M. C. (1989) *Análise biogeográfica da avifauna de florestas do interfluvio Araguaia-São Francisco*. M.Sc. dissertation. Brasília: Univ. Brasília.

_____ (1992) Phylogeny of the *Cercomacra nigricans* species group (Aves: Thamnophilidae) and the biogeographical importance of Pliocene-Pleistocene tectonic movements. *Goeldiana Zool.* 18:1-8.

_____ (1996) New data to support the specific status of *Phyllomyias reiseri*, a central Brazilian endemic. *Bull. Brit. Orn. Club* 116:109-113.

_____ (1997) Endemic bird species and conservation in the Cerrado region, South America. *Biodiv. Conserv*. 6:435-450.

_____ and D. C. Oren (1992) Notes on *Knipolegus franciscanus* Snethlage, 1928 (Aves: Tyrannidae), an endemism of central dry Brazilian forests. *Goeldiana Zool*. 16:1-9.

_____ and D. C. Oren (1997) Geographic variation and conservation of the Moustached Woodcreeper *Xiphocolaptes falcirostris*, an endemic and threatened species of north-eastern Brazil. *Bird Conserv. Intern*. 7:263-274.

_____ and F. C. Straube (1997) Systematics and biogeography of Scaled Woodcreepers (Aves: Dendrocolaptidae). *Stud. Neotrop. Fauna Environ*. 31:3-10.

Stattersfield, A. J., M. J. Crosby, A. J. Long and D. C. Wege (1998) *Endemic Bird Areas of the world: priorities for biodiversity conservation*. Cambridge: BirdLife International (Conservation Series 7).

Whitney, B. M. and J. F. Pacheco (1994) Behaviour and vocalizations of *Gyalophylax* and *Megaxenops* (Furnariidae), two little-known genera endemic to northeastern Brazil. *Condor* 96:559-565.

_____, J. F. Pacheco, D. R. C. Buzzetti, and R. Parrini (2000) Systematic revision of the *Herpsilochmus pileatus* complex, with description of a new species from northeastern Brazil. *Auk* 117:869-891.

Willis, E. O. and Y. Oniki (1991) Avifaunal transects across the open zones of northern Minas Gerais, Brazil. *Ararajuba* 2:41-58.

Zimmer, J. T. (1940) Studies of Peruvian birds. No. XXXV. *Amer. Mus. Nov.* 1095:1-19.

_____ (1955) Further notes on tyrant flycatchers (Tyrannidae). *Amer. Mus. Nov.* 1749:1-24.

Zimmer, K. J. and A. Whittaker, (2000) The Rufous Cacholote (Furnariidae: *Pseudoseisura*) is two species. *Condor* 102:409-422.

_____, _____ and D. F. Stotz (1997) Vocalizations, behaviour and distribution of the Rio Branco Antbird. *Wilson Bull.* 109:663-678.

Appendix 1. List of 292 species recorded at the principal study sites: (A) Pirapora, (B) PN Cavernas do Peruaçu, (C) Fazendas Nossa Senhora Aparecida and Olho d'Água, (D) Mocambinho, and (E) Others (C = Carinhanha, principally the river close to town, I = principally woodlots between Itacarambi and Manga, and marshy areas north of the latter, J = Januária, principally areas south of the town, and P = tall humid forest c. 30 km northeast of Pirapora). An x indicates presence at any of the four principal study sites. An * indicates species that were tape-recorded (see Methods). Systematic order and nomenclature follows Sick 1997, with the exception of *Hydropsalis torquata*, where we follow Pacheco & Whitney (1998), *Thamnophilus pelzelni*, where we follow Isler *et al.* (1997), *Herpsilochmus sellowi*, where we follow Whitney *et al.* (2000), *Lepidocolaptes wagleri*, where we follow Silva and Straube (1997), *Compsothraupis loricata*, where we follow Ridgely & Tudor (1989), and *Agelaioides* (*badius*) *fringillarius*, where we follow Jaramillo and Burke (1999).

		A	B	C	D	E
Tinamidae						
Undulated Tinamou	*Crypturellus undulatus* *				x	
Yellow-legged Tinamou	*Crypturellus noctivagus* *		x	x	x	C
Small-billed Tinamou	*Crypturellus parvirostris*	x				
Tataupa Tinamou	*Crypturellus tataupa* *		x	x	x	
White-bellied Nothura	*Nothura boraquira*	x			x	C
Spotted Nothura	*Nothura maculosa*				x	
Podicipedidae						
Least Grebe	*Tachybaptus dominicus*					J
Phalacrocoracidae						
Neotropic Cormorant	*Phalacrocorax brasilianus*				x	
Ardeidae						
Cocoi Heron	*Ardea cocoi*					J
Great Egret	*Casmerodius albus*	x			x	C

Continued

Appendix 1. Continued.

Taxa		A	B	C	D	E
Snowy Egret	*Egretta thula*	x		x	x	C
Cattle Egret	*Bubulcus ibis*	x			x	I,J
Striated Heron	*Butorides striatus*	x		x	x	C
Whistling Heron	*Syrigma sibilatrix*					J
Capped Heron	*Pilherodius pileatus*				x	
Black-crowned Night-heron	*Nycticorax nycticorax* *				x	J
Threskiornithidae						
Roseate Spoonbill	*Platalea ajaja*				x	
Cathartidae						
King Vulture	*Sarcoramphus papa*					I
Black Vulture	*Coragyps atratus*		x	x	x	I
Turkey Vulture	*Cathartes aura*	x			x	C,I,J
Lesser Yellow-headed Vulture	*Cathartes burrovianus*					I
Anatidae						
White-faced Whistling-duck	*Dendrocygna viduata*	x	x	x		J
Black-bellied Whistling-duck	*Dendrocygna autumnalis*	x		x	x	C,J
Comb Duck	*Sarkidiornis melanotos*					C,I
Brazilian Duck	*Amazonetta brasiliensis*	x	x	x	x	
Muscovy Duck	*Cairina moschata*				x	
Anhimidae						
Horned Screamer	*Anhima cornuta*					I
Accipitridae						
White-tailed Kite	*Elanus leucurus*					J
Pearl Kite	*Gampsonyx swainsonii*					J
Grey-headed Kite	*Leptodon cayanensis*		x			
Hook-billed Kite	*Chondrohierax uncinatus*		x			
Plumbeous Kite	*Ictinia plumbea*	x	x			
Snail Kite	*Rostrhamus sociabilis*					I
Bicolored Hawk	*Accipiter bicolor*					I
Rufous-thighed Hawk	*Accipiter striatus*					I
White-tailed Hawk	*Buteo albicaudatus*					J
Short-tailed Hawk	*Buteo brachyurus*		x			
Grey-lined Hawk	*Asturina nitida* *			x		J
Roadside Hawk	*Rupornis magnirostris*	x	x	x	x	I
Savanna Hawk	*Buteogallus meridionalis*			x	x	I
Black Hawk-eagle	*Spizaetus tyrannus*		x			
Crane Hawk	*Geranospiza caerulescens*	x	x		x	

Continued

Appendix 1. Continued.

		A	B	C	D	E
Pandionidae						
Osprey	*Pandion haliaetus*	x				C
Falconidae						
Laughing Falcon	*Herpetotheres cachinnans*					I
Collared Forest-falcon	*Micrastur semitorquatus*		x			
Barred Forest-falcon	*Micrastur ruficollis*		x			
Yellow-headed Caracara	*Milvago chimachima* *	x	x		x	I
Southern Crested Caracara	*Polyborus plancus*	x	x	x		I,J
Peregrine Falcon	*Falco peregrinus*					J
Bat Falcon	*Falco rufigularis*		x			I,J
Aplomado Falcon	*Falco femoralis*		x	x		I
American Kestrel	*Falco sparverius*	x		x	x	I
Cracidae						
White-browed Guan	*Penelope jacucaca*				x	
Aramidae						
Limpkin	*Aramus guarauna*					I
Rallidae						
Grey-necked Wood-rail	*Aramides cajanea*	x				J
Giant Wood-rail	*Aramides ypecaha* *					J
Common Moorhen	*Gallinula chloropus*				x	
Purple Gallinule	*Porphyrula martinica*					I
Cariamidae						
Red-legged Seriema	*Cariama cristata*			x		
Jacanidae						
Wattled Jacana	*Jacana jacana* *	x		x		C,J
Charadridae						
Southern Lapwing	*Vanellus chilensis* *	x		x	x	J
Pied Plover	*Hoploxypterus cayanus* *	x		x		
Collared Plover	*Charadrius collaris*	x				
Scolopacidae						
Solitary Sandpiper	*Tringa solitaria*			x		J
Lesser Yellowlegs	*Tringa flavipes*	x	x			I
Greater Yellowlegs	*Tringa melanoleuca*	x				I
Spotted Sandpiper	*Actitis macularia*	x				J
Recurvirostridae						
Black-necked Stilt	*Himantopus himantopus*	x	x		x	J

Continued

Appendix 1. Continued.

Taxa		A	B	C	D	E
Laridae						
Large-billed Tern	*Phaetusa simplex* *				x	J
Rynchopidae						
Black Skimmer	*Rynchops niger*				x	C
Colombidae						
Picazuro Pigeon	*Columba picazuro*	x		x	x	C,I,J
Pale-vented Pigeon	*Columba cayennensis*	x	x			
Plumbeous Pigeon	*Columba plumbea* *		x			
Eared Dove	*Zenaida auriculata*		X			I
Plain-breasted Ground-dove	*Columbina minuta*		x	x	x	J
Ruddy Ground-dove	*Columbina talpacoti*	x	x	x	x	I,J
Picui Ground-dove	*Columbina picui*	x	x	x	x	C,J
Blue Ground-dove	*Claravis pretiosa*		x		x	
Scaled Dove	*Scardafella squammata* *	x	x	x	x	I,J
White-tipped Dove	*Leptotila verreauxi* *		x	x	x	I
Grey-fronted Dove	*Leptotila rufaxilla*	x			x	
Psitacidae						
Blue-winged Macaw	*Propyrrhura maracana*				x	I
White-eyed Parakeet	*Aratinga leucophthalmus* *		x			I
Golden-capped Parakeet	*Aratinga (solstitialis) auricapilla* *		x	x		I
Caatinga Parakeet	*Aratinga cactorum* *	x	x	x	x	I
Peach-fronted Parakeet	*Aratinga aurea*					I
Blue-winged Parrotlet	*Forpus xanthopterygius* *	x		x	x	P,J
Yellow-chevroned Parakeet	*Brotogeris chiriri* *	x	x	x	x	C,I,J
Turquoise-fronted Amazon	*Amazona aestiva* *	x			x	
Orange-winged Amazon	*Amazona amazonica*					I
Cuculidae						
Dark-billed Cuckoo	*Coccyzus melacoryphus* *	x	x		x	P
Yellow-billed Cuckoo	*Coccyzus americanus*			x		
Squirrel Cuckoo	*Piaya cayana* *	x	x		x	
Smooth-billed Ani	*Crotophaga ani*	x	x	x	x	J
Greater Ani	*Crotophaga major* *				x	
Guira Cuckoo	*Guira guira*				x	J
Striped Cuckoo	*Tapera naevia* *	x	x	x	x	J
Strigidae						
Tropical Screech-owl	*Otus choliba* *		x			C
Ferruginous Pygmy-owl	*Glaucidium brasilianum* *		x		x	I,J
Burrowing Owl	*Speotyto cunicularia*	x	x	x	x	I,J

Continued

Appendix 1. Continued.

		A	B	C	D	E
Nyctibiidae						
Common Potoo	*Nyctibius griseus* *		x		x	
Caprimulgidae						
Short-tailed Nighthawk	*Lurocalis semitorquatus* *		x			
Common Nighthawk	*Chordeiles acutipennis*	x			x	J
Caatinga Nighthawk	*Chordeiles vielliardi* *	x			x	
Nacunda Nighthawk	*Podager nacunda*					J
Pauraque	*Nyctidromus albicollis* *	x	x		x	
Rufous Nightjar	*Caprimulgus rufus* *		x			
Scissor-tailed Nightjar	*Hydropsalis torquata*					I
Apodidae						
White-collared Swift	*Streptoprocne zonaris*		x	x		I
Biscutate Swift	*Streptoprocne biscutata*		x		x	I
Ashy-tailed Swift	*Chaetura cinereiventris*			x		
Trochilidae						
Planalto Hermit	*Phaethornis pretrei*		x			
Grey-breasted Sabrewing	*Campylopterus largipennis*			x		
Swallow-tailed Hummingbird	*Eupetomena macroura*	x				
Glittering-bellied Emerald	*Chlorostilbon aureoventris*	x	x	x	x	
Ruby-topaz Hummingbird	*Chrysolampis mosquitus*					I
Fork-tailed Woodnymph	*Thalurania furcata*	x	x		x	
Versicolored Emerald	*Amazilia versicolor*			x	x	
Glittering-throated Emerald	*Amazilia fimbriata*	x			x	I,J
Stripe-breasted Starthroat	*Heliomaster squamosus*					I
Trogonidae						
Surucua Trogon	*Trogon surrucura*	x	x			
Blue-crowned Trogon	*Trogon curucui* *		x	x	x	
Alcedinidae						
Ringed Kingfisher	*Ceryle torquata*	x			x	
Amazon Kingfisher	*Chloroceryle amazona*				x	
Green Kingfisher	*Chloroceryle americana*	x				
Galbulidae						
Rufous-tailed Jacamar	*Galbula ruficauda* *	x	x		x	I
Bucconidae						
Spot-backed Puffbird	*Nystalus maculatus* *	x	x		x	I
Rusty-breasted Nunlet	*Nonnula rubecula* *	x	x			

Continued

Appendix 1. Continued.

		A	B	C	D	E
Picidae						
White-wedged Piculet	*Picumnus albosquamatus*					P
Spotted Piculet	*Picumnus pygmaeus* *		x	x	x	I,P
Green-barred Woodpecker	*Colaptes melanochloros*	x	x	x		
Golden-green Woodpecker	*Piculus chrysochloros*		x		x	
Blond-crested Woodpecker	*Celeus flavescens*			x		
Little Woodpecker	*Veniliornis passerinus* *		x		x	
Crimson-crested Woodpecker	*Campephilus melanoleucos* *	x	x	x		
Thamnophilidae						
Great Antshrike	*Taraba major* *	x	x		x	
Silvery-cheeked Antshrike	*Sakesphorus cristatus* *	x	x		x	I
Barred Antshrike	*Thamnophilus doliatus*		x		x	I
Planalto Slaty-antshrike	*Thamnophilus pelzelni* *	x	x		x	I
Stripe-backed Antbird	*Myrmorchilus strigilatus* *				x	
Black-capped Antwren	*Herpsilochmus atricapillus* *	x	x			I
Caatinga Antwren	*Herpsilochmus sellowi* *		x		x	
Black-bellied Antwren	*Formicivora melanogaster* *		x		x	P
Formicariidae						
White-browed Antpitta	*Hylopezus ochroleucus* *		x		x	
Conopophagidae						
Rufous Gnateater	*Conopophaga lineata*	x	x			
Furnariidae						
Rufous Hornero	*Furnarius rufus* *	x	x	x	x	J
Pale-legged Hornero	*Furnarius leucopus* *	x	x		x	I
Wing-banded Hornero	*Furnarius figulus* *	x	x	x	x	
Chotoy Spinetail	*Schoeniophylax phryganophila* *	x				I
Sooty-fronted Spinetail	*Synallaxis frontalis* *	x	x		x	
Pale-breasted Spinetail	*Synallaxis albescens*		x			
Ochre-cheeked Spinetail	*Poecilurus scutatus* *	x	x			
Red-shouldered Spinetail	*Gyalophylax hellmayri* *					I
Yellow-chinned Spinetail	*Certhiaxis cinnamomea* *					I
Grey-headed Spinetail	*Cranioleuca semicinerea* *		x	x		
Common Thornbird	*Phacellodomus rufifrons* *	x	x			J
Greater Thornbird	*Phacellodomus ruber*	x				I,J
Caatinga (Rufous) Cacholote	*Pseudoseisura cristata* *	x		x	x	
Henna-capped Foliage-gleaner	*Hylocryptus rectirostris* *	x	x			
Streaked Xenops	*Xenops rutilans* *		x	x	x	
Great Xenops	*Megaxenops parnaguae* *		x		x	I

Continued

Appendix 1. Continued.

		A	B	C	D	E
Dendrocolaptidae						
Olivaceous Woodcreeper	*Sittasomus griseicapillus* *	x	x	x		I
Moustached Woodcreeper	*Xiphocolaptes falcirostris* *		x	x		I
Planalto Woodcreeper	*Dendrocolaptes platyrostris*		x	x		I
Narrow-billed Woodcreeper	*Lepidocolaptes angustirostris*	x	x		x	I
Scaled Woodcreeper	*Lepidocolaptes squamatus* *	x				
Wagler's Woodcreeper	*Lepidocolaptes wagleri* *		x	x		I
Red-billed Scythebill	*Campylorhamphus trochilirostris*		x			
Tyrannidae						
Planalto Tyrannulet	*Phyllomyias fasciatus* *	x	x			
Reiser's Tyrannulet	*Phyllomyias reiseri* *		x	x		I
Southern Beardless Tyrannulet	*Camptostoma obsoletum*	x	x		x	I,J
Mouse-colored Tyrannulet	*Phaeomyias murina* *	x	x		x	
Suiriri Flycatcher	*Suiriri suiriri* *				x	
Greenish Elaenia	*Myiopagis viridicata* *		x	x	x	I
Grey Elaenia	*Myiopagis caniceps* *	x	x	x	x	
Yellow-bellied Elaenia	*Elaenia flavogaster*	x				
Large Elaenia	*Elaenia spectabilis* *	x				
Lesser Elaenia	*Elaenia chiriquensis*		x			
Greater Wagtail-tyrant	*Stigmatura budytoides* *				x	
Tawny-crowned Pygmy-tyrant	*Euscarthmus meloryphus*		x		x	
Sepia-capped Flycatcher	*Leptopogon amaurocephalus* *	x	x			
Southern Bristle-tyrant	*Phylloscartes eximius*	x				
Minas Gerais Tyrannulet	*Phylloscartes roquettei* *	x				
Southern Antpipit	*Corythopis delalandi* *		x			
Stripe-necked Tody-tyrant	*Hemitriccus striaticollis*	x				
Pearly-vented Tody-tyrant	*Hemitriccus margaritaceiventer*	x			x	
Common Tody-flycatcher	*Todirostrum cinereum* *	x	x		x	I
Yellow-olive Flycatcher	*Tolmomyias sulphurescens*	x	x	x		
Yellow-breasted Flycatcher	*Tolmomyias flaviventris* *		x		x	
Black-tailed Flycatcher	*Myiobius atricaudatus*		x			
Bran-colored Flycatcher	*Myiophobus fasciatus*	x				
Tropical Pewee	*Contopus cinereus* *		x			
Euler's Flycatcher	*Lathrotriccus euleri*		x			
Fuscous Flycatcher	*Cnemotriccus fuscatus* *	x		x	x	
Grey Monjita	*Xolmis cinerea*	x				
White-rumped Monjita	*Xolmis velata*	x				
White Monjita	*Xolmis irupero*		x	x	x	C,I
Masked Water-tyrant	*Fluvicola nengeta* *	x			x	
White-headed Marsh-tyrant	*Arundinicola leucocephala*				x	

Continued

Appendix 1. Continued.

		A	B	C	D	E
Long-tailed Tyrant	*Colonia colonus*		x			
Cliff Flycatcher	*Hirundinea ferruginea* *		x			
Cattle Tyrant	*Machetornis rixosus*	x	x			C,I
Rufous Casiornis	*Casiornis rufa*	x				
Ash-throated Casiornis	*Casiornis fusca* *		x		x	
Sirystes	*Sirystes sibilator* *		x	x		
Short-crested Flycatcher	*Myiarchus ferox*	x	x			
Brown-crested Flycatcher	*Myiarchus tyrannulus* *				x	
Swainson's Flycatcher	*Myiarchus swainsonii*		x		x	
Great Kiskadee	*Pitangus sulphuratus* *	x	x	x	x	J
Boat-billed Flycatcher	*Megarhynchus pitangua* *	x	x	x		C,I
Social Flycatcher	*Myiozetetes similis* *	x		x	x	I
Rusty-margined Flycatcher	*Myiozetetes cayanensis*				x	
Streaked Flycatcher	*Myiodynastes maculatus* *	x	x	x	x	I
Variegated Flycatcher	*Empidonomus varius*	x	x	x	x	
Crowned Slaty Flycatcher	*Griseotyrannus aurantioatrocristatus* *	x				
Fork-tailed Flycatcher	*Tyrannus savanna*	x				I
Tropical Kingbird	*Tyrannus melancholicus* *	x	x	x	x	
Green-backed Becard	*Pachyramphus viridis* *	x				P
Chestnut-crowned Becard	*Pachyramphus castaneus*		x			
White-winged Becard	*Pachyramphus polychopterus* *		x	x	x	P
Crested Becard	*Pachyramphus validus*	x				
Black-tailed Tityra	*Tityra cayana* *		x	x		I
Black-crowned Tityra	*Tityra inquisitor*			x		
Hirundinidae						
White-winged Swallow	*Tachycineta albiventer*				x	
White-rumped Swallow	*Tachycineta leucorrhoa*				x	
Brown-chested Martin	*Phaeoprogne tapera*				x	
Grey-breasted Martin	*Progne chalybea*		x			
Southern Rough-winged Swallow	*Stelgidopteryx ruficollis*	x			x	
Sand Martin	*Riparia riparia*	x				
Corvidae						
White-naped Jay	*Cyanocorax cyanopogon* *		x	x	x	I
Troglodytidae						
Black-capped Donacobius	*Donacobius atricapillus*					I
Buff-breasted Wren	*Thryothorus leucotis* *	x	x			
House Wren	*Troglodytes aedon* *	x	x		x	I

Continued

Appendix 1. Continued.

		A	B	C	D	E
Muscicapidae						
Tropical Gnatcatcher	*Polioptila plumbea* *	x			x	
Rufous-bellied Thrush	*Turdus rufiventris*		x	x	x	
Pale-breasted Thrush	*Turdus leucomelas*	x	x	x		
Creamy-bellied Thrush	*Turdus amaurochalinus* *		x			
White-necked Thrush	*Turdus albicollis* *		x	x		
Mimidae						
Chalk-browed Mockingbird	*Mimus saturninus*	x				I
Vireonidae						
Rufous-browed Peppershrike	*Cyclarhis gujanensis* *	x	x	x	x	
Chivi Vireo	*Vireo olivaceus* *		x	x		
Grey-eyed Greenlet	*Hylophilus amaurocephalus*		x		x	
Emberizidae						
Tropical Parula	*Parula pitiayumi* *		x		x	
Flavescent Warbler	*Basileuterus flaveolus* *	x	x		x	
Golden-crowned Warbler	*Basileuterus culicivorus* *		x			I,P
White-browed Warbler	*Basileuterus leucophrys* *		x			P
Bananaquit	*Coereba flaveola* *	x				
Scarlet-throated Tanager	*Compsothraupis loricata* *	x			x	J
Orange-headed Tanager	*Thlypopsis sordida*	x				
Guira Tanager	*Hemithraupis guira* *		x		x	
Hooded Tanager	*Nemosia pileata*	x	x	x		P
White-lined Tanager	*Tachyphonus rufus* *	x	x		x	J
Sayaca Tanager	*Thraupis sayaca*	x	x		x	
Palm Tanager	*Thraupis palmarum* *	x				
Purple-throated Euphonia	*Euphonia chlorotica* *		x		x	J
Burnished-buff Tanager	*Tangara cayana*	x				
Blue Dacnis	*Dacnis cayana*	x				
Chestnut-vented Conebill	*Conirostrum speciosum* *	x		x	x	J
Rufous-collared Sparrow	*Zonotrichia capensis*	x			x	J
Grassland Sparrow	*Ammodramus humeralis*	x				I
Orange-fronted Yellow-finch	*Sicalis columbiana* *	x	x	x		
Saffron Finch	*Sicalis luteola*				x	C,I
Blue-black Grassquit	*Volatinia jacarina* *	x		x	x	C,I
Lined Seedeater	*Sporophila lineola*				x	
Yellow-bellied Seedeater	*Sporophila nigricollis* *		x		x	I
São Francisco Sparrow	*Arremon franciscanus* *		x		x	
Grey Pileated Finch	*Coryphospingus pileatus* *	x	x	x	x	

Continued

Appendix 1. Continued.

		A	B	C	D	E
Red-cowled Cardinal	*Paroaria dominicana*	x		x	x	C,J
Green-winged Saltator	*Saltator similis*	x	x			
Greyish Saltator	*Saltator coerulescens* *				x	
Ultramarine Grosbeak	*Cyanocompsa brissonii*		x			
Solitary Cacique	*Cacicus solitarius* *	x			x	
Epaulet Oriole	*Icterus cayanensis* *	x			x	
Troupial	*Icterus jamacaii* *	x	x	x		I
Chestnut-capped Blackbird	*Agelaius ruficapillus*		x	x		I,J
White-browed Blackbird	*Leistes superciliaris*					J
Chopi Blackbird	*Gnorimopsar chopi* *		x	x	x	J
Baywing	*Agelaioides* (*badius*) *fringillarius* *		x	x	x	J
Shiny Cowbird	*Molothrus bonariensis*	x			x	J
Screaming Cowbird	*Molothrus rufoaxillaris* *	x	x	x		J
Giant Cowbird	*Scaphidura oryzivora*				x	
Fringillidae						
Hooded Siskin	*Carduelis magellanica*		x			
Passeridae						
House Sparrow	*Passer domesticus*	x	x		x	C,J