

HABITAT, DISTRIBUTION, AND CONSERVATION OF ATLANTIC FOREST BIRDS IN ARGENTINA: NOTES ON NINE RARE OR THREATENED SPECIES

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Resumen. – **Hábitat, distribución, y conservación de aves del bosque Atlántico en Argentina: notas sobre nueve especies raras o amenazadas.** – Presentamos información reciente sobre la distribución, estatus de conservación, e historia natural de nueve especies de aves raras o amenazadas, mayormente endémicas a la selva Atlántica, en base a 218 días de muestreo en el centro y norte de la provincia de Misiones, Argentina. Encontramos a la Yacutinga (*Pipile jacutinga*) sólo en grandes extensiones de selva; requiere protección urgente de la caza furtiva. La Lechuza listada (*Strix hylophila*) resultó la más común de las grandes lechuzas en nuestra área de estudio. El Carpintero cara canela (*Dryocopus galeatus*) fue escaso, pero se halló en casi todos los sitios, en selva madura, selva degradada, y plantaciones de árboles. El Tacuarero (*Clibanornis dendrocolaptoides*) tuvo su mayor abundancia en selva degradada, en el Parque Provincial de la Araucaria y Area Experimental Guarani. Encontramos 35 individuos de Batará pecho negro (*Biatas nigropectus*), siempre en grandes parches de caña *Guadua trinii*. Encontramos a la Tovaca colorada (*Chamaeza ruficauda*) tan bajo como 320 m s.n.m., siempre en fuertes pendientes, con sotobosques densos de las cañas *Chusquea ramosissima* y *Merostachys clausenii*. La Mosqueta oreja negra (*Phylloscartes paulista*) fue encontrada en bandos mixtos, cerca de arroyos en selva madura. La Urraca azul (*Cyanocorax caeruleus*) se halló sólo en selva degradada y hábitat antropizado. El Tesorito (*Phibalura flavirostris*) apareció irregularmente, aparentemente debido a movimientos estacionales desde Brasil.

Abstract. – We present recent information on the distribution, conservation status, and natural history of nine rare or threatened birds, mostly Atlantic forest endemics, based on 218 field days in north and central Misiones, Argentina. We found the Black-fronted Piping-Guan (*Pipile jacutinga*) only in large tracts of forest; it requires urgent protection from poaching. The Rusty-barred Owl (*Strix hylophila*) was the most common of the large owls in our study area. The Helmeted Woodpecker (*Dryocopus galeatus*) was scarce, but found at nearly all sites, in mature forest, degraded forest, and tree plantations. The Canebrake Ground-creeper (*Clibanornis dendrocolaptoides*) was most abundant in degraded forest, at Parque Provincial de la Araucaria and Area Experimental Guarani. We found 35 White-bearded Antshrikes (*Biatas nigropectus*), always in large patches of *Guadua trinii* bamboo. We found the Rufous-tailed Antthrush (*Chamaeza ruficauda*) as low as 320 m a.s.l., always on steep slopes, with a dense understory of *Chusquea ramosissima* and *Merostachys clausenii* bamboo. The Sao Paulo Tyrannulet (*Phylloscartes paulista*) occurred in mixed species flocks, near streams in mature forest. The Azure Jay (*Cyanocorax caeruleus*) was present only in degraded forest and anthropogenic habitat. The Swallow-tailed Cotinga (*Phibalura flavirostris*) appeared irregularly, apparently due to seasonal movements from Brazil. *Accepted 8 January 2006.*

Key words: Bamboo, *Biatas nigropectus*, *Chamaeza ruficauda*, *Clibanornis dendrocolaptoides*, *Cyanocorax caeruleus*, *Dryocopus galeatus*, *Phibalura flavirostris*, *Phylloscartes paulista*, *Pipile jacutinga*, *Strix hylophila*.

INTRODUCTION

Although the Atlantic forest is one of the world's top five biodiversity hotspots (Myers *et al.* 2000) and one of South America's highest priorities for bird conservation (Stotz *et al.* 1996), little is known about the status, distribution, and natural history of the region's threatened birds. Despite its small size (about 30,000 km²), the Argentine province of Misiones contains some of the largest remaining tracts of Atlantic forest (Giraud *et al.* 2003), and an important number of threatened bird species (Wege & Long 1995). Although there have been several studies of birds in Misiones, they have been concentrated at just a handful of sites. Based on bird surveys at sites throughout central and northern Misiones, we present information on distribution, habitat, conservation status, and some aspects of natural history for nine poorly-known species, most of which are threatened either globally (BirdLife International 2004) or nationally (Fraga 1997).

STUDY AREA AND METHODS

Study area. Misiones is the only Argentine province within the Atlantic forest, a region which also includes southeastern Brazil and eastern Paraguay. In contrast to the latter countries, where large-scale commercial agriculture prevails, northern Misiones has privately-owned forest (used for commercial logging), parks, commercial tree plantations, and small (10 to 100 ha) family-run farms. Farming areas retain patches and corridors of relatively connected forest, although much of it is degraded. Thus, forest remains in northern and central Misiones, in protected and unprotected areas, in large and medium-sized tracts, and in small, partly connected fragments in agricultural areas and around towns.

Our study sites included both mature and degraded forest, in large tracts and in smaller

fragments. They ranged from 140 to 750 m a.s.l., and comprised three different types of mixed forests ("selvas mixtas") described by Cabrera (1976) for Misiones: 1) mixed forest with "laurel" (mostly *Nectandra saligna*) and "guatambú" (*Balfourodendron riedelianum*), 2) mixed forest with laurel, guatambú, and the emergent native conifer *Araucaria angustifolia*, and 3) mixed forest with laurel, guatambú, and the emergent "palo rosa" (*Aspidosperma polyneuron*). Mature forest had emergent trees, a closed canopy, and a relatively open understory, while degraded forest typically had fewer trees, an open canopy, and a dense understory dominated by one or two native bamboo species.

Four native bamboo species occurred at our sites, and three of these were of key importance for birds. The first, "tacuapi" (*Merostachys clausenii*) is an arching bamboo with medium-sized canes, reaching 3-7 m in height (Ragonese & Martínez Crovetto 1947). The second, "tacuarembó" (*Chusquea ramosissima*) is a slender-stemmed bamboo which forms a dense, tangled carpet, 1.5 m high, covering the forest floor almost entirely, and climbing the trunks of remnant trees. Both of these species rapidly invade the forest understory after selective logging. The third species, "yatevó" (*Guadua trinii*) is a tall, thorny bamboo with large canes, also called "tacuaruzú" or "tacuara brava" in central Misiones, where *Guadua angustifolia* (the other "tacuaruzú") is absent. It generally grows in monospecific clumps, up to 12 m in height, and can be found in mature forest, degraded forest, and cleared areas.

In addition to native forest, some study sites included abandoned plantations of exotic (*Pinus* sp.) or native (*Araucaria angustifolia*) conifers, or of the native yerba mate (*Ilex paraguariensis*). Abandoned conifer plantations had a closed canopy, lacked midstory vegetation, and had generally acquired, in the understory, native trees and shade-tolerant shrubs,

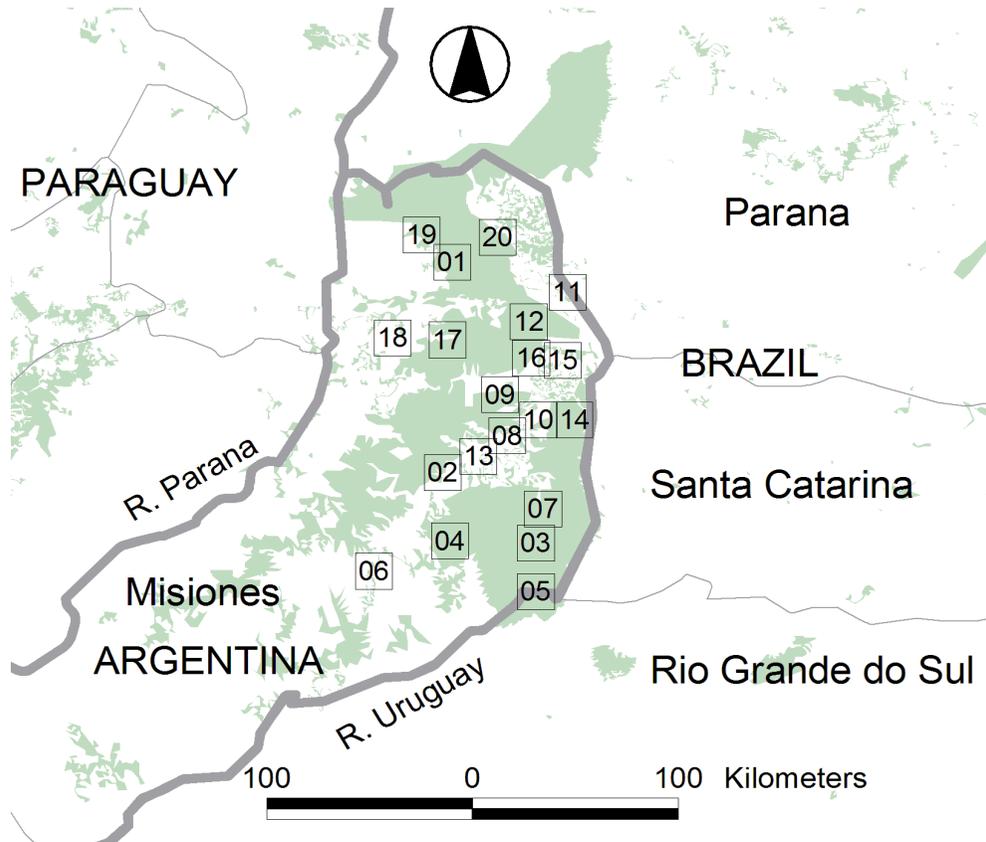


FIG. 1. Map of Misiones showing remaining forest cover (grey) based on LandSat 5 TM satellite images from 2004 and 2005, and sites where species were recorded: 01- Seccional Uruzú, 02- Reserva Privada Yaguaroundí, 03- Parque Provincial Esmeralda, 04- Area Experimental Guaraní, 05- Parque Provincial Moconá, 06- San Vicente, 07- Aborigin Reserve, Arroyo Yabotí Miní, 08- Parque Provincial Cruce Caballero, 09- Establecimiento La Alegría, 10- Tobuna, 11- Estación INTA and Reserva Natural Estricta San Antonio, 12- Southwest corner of Parque Provincial Urugua-í, 13- San Pedro and Parque Provincial de la Araucaria, 14- Parque Provincial El Piñalito, 15- Arroyo Fragoso, 16- Unnamed creek, 17- Tributary A Arroyo Aguaray Guazú Sur, 18- Tributary B Arroyo Aguaray Guazú Sur, 19- Establecimiento San Jorge, 20- Seccional 101.

especially Piperaceae. Abandoned yerba mate plantations became dense woods up to 10 m high, with many creepers and lianas.

Field methods. We spent a total of 218 days observing birds at sites throughout the Río Paraná and Río Uruguay watersheds and in the Sierra Central which divides these two sys-

tems (Fig. 1, Table 1). Our greatest effort was spent at 12 main sites (Table 1).

Most birds were detected first by their voices, then observed using binoculars. We tape-recorded or photographed all species except the Swallow-tailed Cotinga (*Phibalura flavirostris*). We used playback to find secretive species. For the most distinctive and conspic-

TABLE 1. Sites where birds were observed, from 2003 to 2005, in Misiones, Argentina.

Sites	Area (ha) ¹	Coordinates	Elevation (m a.s.l.)	Survey dates	Level of protection ²
Mixed forest with laurel and guatambú					
Seccional Uruzú ³ , Parque Provincial Urugua-í	84000	25°52'S, 54°11'W	250	9-12 Feb 2004; 2-4 Jun 2005	A 1 i
Reserva Privada Yaguaroundí ³	600	26°42'S, 54°16'W	350-550	3-7 Feb 2004; 12-17 May, 28-30 May 2004	A 1 ii
Parque Provincial Esmeralda ^{3,4}	32000	26°53'S, 53°53'W	300-500	24 Nov-3 Dec 2004; 17-21 Sep 2005	A 1 i
Area Experimental Guaraní ^{3,4}	5300	26°56'S, 54°13'W	300-500	17-24 Jul 2004; 31 Mar-5 Apr, 28 Sep-5 Oct 2005	A 2 ii
Parque Provincial Mocona ^{3,4}	999	27°09'S, 53°54'W	140-350	14-20 Oct 2005	A 1 i
San Vicente (forest remnants)		27°02'S, 54°33'W	250	10-11 Jul 2004	B 2 ii
Aboriginal reserve, Arroyo Yabotí Mimi ⁴		26°50'S, 53°53'W	300	9 Jan 2005	A 2 ii
Mixed forest with laurel, guatambú and Araucaria					
Parque Provincial Cruce Caballero ³	600	26°31'S, 53°58'W	550-600	21-24 Oct 2003; 19-22 Jan, 22-29 Jun 2004; 29 Apr-7 May 2005	A 1 ii
Establecimiento La Alegría ³	10000	26°27'S, 53°58'W	500-600	30 Oct-2 Nov 2003; 13-22 Feb 2004	B 2 iii
Tobuna (forest remnant) ³	500	26°28'S, 53°53'W	600	14-17 Feb 2005	B 1 i
Estación INTA and Reserva Natural Estricta San Antonio ³	2000	26°02'S, 53°48'W	450	3-10 Jun 2004	A 1 iii
Southwest corner of Parque Provincial Urugua-í ³		26°10'S, 53°57'W	350-600	17-18 Jan, 26 May-1 Jun 2005	A 2 iii
Town of San Pedro and Parque Provincial de la Araucaria ³	92	26°38'S, 54°07'W	550-600	Oct 2003-Jul 2004, Nov 2004-Oct 2005 (70 days)	A 1 ii
Parque Provincial El Piñalito	4500	26°26'S, 53°49'W	700-750	29-31 Jan 2004, 25-28 Feb 2004	A 1 iii
Arroyo Fragoso (Hwy 18)		26°17'S, 53°49'W	580	26 May 2005	B 2
Unnamed creek (Hwy 18)		26°15'S, 53°53'W	650	26 May 2005	B 2
Tributary A, Arroyo Aguaray Guazú Sur (Hwy 18)		26°12'S, 54°15'W	264	1 Jun 2005	B
Tributary B, Arroyo Aguaray Guazú Sur (Hwy 18)		26°12'S, 54°24'W	210	1 Jun 2005	B
Mixed forest with laurel, guatambú, and palo rosa					
Establecimiento San Jorge ³	16500	25°50'S, 54°15'W	200-350	19-28 Sep 2004	B 1 i
Seccional 101, Parque Provincial Urugua-í		25°49'S, 54°01'W	350	3-5 Jun 2005	A 1 i

¹Area of park, reserve or property. Area surveyed may be smaller, and area of forest tract may be larger.

²A- legal protection, B- no legal protection, 1- permanent staff, 2- no staff or occasional staff, i- no evidence of hunting/illegal logging/illegal occupancy, ii- evidence of hunting/illegal logging/illegal occupancy, iii- evidence of very high level of hunting/illegal logging/illegal occupancy.

³Main study sites.

⁴Sites within the 250,000 ha UNESCO Yabotí Biosphere Reserve.

uous species, we also present a few observations obtained by reliable park rangers and other observers. We incorporate some observations from our 2 years of previous experience with Atlantic forest birds in eastern Paraguay, where we visited 45 sites during 306 field days from 2000 to 2002.

RESULTS AND DISCUSSION

Black-fronted Piping-Guan (*Pipile jacutinga*). The Black-fronted Piping-Guan is considered endangered globally (BirdLife International 2004) and in Argentina (Fraga 1997). It has been extirpated from many parts of its range in Brazil, Paraguay, and Argentina (del Hoyo & Motis 2004). In Misiones, it was characterized by Partridge, *vide* Chebez (1990), as “always abundant” and “very abundant” along the Arroyo Urugua-í in 1950 and 1954, respectively, but it has undergone a steep decline over the last half century (Chebez 1994). In the adjacent state of Rio Grande do Sul, Brazil, the species is critically endangered (Bencke *et al.* 2003).

We recorded the Black-fronted Piping-Guan at six sites, all of them within Misiones’ two large remaining forest tracts (Iguazú-Urugua-í complex and adjacent forest, and Reserva de la Biósfera Yabotí; Table 2). The species was absent or very rare at sites without effective protection from hunters, consistent with the findings of Galetti *et al.* (1997) in São Paulo, Brazil. In southwest Parque Provincial Urugua-í, where the species was very rare, we found poachers’ camps with Black-fronted Piping-Guan feathers, as was also reported by Straube *et al.* (2004) for the nearby Parque Nacional Iguazú, in Paraná, Brazil. We recorded the largest numbers of Black-fronted Piping-Guans at two well-protected sites on the Arroyo Uruzú (Table 2). Consistent with these results, Benstead *et al.* (1993) found the highest density of the species along the Arroyo Uruzú, while Giraudo *et al.* (1993)

highlight its extreme rarity along the Arroyo Pepirí Mini and the Arroyo Yabotí Mini, in a part of the Yabotí Biosphere Reserve without effective protection from hunting.

Consistent with reports by Partridge, *vide* Chebez (1990), Chebez (1994), and Saibene *et al.* (1996), we found most Black-fronted Piping-Guans near major, permanent streams. At Seccional Uruzú, in February 2004, the Arroyo Uruzú had a very low water level, and the piping-guans frequented large rocks in the creek, as reported by Benstead *et al.* (1998). In June and September 2005, when the water level was higher, we observed the species in the forest canopy above the creek. At Parque Provincial Moconá, Parque Provincial Esmeralda, Seccional 101 in Parque Provincial Urugua-í, and Establecimiento San Jorge, we recorded a few individuals in upland areas (away from streams).

The Black-fronted Piping-Guan faces a precarious future throughout its range. In São Paulo, its Brazilian stronghold, Galetti *et al.* (1997) recorded only 154 (or fewer) individuals in 6 years of searching. In Misiones, populations must now be fragmented, as there are regions where we have never detected the species and where human populations make its presence very unlikely. For example, in Parque Provincial Cruce Caballero and near the farming community of Tobuna, it was once common, but disappeared between 10 and 20 years ago, presumably as a result of hunting and forest fragmentation (J. Sosa pers. com., M. Debarba pers. com.). Nevertheless, Misiones may offer the best possibility for conserving the species in the western part of its range; in Paraguay, where most parks do not have park rangers, we have recorded only two individuals, at Estancia Tapytá (26°14’S, 55°58’W) and at Reserva Privada Itabó (24°30’S, 54°38’W), and the species should be considered critically endangered.

To conserve the Black-fronted Piping-

TABLE 2. Abundance of Black-fronted Piping-Guans (*Pipile jacutinga*) at six sites in Misiones' two large forest tracts. We did not find the species at any other sites in the province. More individuals were found at sites with effective protection from hunting.

Sites	Protection from hunting	Number of individuals
Iguazú - Urugua-í forest tract		
Establecimiento San Jorge (Arroyo Uruzú)	Yes - access control	6-10/day ¹
Seccional Uruzú (Arroyo Uruzú)	Yes - park rangers	6-10/day
Southwest Parque Provincial Urugua-í	No - poachers' camps	1/week
Seccional 101, Parque Provincial Urugua-í	Yes - park rangers	Present
Tributary A Arroyo Aguaray Guazú Sur	?	Present
Yabotí Biosphere Reserve forest tract		
Parque Provincial Esmeralda	Yes - park rangers	Upland: 5/week ² ; creek: several/day ³
Parque Provincial Mocona	Yes - park rangers	Present

¹Wing-whirring display recorded in September 2004.

²Wing-whirring display recorded in November 2004.

³H. Geier (pers. com.) found eight individuals in one day at Arroyo Florida, in March 2005.

Guan in Argentina, Parque Provincial Urugua-í and the Yabotí Biosphere Reserve need more and better-equipped ranger stations, with more park rangers. In particular, stations and patrols are needed along the Brazilian border which forms the eastern edge of the Biosphere Reserve.

Rusty-barred Owl (*Strix hylophila*). BirdLife International (2004) recently upgraded the Rusty-barred Owl to near-threatened, considering habitat loss to be the main threat to the species. In Argentina it is classified as low risk (Fraga 1997). There are numerous historical and recent records for Misiones.

We found several individuals at each of our 12 main study sites. The species was vocal throughout the year, responding readily to playback, including recordings of other large owls. At many sites, playback from a single point was answered by the Rusty-barred Owl, the Tawny-browed Owl (*Pulsatrix koeniswaldiana*), and the Mottled Owl (*Strix virgata*). At Parque Provincial Cruce Caballero and

Establecimiento La Alegría, these three species were joined by the Black-banded Owl (*Strix hubbula*). We found the Rusty-barred Owl in mature, degraded, and secondary forest, and in plantations of *Pinus* sp., including the abandoned plantations of *Pinus* sp. near Paraje Piñalito Sur in Parque Provincial El Piñalito, and even the extensive commercial plantations of Alto Paraná S. A. on the Arroyo Piray Guazú (26°35'S, 54°30'W), where two individuals were tape-recorded and heard daily by N. Fariña from October 2004 to January 2005. It was present even in periurban areas around San Pedro. Contreras *et al.* (1994) also note that the species is found in degraded and fragmented forest.

We agree with Olrog (1985) that, after the Ferruginous Pygmy-Owl (*Glaucidium brasilianum*) and the Tropical Screech-Owl (*Otus choliba*), this is the most common owl in northern Misiones. Our experience suggests that the Rusty-barred Owl is more common in Misiones than in Paraguay, where it survives only in the last remaining patches of for-

TABLE 3. Records of White-bearded Antshrike (*Biatas nigropectus*) in northern and central Misiones. All records were in *Guadua trinii*, and all but two were obtained using playback.

Sites	Date	Number of individuals
San Pedro	October 2003 - June 2004	1 pair
Establecimiento La Alegría	February 2004	1 male
Establecimiento San Jorge	September 2004	3 males
Arroyo Fragoso (Hwy 18)	26 May 2005	1 pair
Unnamed Creek (Hwy 18)	26 May 2005	1
Tributary A, Arroyo Aguaray Guazú Sur	1 June 2005	1 pair + 2 males
Tributary B, Arroyo Aguaray Guazú Sur	1 June 2005	2 males + 1
Seccional Uruzú	2 June 2005	1
Parque Provincial Cruce Caballero	April - May 2005	3 pairs + 10 males
Parque Provincial El Piñalito	10 June 2005	1 pair*

*N. Fariña (pers. com.)

est. Belton (2000) also considers this species “relatively common” in northeast Rio Grande do Sul.

Helmeted Woodpecker (*Dryocopus galeatus*). The Helmeted Woodpecker is considered vulnerable globally (BirdLife International 2004) and in Argentina (Fraga 1997). It has been recorded at many localities in Misiones (Chebez 1995), and indeed Bencke *et al.* (2003) consider this province to be the species’ stronghold, providing the source population that maintains the species in neighbouring Rio Grande do Sul.

We encountered the Helmeted Woodpecker throughout our study area. It was uncommon at all sites but Parque Provincial Cruce Caballero and Parque Provincial Moconá, where we recorded it most days. All observations were of single individuals or pairs. At Parque Provincial Cruce Caballero and Parque Provincial Moconá, most observations occurred in mature forest. We also observed the species in secondary forest, twice in a native tree plantation (*Araucaria*), and once in a non-native tree plantation (*Pinus* sp). Farther south in Misiones, we recorded the Helmeted Woodpecker in a very different habitat: mature gallery forest within savanna,

along the Río Uruguay at Barra Concepción (28°05’S, 55°32’W).

At our study sites, the Helmeted Woodpecker appeared to be more common than the Blonde-crested Woodpecker (*Celex flavescens*), but much less common than the Lineated Woodpecker (*Dryocopus lineatus*). It was also less active than the Lineated Woodpecker, and vocalized rarely, most often at dawn.

The Helmeted Woodpecker appears to be more widespread, but locally less common, in Misiones than in Paraguay. Guyra Paraguay (2004) considers it scarce in Alto Paraná and Paraguay Central, and, at a few sites, it is as common as the Lineated Woodpecker (pers. observ.). In Paraguay, we have recorded the Helmeted Woodpecker in mature and degraded forest, in tree plantations, and even in a large garden with native trees.

Canebrake Groundcreeper (*Clibanornis dendrocolaptoides*). The Canebrake Groundcreeper is considered near threatened globally (BirdLife International 2004), and vulnerable in Argentina (Fraga 1997). The species was first collected in Argentina in Santa Ana, southern Misiones, in 1917 (Partridge 1954). It has been recorded from four protected areas in Misiones; however, the Canebrake

Groundcreeper is a cryptic species and it is not clear what habitat it prefers in Argentina (Remsen 2003).

We found the species at Establecimiento San Jorge (5 apparent territories within 1 km of the Arroyo Uruzú), San Pedro (14 territories in Parque Provincial de la Araucaria, and six more outside of the park), Area Experimental Guaraní (10 territories), Reserva Privada Yaguaroundí (2 records of one individual), Establecimiento La Alegría (at least 7 records per day), Parque Provincial Esmeralda (1 record), Parque Provincial Cruce Caballero (2 individuals), and Seccional Uruzú (1 record). We tape-recorded songs and alarm calls on many occasions, particularly in September 2004 at Establecimiento San Jorge, and in October 2005 in Area Experimental Guaraní.

Most of our records were from degraded forests, with the species' greatest density found in Parque Provincial de la Araucaria, in regenerating forest under remnant Araucarias, and in Area Experimental Guaraní, in secondary forest without Araucaria. In contrast, in Parque Provincial Cruce Caballero, where the Araucaria forest is mature, the species was rare, and found only at forest edges. All individuals were found in forest with a dense understory; most (though not all) individuals were in or near *Merostachys clausenii* bamboo. We observed individuals foraging within 1 m of the ground, gleaning invertebrates from leaf litter trapped in low branches or leaf litter on the forest floor. In Brazil the species is found in ravines near streams (Remsen 2003); many, but not all, of our records also came from areas near streams.

The Canebrake Groundcreeper's nest has not been described (Remsen 2003), but several observations suggest that the species nests in holes in earth walls. In Misiones, there are places where tiny springs carve the earth into caves and tunnels, with vertical earth banks 1-2 m high and approx. 5 m long.

Near one such spring, near the Arroyo Uruguayá, Partridge (*vide* Chebez 1997) collected three Canebrake Groundcreepers in August 1954, describing the spring's bank as containing "various holes, apparently inhabited by this bird". We searched the four areas where we heard Canebrake Groundcreepers at Area Experimental Guaraní, and two areas near Parque Provincial de la Araucaria, and found, in each case, a small spring system with vertical or concave banks containing many horizontal holes, apparently created by birds. We repeatedly observed Canebrake Groundcreepers near these holes, on different days, in September and October 2005.

If the Canebrake Groundcreeper nests in earth banks, it may also find nest sites in pits made by humans. Kindel (*vide* Bencke *et al.* 2003) mentions an excavated nest in the wall of a pit used for household garbage. In Parque Provincial de la Araucaria, where the species is common (pers. observ.), Krauczuk & Baldo (2004) observed, on two occasions, individuals leaving two of the park's numerous abandoned wells. The vertical walls of these wells contain many horizontal holes (pers. observ.), which are used for nesting by other species of birds (N. Fariña pers. com.). Such earth walls may provide key nesting habitat for the Canebrake Groundcreeper, explaining its relatively high density at Parque Provincial de la Araucaria and Area Experimental Guaraní.

The Canebrake Groundcreeper vocalized mainly in spring and summer. In autumn and winter, we occasionally heard it calling for a few minutes at dawn or dusk. Even in known territories, the species often failed to respond to playback of other individuals; however, when we recorded an individual singing or calling and played back the voice immediately, it always moved toward us.

White-bearded Antshrike (*Biatas nigropectus*). The White-bearded Antshrike is considered

vulnerable globally (BirdLife International 2004) and in Argentina (Fraga 1997). Misiones is the source of the largest series of museum specimens (Collar *et al.* 1992); however, there have been very few records in this province since 1960. The species was collected in the 1940s and 1950s by Gai (1950, 1951) and Partridge (Navas & Bo 1988), but was not recorded subsequently until the 1990s (Collar *et al.* 1992, Benstead *et al.* 1993).

Based on recommendations from BirdLife International (2004), we searched for the White-bearded Antshrike, using playback, in stands of *Merostachys* and *Guadua* bamboo. In 2003 and 2004, we only detected the species in stands of *Guadua trinii*, and in 2005 we restricted playback to this habitat. Our greatest effort was spent in and around Parque Provincial Cruce Caballero, where, for 9 days in April-May 2005, we searched exclusively for White-bearded Antshrikes, using playback in stands of *Guadua trinii*.

With the help of N. Fariña, we recorded 35 individuals at 10 sites (Table 3); all records were from dense, continuous, mature stands of *Guadua trinii*, despite our efforts with playback in smaller patches and in other bamboo species. Large stands may allow individual birds to move their territories when clumps of bamboo die (Zimmer & Isler 2003). Where we found White-bearded Antshrikes, trees were generally small and scattered, and *Guadua trinii* dominated the vegetation, reaching 12 m in height. In a minority of cases, the *Guadua trinii* occurred below an open canopy of trees. Most of the White-bearded Antshrikes were detected near streams, on slopes of 20-60%. Some individuals were found in flat areas above steeper slopes, up to 500 m from streams. Several of our records came from fragmented forest or forest edges bordering pastures, and one territory was 500 m from the town of San Pedro.

There is some confusion regarding the White-bearded Antshrike's preference for

particular bamboos (BirdLife International 2004). Most authors mention *Merostachys* sp. (Collar *et al.* 1992, Zimmer & Isler 2003), particularly in Brazil, but some also refer to *Guadua* sp. (BirdLife International 2004) or to "thorny bamboo" (Mattos *vide* Sick 2001) which can only be *Guadua* (Judziewicz *et al.* 1999). Compared to other parts of the White-bearded Antshrike's range, our study area is relatively poor in bamboo diversity, with just four species, compared to Brazil's coastal Atlantic forest, a world center of bamboo diversity, with some 62 species, including many species of *Merostachys* (Judziewicz *et al.* 1999). In Misiones, previous records of the White-bearded Antshrike are from "bamboo" (Benstead *et al.* 1993), mixed stands of *Guadua trinii* and *Merostachys clausenii* (Pearman 2001), and *Guadua trinii* (Gai 1950, 1951; Pearman 2001), consistent with our results.

We detected the species without playback only twice. In both cases, we heard spontaneous vocalizations and observed single males, partially hidden near the tips of bamboo branches, 4 and 6 m high in stands of *Guadua trinii*: in June 2004, at dawn, in Parque Provincial Cruce Caballero, and in September 2004, at 11:00 h SA Eastern Standard Time, at Establecimiento San Jorge.

Males, and sometimes their mates, responded to playback with several different vocalizations. In most cases only males responded to playback, even in presumed territories where we had observed females on previous occasions. We never saw a female unaccompanied by a male. Interestingly, of 16 Argentine specimens of the White-bearded Antshrike at three museums (Museo Argentino de Ciencias Naturales, Museo de La Plata, and Field Museum of Natural History) 14 are male, suggesting that the female is indeed more cryptic.

The White-bearded Antshrike is a vulnerable habitat specialist requiring specific conservation measures. Misiones' remaining large

stands of *Guadua trini* should be located, and existing parks should be expanded to include this key habitat. Parque Provincial Cruce Caballero is clearly a stronghold; however, of the 16 individuals detected at this site, 9 were outside of park boundaries, demonstrating the critical need to expand this small reserve to include adjacent lots with *Guadua trini*. Our record from Establecimiento La Alegría occurred along the upper reaches of the Arroyo Alegría, several kilometers to the northeast of Pearman's (2001) record of the species at "Arroyo Alegría" in 1997 and 1998. Although a small patch of forest was subsequently logged, most of the Arroyo Alegría valley remains forested (contrary to the suggestion by BirdLife International 2004), connecting Parque Provincial Cruce Caballero and Establecimiento La Alegría. This area should be targeted for searches and conservation.

Rufous-tailed Antthrush (*Chamaeza ruficauda*). The Rufous-tailed Antthrush is classified as not threatened (least concern) globally (BirdLife International 2004). Its conservation status has not been evaluated in Argentina. The scarce available data on the species is summarized in Belton (2000) and Krabbe & Schulenberg (2003).

The Rufous-tailed Antthrush was only recently discovered for Argentina (Navas & Bo 1995), based on a museum skin collected at Tobuna in August 1959. It has since been recorded at four other localities in the province of Misiones (Mazar Barnett & Pearman 2001); according to Pearman (2001), these sites are all within close proximity of one another, and all above 600 m a.s.l. Krabbe & Schulenberg (2003) report the species from 1000 to 2200 m a.s.l., at higher elevations than the Short-tailed Antthrush (*Chamaeza campanisona*) where the species' ranges overlap, but as low as 600 m a.s.l. in Argentina.

We recorded more than 100 Rufous-tailed

Antthrushes, at eight different sites. The species was most abundant at Reserva Privada Yaguaroundí, where we recorded more than 10 individuals daily in February 2004, and in Parque Provincial Esmeralda, where we recorded 18 individuals in 5 km on 20 September 2005. It was also common at two other sites in the Yabotí Biosphere Reserve: Area Experimental Guaraní, and the Aboriginal Reserve on the Arroyo Yabotí Mini. In southwest Parque Provincial Urugua-í, we recorded 11 individuals on 31 May 2005, in the valley of the Arroyo 83 near its junction with the Arroyo Urugua-í. We have also recorded the species at Parque Provincial El Piñalito where it was previously reported as relatively common in September 1999 (Pearman 2001), at Parque Provincial Moconá, and at Establecimiento La Alegría, in the valley of the Arroyo Alegría.

We found all individuals in steep-sided creek valleys with shallow soils (strongly divided mountainous relief, which covers 29.6% of the province; Ligier *et al.* 1990), in many cases within 200 m of a creek. At Area Experimental Guaraní and southwest Parque Provincial Urugua-í, several individuals were found in mature forest with a dense understory of *Merostachys clausenii* bamboo; all other individuals were in degraded forest, generally with a very dense understory of *Chusquea ramosissima* bamboo.

We found the Rufous-tailed Antthrush as low as 320 m a.s.l. in southwest Parque Provincial Urugua-í, with most of our observations between 350 and 500 m a.s.l. at other sites. The Short-tailed Antthrush was present at the same sites and the same elevations, and the two species were often found within 100 m of one another. In northeast Rio Grande do Sul, Bencke & Kindel (1999) found the Short-tailed Antthrush at stations from 0 to 900 m a.s.l., and the Rufous-tailed Antthrush, partially overlapping this distribution, in forest above 500 m a.s.l. In Misiones, the Short-

tailed Antthrush is common in all types of forest, whereas the Rufous-tailed Antthrush appears to be restricted to the habitat described above.

Belton (2000) and Krabbe & Schulenberg (2003) report that the Rufous-tailed Antthrush is silent during part of the year, from June to September in Rio Grande do Sul. We repeatedly found individuals in the same places at different times of the year. This suggests that the species is resident, perhaps with year-round territoriality. In Misiones, it vocalizes throughout the year, and was recorded vocalizing spontaneously at Area Experimental Guaraní in late July 2004; however, in winter, vocalizations were restricted to shorter periods, generally around mid-morning and sunset. In spring, we recorded spontaneous vocalizations at different moments throughout the day, beginning shortly after dawn. The species responded readily to playback, particularly in spring and summer, making this an excellent tool for surveys in appropriate habitat.

Our results suggest that, in Misiones, the Rufous-tailed Antthrush has a wider distribution than was previously thought. As it appears to tolerate very degraded forest, it is fairly well protected throughout the Reserva de la Biosfera Yabotí, where forest clearing is not currently permitted. We did not, however, find the species in fragmented forest (around San Pedro, Tobuna, and San Antonio), suggesting that it does not tolerate forest fragmentation in Misiones. Thus, in the short term, the Rufous-tailed Antthrush does not appear to be threatened in Argentina; however, further studies should examine its response to habitat fragmentation, and its requirement for large forest tracts should be considered when new decisions are made regarding land use in the Reserva de la Biosfera Yabotí.

São Paulo Tyrannulet (*Phylloscartes paulista*).

The Sao Paulo Tyrannulet is classified as near threatened globally (BirdLife International 2004), but its conservation status has not been evaluated in Argentina. Mazar Barnett & Pearman (2001) consider the species to be hypothetical in Argentina, based on undocumented records from various sites in Misiones. We present 13 records from 6 sites, 2 of them documented by tape-recordings. At Seccional Uruzú, we observed one individual vocalizing on 2 June 2005; at Reserva Privada Yaguaroundí, we observed one individual vocalizing on 6 February 2004; at San Antonio, we observed one individual vocalizing on 4 June and one individual vocalizing on 9 June 2004; at Area Experimental Guaraní, we tape-recorded one individual on 5 April 2005; at Parque Provincial Moconá, we observed a pair on 17 October 2005; and at Parque Provincial Cruce Caballero, we observed one individual in March 1997, observed one individual on 22 October and a pair on 23 October 2003, observed one individual on 22, 24, and 27 June 2004, and tape-recorded one individual on 4 May 2005.

All of our observations occurred in mature forest, with the exception of one record at San Antonio in a 60-year old plantation of *Araucaria angustifolia* with native trees in the understory, only a few meters from mature forest. In all cases but one, individuals were observed in mixed species flocks, "sallying" for insects on the undersides of leaves, in the crowns of small trees, 2-10 m high (understory and midstory), accompanied by Golden-crowned Warblers (*Basileuterus culicivorus*), which foraged higher than usual (in the lower canopy). These two species were accompanied, usually, by the Greenish Tyrannulet (*Phylloscartes virens*) and, in many cases, as mentioned by Fitzpatrick (2004), the Southern Bristle-Tyrant (*Phylloscartes eximius*). All records occurred near small streams or in naturally flooded forest, where the dominant tree species were from the Myrtaceae family (e.g.,

Plinia rivularis, *Eugenia pungens*, and *Gomedia reticulata*). The forest had a closed canopy and open understory, without bamboo. An additional observation of the species, on 1 September 2002, at Estancia La Vencedora, Serranía San Joaquín, Caaguazú, Paraguay (25°13'S, 56°10'W), coincides with the same type of forest.

The Sao Paulo Tyrannulet has an inconspicuous voice, which renders it difficult to detect, but it is also genuinely rare. Both in Misiones and in Paraguay, it is by far the rarest of the *Phylloscartes* flycatchers. Given its rarity and its dependence on mature forest with open understory, we believe the Sao Paulo Tyrannulet should be considered vulnerable in Argentina.

Azure Jay (*Cyanocorax caeruleus*). The Azure Jay is classified as near threatened globally (BirdLife International 2004), and vulnerable in Argentina (Fraga 1997). The species is considered rare in Misiones, where it reaches the western limit of its distribution (Chebez 1994), not being present in Paraguay (Guyra Paraguay 2004). In Misiones, populations are fragmented (Chebez 1994), but there are records for 13 of the province's 17 departamentos (Chebez 1996) and the species can still be found throughout southern Misiones (E. Krauczuk pers. com.). We recorded the species on 15 occasions, always in mosaic landscapes, in Parque Provincial de la Araucaria, around San Pedro, in Parque Provincial Cruce Caballero, at Establecimiento La Alegría, around Tobuna, and near San Vicente. Between March 2003 and April 2005, G. Capuzzi (pers. com.) observed the species on 20 occasions, at the same localities, and additionally near Bernardo de Irigoyen (26°15'S, 53°39'W) and in Parque Provincial El Piñalito. All of these records were from degraded forest, regenerating secondary forest, abandoned plantations of yerba mate, or plantations of Araucaria or *Pinus* sp. We have

not recorded the species from mature forest or within large blocks of continuous forest. Araucaria was present at all of these sites, and is an important food source for the Azure Jay in other parts of its range (dos Anjos 1991). Nevertheless, as in parts of Brazil (Rosario 1996, Naka & Rodrigues 2000), in Misiones the Azure Jay is not confined to forest with Araucaria, as demonstrated by historical and recent records from the south of the province (Chebez 1996).

The species was uncommon, but present throughout the year. Most records were of pairs, but up to six individuals were seen together by G. Capuzzi (pers. com.).

Belton (2000) reports that in Rio Grande do Sul, Azure Jays generally move toward people or make their presence known by calling loudly for several minutes; in contrast, at our study sites, we found the species to be shy, particularly when compared to the more common Plush-crested Jay (*Cyanocorax chrysops*).

M. Debarba (pers. com.) reports recently flushing an Azure Jay from its nest in a yerba mate tree covered by vines, in an abandoned yerba mate plantation in Tobuna. It was December, and the nest contained eggs.

Swallow-tailed Cotinga (*Phibalura flavirostris*). The Swallow-tailed Cotinga is classified as near threatened globally (BirdLife International 2004) and vulnerable in Argentina (Fraga 1997), where there are few modern records. Partridge (1954) characterized it as "abundant" at Tobuna in February and March of 1952, when he collected 12 individuals in one month. Although Partridge continued to work in Misiones until 1960, he apparently failed to collect the species subsequently. There were no further records in Argentina for over 20 years (Saibene *et al.* 1996; Chebez *et al.* 1998). In August 1977, seven individuals were mist-netted and banded in Parque Nacional Iguazú (Saibene *et al.* 1996).

Recently, the species was observed in Parque Provincial de la Araucaria: one individual in July 2001 (Krauczuk & Baldo 2004), and one individual on 30 August 2002 (G. Capuzzi pers. com.).

We recorded the species on five occasions: on 24 June 2004, a pair in Parque Provincial Cruce Caballero; on 7 July 2004, a male in Parque Provincial de la Araucaria; on 18 July 2004, a pair at Area Experimental Guaraní; on 23 September 2004, a female at Establecimiento San Jorge; and on 10 May 2005, a pair in the town of San Pedro. Additionally, N. Fariña (pers. com.) observed a pair on 15 August 2005, at Area Experimental Guaraní.

All individuals were seen perched on exposed branches, high in trees, once in degraded forest, four times in regenerating forest, and once in an urban area, coinciding with Belton's (2000) habitat description. In the first four cases, the species was seen in mixed species flocks, accompanied by the Green-backed Becard (*Pachyrhamphus viridis*).

Little is known about the Swallow-tailed Cotinga's apparently complex seasonal movements. Although Partridge's (1954) data suggest the species was abundant during at least one summer in Tobuna, and Bencke *et al.* (2003) suggest that the species reproduces in Misiones, all recent records in Argentina are from winter or early spring. Our records may correspond to winter migrants from Brazil, where the species is apparently an austral and altitudinal migrant (Sick 2001, Bencke *et al.* 2003, BirdLife International 2004); in Río Grande do Sul, for example, it is "a very scarce summer resident", only recorded from 23 September to 24 March (Belton 2000).

RECOMMENDATIONS

With its large tracts of remaining forest and system of protected areas, Misiones presents an excellent opportunity for conserving many rare and threatened Atlantic forest birds;

however, urgent measures are needed to reduce forest fragmentation and poaching. We found many rare and threatened species outside of pristine forest, demonstrating the importance of protecting even degraded forest and small forest islands to conserve Atlantic forest birds. However, game birds such as the Black-fronted Piping-Guan are almost certainly declining due to poaching, and have disappeared from most sites. Several other bird species appeared to depend on specific microhabitats, such as large stands of a single bamboo species, making these birds particularly vulnerable to habitat loss. To reduce poaching, new, equipped, park ranger stations and more park rangers are urgently needed in Parque Provincial Urugua-í and the Yabotí Biosphere Reserve, where some 15 half-time park rangers are currently charged with protecting more than 400,000 ha of forest, surrounded by human settlements. To reduce fragmentation of remaining forest, key sites such as Establecimiento San Jorge should be legally protected, buffer zones should be implemented around existing parks, and small farmers should be provided with technical support to promote sustainability and reduce further deforestation on their farms. Finally, ongoing environmental education is urgently needed in schools and the local media, particularly in farming areas where there is still very little awareness of environmental issues.

ACKNOWLEDGMENTS

We especially thank R. Fraga for many helpful suggestions on the manuscript, N. Fariña for field assistance, J. C. Chebez for inspiring our work in Misiones, and G. Capuzzi, R. Fariña, L. Forte, and M. Ruiz Blanco for providing public education to accompany the research. G. Capuzzi, M. Debarba, J. I. Areta, T. Perkins, M. Codesido, H. Geier, G. Bodrati, and H. Povedano collaborated on field work or contributed their unpublished observations.

A. Giacchino provided institutional support. Field work at Establecimiento San Jorge was conducted during a survey by the Fundación Vida Silvestre Argentina, by request of Alto Paraná S. A. For logistical support and permission to work at the remaining field sites, we thank the Ministerio de Ecología, R. N. R. y Turismo of the Province of Misiones, the Delegación Regional Noreste Argentino de la Administración de Parques Nacionales, the Instituto Nacional de Tecnología Agropecuaria, the Facultad de Ciencias Forestales at the Universidad Nacional de Misiones, Colonizadora Misionera S. A. I. C., and the Debarba, Fariña, Duarte, and González families. A large part of our work was supported by a Rufford Small Grant for Nature Conservation from the Rufford Whitley Laing Foundation, a Flagship Species Grant from the 100% Fund of Fauna & Flora International and DEFRA, a Bergstrom Memorial Research Grant from the Association of Field Ornithologists, and equipment donations from Idea Wild, The Birders' Exchange, and Optics for the Tropics. Satellite images were provided by the Comisión Nacional de Actividades Espaciales through an agreement with the Fundación de Historia Natural Félix de Azara.

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