

The conservation of the avifauna in a lowland Atlantic forest in south-east Brazil

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Summary

The avifauna of a pristine lowland Atlantic forest in south-east Brazil was studied over 2 years. A total of 234 species was recorded, of which 190 species (81.54%) occurred in forested habitats. Thirty one species are listed as threatened or near-threatened and information on habitat and abundance is described for each species. The Parque Estadual Intervales holds one of the last pristine lowland Atlantic forests and it is one of the few reserves that encompasses a large altitudinal gradient. In the past few years the protection of the reserve has been threatened by palm harvesting, hunting, dams and mining.

A avifauna de uma região de Mata Atlântica de baixada no sudeste do estado de São Paulo foi estudada por um período contínuo de 2 anos. Foram observados um total de 234 espécies de aves sendo que 190 espécies (81,54%) ocorreram predominantemente em ambientes florestais primários e perturbados. Trinta e uma espécies são consideradas ameaçadas ou vulneráveis e informações sobre hábitat e abundância são fornecidas. Nos últimos anos a proteção da reserva está ameaçada pelo corte do palmito, caça, construções de hidroelétricas e mineração.

Introduction

When the first Portuguese arrived in Brazil in 1500, the coastal Atlantic forest covered around 1 million km² (SOS Mata Atlântica and INPE 1992). This continuous vegetation was one of the largest North–South tropical forests in the world, occurring from the Rio Grande do Norte (6 °S) to Rio Grande do Sul (30 °S) and was about 200 km wide. The limits of the Atlantic forest are still disputed (Leitão-Filho 1993) and, while some authors include only the straight belt in the coastal mountains (Joly *et al.* 1991), others consider also the seasonal forests of the interior of São Paulo and Minas Gerais, eastern Paraguay as part of the Atlantic forest (Rizzini 1963).

Currently only 5% or about 60,000 km² of the Brazilian Atlantic forest remains (SOS Mata Atlântica and INPE 1992) distributed in several small fragments and a few large forests. Land degradation varies between states, with some states having only 1% of forest cover (Sergipe), while others are 30% forested (Santa Catarina). Following the Portuguese exploitation of timber trees, such as the “pau-brasil” *Caesalpinia echinata*, mahogany *Cedrela* spp. and many others, the forest was logged for sugar cane and coffee plantations.

The lowland Atlantic forest of Brazil has high levels of endemism in all taxonomic groups, including birds (Haffer 1974), primates (Kinsey 1982),

butterflies (Brown 1979) and plants (Mori 1989). The Atlantic forest area has 682 bird species, with 199 endemic to this region (Stotz *et al.* 1996). After almost 500 years of European occupation much of the Atlantic forest avifauna is threatened, although there is only one extinction recorded in the wild, the Alagoas Curassow *Mitu mitu* (Collar *et al.* 1994). Extinction rates in Atlantic forest birds are, however, probably time-lagged (Brooks and Balmford 1996) and in the next few years some species may disappear if no conservation plans are implemented.

Brazil holds the highest number of threatened bird species (96) of the world with two thirds confined to the lowlands (Wege and Long 1995). However, information on lowland Atlantic forest bird communities is scarce, mainly anecdotal and gathered during brief studies (Scott and Brooke 1985). This paper provides information on the status of threatened birds in a pristine lowland Atlantic forest in south-east Brazil based on a study over 2 years.

Study area and methods

The present study was carried out at the Parque Estadual Intervales, Base do Saibadela (hereafter Saibadela forest), municipality of Sete Barras in the state of São Paulo, Brazil (24° 14' 08" S, 48° 04' 42" W) (Figure 1). The Parque Estadual Intervales is 380 km² of protected forest, established in 1986. It was managed by the Fundação Florestal do Estado de São Paulo until 1995. In June 1995 the area was declared a "Parque Estadual" (State Park) and another 110 km² were added to the reserve. This reserve is surrounded by three other reserves: Carlos Botelho, Petar and Xituê Park, comprising more than 1,200 km² of protected forests. Nowadays, the area comprises one of the largest blocks of the "typical" coastal Atlantic forest in Brazil.

Saibadela is one of 10 bases in the Parque Estadual Intervales and it is located in the Vale do Ribeira at the eastern border of the reserve at 70 to 350 m above sea level. The Saibadela region is considered to be one of the best preserved and undisturbed areas in the entire reserve but recently occasional hunting and illegal palm heart harvesting have occurred (Galetti and Chivers 1995).

In the Saibadela area there is a seasonal distribution of rain: the wettest months are January, February and March (average of 1,000 mm) and the driest months, June, July and August (306 mm). The annual rainfall in 1994 and 1995 was 4,244 mm and 3,958 mm, respectively (Figure 2). A striking characteristic of Parque Intervales is that, while rainfall reaches more than 4,000 mm in the lowlands, only 1,600 mm is recorded for higher elevations. Moreover, the Saibadela region receives much more rain than the nearest city, Sete Barras, 42 km distant (c. 2,500 mm annual rainfall).

Temperature is more variable throughout the year at Saibadela. The hotter and wetter season runs from October to March (mean 26.8 °C) and the colder and drier season from April to September (21.1 °C). The lowest temperature rarely drops below 5 °C (winter 1994). The annual mean temperature is around 24 °C with a maximum temperature of 42 °C and a minimum of 3 °C (Figure 2). Temperatures below freezing, known as "geadas" (frost) occur every 4–5 years in the state of São Paulo (see Guix 1995). In the higher areas of Intervales (Carmo and Sede base) temperatures can drop below 0 °C (e.g. July 1994).



Figure 1. Location of Parque Estadual Intervales in south-east Brazil.

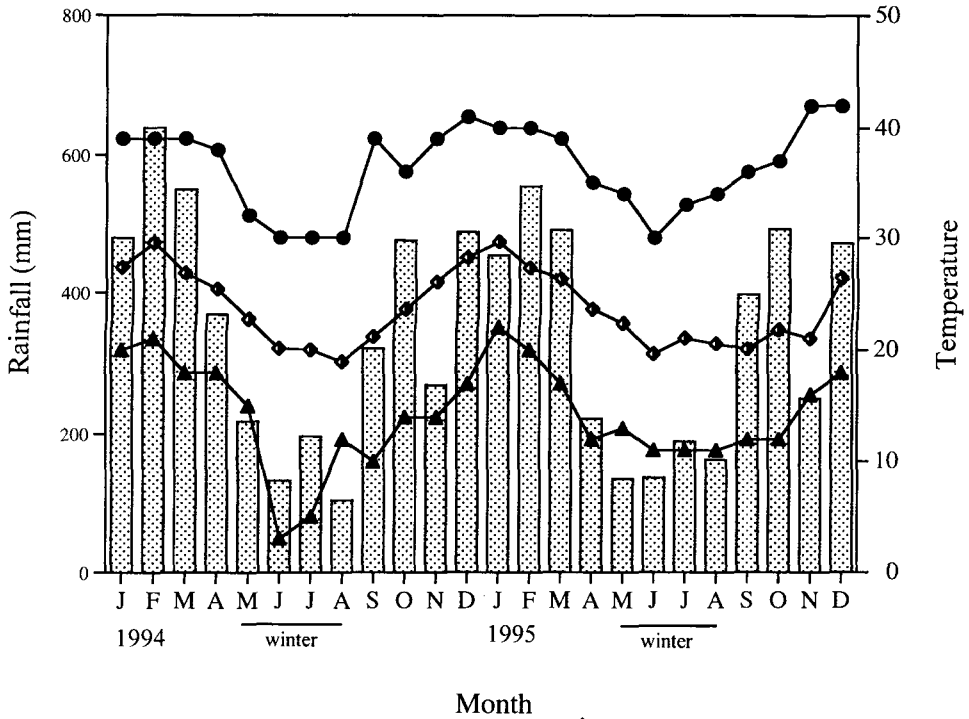


Figure 2. Climatic diagram of Base do Saibadela, Parque Estadual Intervales, São Paulo (the bars are rainfall and the lines are maximum, mean and minimum temperature).

The avifauna of the reserve has been studied since 1988 (Willis 1989, Olmos and Rodrigues 1990, Santos 1991, Rodrigues *et al.* 1994a,b, Rodrigues 1995, Guix 1995, Olmos 1996) but only in the highlands (Carmo and Sede station) where human disturbance of the vegetation was intense before the creation of the reserve in 1986. The reserve is considered one of the highest priorities for bird conservation in the Neotropics (Wege and Long 1995).

The Saibadela area is covered by primary coastal lowland Atlantic forest, where the canopy can reach 35–40 m. The most common plant families are Lauraceae, Myrtaceae, Palmae and Rubiaceae (Almeida-Scabbia 1996). Adjacent to the station, patches of secondary and logged forests, and pastures are the main vegetation types, but also a large block of primary forest where only palmito *Euterpe edulis* was harvested (Galetti 1996a).

Field work was conducted from December 1993 to February 1996. In each month visits from 5 to 15 days were made. The main habitat surveyed was the primary forest (interior, gaps and edge). Further observations were made in an adjacent palm harvested and partially logged forest, 1.5 km from the primary forest, and in swampy and pasture areas near the station.

Bird abundance was estimated based on unlimited distance point counts (Blondel *et al.* 1970, 1981, Vielliard and Silva 1990). All the censuses carried out took into account possible bias, such as effort and speed of the census, bird species, time of the day, weather, season, bird density and habitat (Bibby *et al.*

1992). Thus, the censuses were carried out slowly (1 km/h), in the morning (from sunrise to 11h00) when most birds are active and on non-rainy days. Moreover, the sampling effort was similar for all months. The only bias that could not be avoided was differences in bird species detection.

The point counts (or "stations d'écoute") were placed along eight trails of 1 km each. On each trail, five "point counts" were spaced 200 m apart. At these points all birds heard or seen during a 20-minute period were recorded. At least three trails (or 15 points), randomly chosen, were sampled each month. The index of point abundance (IPA) was calculated by dividing the number of contacts by the total number of points sampled. Each contact is defined as a sighting of one individual or a bird flock in the vicinity of the point. The radius of detection in this method is not taken into account because it is very difficult to know how far a bird is calling from the point sampled.

A collection of tape recordings of the birds of the area was deposited at Arquivo Sonoro Neotropical (ASN), in the Bioacoustical Laboratory of the Universidade Estadual de Campinas (UNICAMP), Brazil.

Results

Richness and composition of the avifauna

In the Saibadela area 234 bird species were recorded (Appendix). Most of the species recorded (190, 81.5%) were associated with forest habitats (interior, logged forest, edges, treefalls and streams). The remaining species (43, 18.5%) were found exclusively in non-forest habitats such as pastures and swamps.

The species were classified as (1) residents (recorded throughout the year in the area); (2) winter migrants (detected mainly from May to August); (3) summer migrants (recorded mainly during the avian breeding season (September–March)); (4) vagrants (species that are extremely rare in the area or did not show any seasonal pattern in abundance).

Resident species were dominant in the bird community of Saibadela forest with 155 confirmed species (66.5%) of forest and non-forest habitats. Some residents (tinamous, pigeons, cotingas, and tapaculos) were scarce and rarely detected by their calls outside the main breeding season (September–March). Summer migrants comprise 28 species (12%), mainly hummingbirds, tyrant-flycatchers and some becardas. Winter migrants are typically altitudinal migrants from upper and colder elevations. At least four frugivore species are regular altitudinal migrants but upper elevation populations of some species may also migrate altitudinally, wintering in the Saibadela area (e.g. Red-breasted Toucan *Ramphastos dicolorus*, Plumbeous Pigeon *Columba plumbea*, Hooded Berryeater *Carpornis cucullatus* and Red-ruffed Fruitcrow *Pyroderus scutatus*). Non-regular altitudinal migrants (species with a variable degree of propensity to altitudinal migration) account for many of the 30 (13%) confirmed vagrant species recorded in the area mainly during the severe winter of 1994. Some of the other vagrant species are those for which there is insufficient habitat, mainly open areas and swamps. A further 17 (7%) species are extremely rare and/or poorly known in the area and their current status is only tentatively assigned (Appendix).

confirmed that the recordings were of the latter species. These parrotlets were not recorded in point counts and were extremely difficult to study in the wild, adding to the difficulties of establishing conservation plans for the species.

Red-capped Parrot *Pionopsitta pileata* (NT)

Pairs and small groups are regularly recorded (IPA = 0.06) throughout the year at Saibadela but rarely observed perched. They were also observed in logged and secondary forest. One male bird was observed eating *Phytolacca dioica* (Phytolaccaceae) fruits. In the highlands this parrot was observed eating *Solanum granuloso-leprosum* (Solanaceae) (Pizo *et al.* 1995). This species needs large areas encompassing different elevations in the Serra do Mar, indeed it is regularly found in areas with large forest patches in south-eastern Brazil (A. A., pers. obs.) but is extremely difficult to study in the wild (Pizo *et al.* 1995, Galetti 1996a).

Vinaceous Amazon *Amazona vinacea* (E)

Observed at Saibadela only once in February 1994, a vagrant individual probably coming from forests near the coast (Eldorado, where it was regularly recorded, Collar *et al.* 1992). This species is distributed in the Ribeira river valley in southern São Paulo state and in the forests of eastern, northern and western Paraná state (Collar *et al.* 1992). Not recorded in point counts.

Blue-bellied Parrot *Triclarina malachitacea* (E)

This species lives in pairs or small groups (group size is 2–4 birds) which usually forage in understorey vegetation. Commonly observed eating Myrtaceae fruits (*Eugenia* spp., *Campomanesia neriiflora*, and *Campomanesia* sp.) and oranges in orchards (Pizo *et al.* 1995, M. G. unpubl. data). Although considered dependent on *Euterpe edulis* fruits (Collar *et al.* 1994) it was observed eating fruits of this palm only twice (Galetti 1996a). It is a rare in the highlands of the reserve (Pizo *et al.* 1995) but is still common (IPA = 0.22) at Saibadela forest.

Saw-billed Hermit *Ramphodon naevius* (NT)

One of the commonest species recorded in point counts at Saibadela (IPA = 1.21), where it is a year round resident, breeding from October to March. The nest is constructed on petioles of palms about 0.8–1.3 m above the ground. Also recorded in logged and secondary forest, being common throughout the lowland Atlantic Forest (0–300 m.) decreasing in numbers with increased altitude. Extremely common in patches of lowland Atlantic Forest in coastal São Paulo and Paraná. The main nectar source in the area include several bromeliads and the exotic *Musa velutina* and *Aphelandra micrantha* (Acanthaceae). The ecology of this hummingbird has been studied extensively elsewhere (Sazima *et al.* 1995).

Saffron Toucanet *Bailloni* *bailloni* (NT)

Recorded throughout the year at Saibadela in small numbers but only in forest edges and in logged and secondary forests. Not recorded in point counts. This

toucanet is more common in the highlands of Parque Estadual Intervalos but usually locally distributed in the Atlantic Forest. It is virtually restricted to mid-elevation zones at Serra de Paranapiacaba in south-eastern Brazil at 400–600m. (A. A., *et al.* unpubl. data). Observed eating *Sloanea guianensis* and *Nectandra megapotamica* among other plants (Galetti 1996a). Mañosa *et al.* (1995) estimated a density of 5.08 birds/km² in the uplands of the reserve. It is known to thrive in forest fragments (Mikich 1996).

Spot-breasted Antwren *Dysithamnus stictothorax* (NT)

Common in forest edges, logged and secondary forests. Found in the upper elevations of Parque Estadual Intervalos and in primary forest. Also locally distributed in the Atlantic forest and abundant at mid-elevations of Serra de Paranapiacaba (A. A. *et al.* unpubl. data).

Salvadori's Antwren *Myrmotherula minor* (NT)

A rare species at Saibadela, always recorded in pairs while joining understorey mixed-species flocks in primary and logged forests. One male was tape recorded only once at Saibadela, and the species was probably overlooked during the study due to its inconspicuous voice. Seems to be patchily distributed and strictly associated with mixed-species flocks.

Unicolored Antwren *Myrmotherula unicolor* (NT)

Pairs were regularly observed throughout the year (IPA = 0.06) as members of understorey mixed-species flocks but also (to a lesser degree) foraging away from flocks. The call of this species is more conspicuous than that of Salvadori's Antwren and consequently much more often detected. Recorded in primary, secondary and logged forests and together with Lesser Woodcreeper *Lepidocolaptes fuscus*, Black-capped Foliage-gleaner *Philydor atricapillus*, White-eyed Foliage-gleaner *Automolus leucophthalmus* and Red-crowned Ant-tanager *Habia rubica* forms the core of the understorey mixed-species flocks at Saibadela (M. A. Pizo and A. A., unpubl. data). Restricted to the lower elevations of Serra de Paranapiacaba and Serra do Mar and consequently vulnerable to forest clearing in the lowlands.

Spotted Bamboowren *Psiloramphus guttatus* (NT)

Recorded only twice in tangles in the logged forest, probably vagrants from upper elevations where the species is regularly found throughout the year in bamboo thickets. Also found in the mountains of São Paulo state, being more numerous in mid-elevation zones (400–600m).

Slaty Bristlefront *Merulaxis ater* (NT)

Rarely detected outside the main breeding season (October–March) (annual IPA = 0.02). In the breeding season several pairs were often recorded within well-defined territories in primary and logged forests.

Swallow-tailed Cotinga *Phibalura flavirostris* (NT)

A pair was observed once eating *Psychotria mapoureoides* (Rubiaceae) fruits in July 1994 in a logged forest. It is probably an altitudinal migrant from upper elevations, where the species breeds. This cotinga was observed nesting in the winter (May–August) in the highlands of the reserve (M. A. Pizo, verbally).

Hooded Berryeater *Carpornis cucullatus* (NT)

Very rare at Saibadela (IPA = 0.01), where it is replaced by the Black-headed Berryeater (*C. melanocephalus*). At higher elevations (400–1000 m.) Hooded Berryeater is most numerous. In the winter of 1994 (when the temperatures dropped to -4° C in the highlands) some Hooded Berryeaters were observed at Saibadela.

Black-headed Berryeater *Carpornis melanocephalus* (V)

Common at Saibadela (IPA = 0.55), recorded mainly in the understorey of primary forest. This mid-sized frugivore eats many Myrtaceae fruits at the study site and is active early in the morning. It is endemic to the lowland Atlantic forest and is thus threatened due to extensive deforestation, while it is also affected by *Euterpe edulis* harvesting (Galetti 1996a).

Cinnamon-vented Piha *Lipaugus lanioides* (V)

Recorded 17 times in logged forest and only rarely in primary forest (IPA = 0.006). Commonly observed at mid-elevational zones and in the highlands of the reserve (Carmo station). Although previously considered *Euterpe*-dependent (Collar *et al.* 1992) recent studies showed that this species is not affected by palm harvesting (Galetti 1996a). The diet of *Lipaugus* in the highlands of Intervalles showed that this cotinga consumes more than 20 fruit species as well as insects (R. Laps *in litt.*).

Bare-throated Bellbird *Procnias nudicollis* (NT)

Recorded at Saibadela mainly before and during the onset of the breeding season (July–October), but it was observed during 8 months at Saibadela. During the breeding season they are heard calling continuously throughout the day (annual IPA = 1.00). After the breeding season they are more common in higher elevations. Also common in other areas where large pristine forest still occurs. The maintenance of undisturbed elevational gradients may be critical for the preservation of this species in the Atlantic forest. However, this species is easily overlooked when are not calling and altitudinal migration can only be assessed with radiotelemetry (Powell and Bjork 1995).

Shear-tailed Gray-tyrant *Muscipipra vetula* (NT)

An altitudinal vagrant recorded only once (January 1994) at Saibadela. Regularly observed at upper elevations in the Parque Estadual Intervalles (700–1000 m.) but absent from here during the winter.

Russet-winged Spadebill *Platyrrinchus leucoryphus* (V)

Still fairly common at the study site (IPA = 0.10). Three territories were recorded in only 50 ha of primary undisturbed lowland forest but the mean territory size is large for a small tyrant (about 10 ha). Vocally active throughout the year but the species's typical song is heard only during part of the breeding season (October–January). Forages at low and mid heights (2–7 m.) in dense undisturbed forest understorey, sallying out for arthropods on leaves.

Eye-ringed Tody-tyrant *Hemitriccus orbitatus* (NT)

Like Russet-winged Spadebill, was recorded at Saibadela only in the dense understorey of the primary undisturbed lowland forest (IPA = 0.07). Two pairs were observed frequently joining understorey mixed-species flocks within its respective territories. At other Atlantic forest sites (Tapiraí and Barreiro Rico, both in São Paulo State) it has also been recorded in large numbers in secondary forest.

Bay-ringed Tyrannulet *Phylloscartes sylviolus* (NT)

At Saibadela recorded only in edges, secondary and logged forest mainly while joining canopy mixed-species flocks (IPA = 0.006). More abundant at upper elevations of the Parque Estadual Intervales, especially at mid-elevation zones.

Oustalet's Tyrannulet *Phylloscartes oustaleti* (NT)

Recorded in small groups (3–6) predominantly in canopy and understorey, associated with mixed-species flocks (IPA = 0.06). More abundant at upper elevations where the São Paulo Tyrannulet *Phylloscartes paulistus* is absent. At Saibadela recorded in primary and logged forests.

São Paulo Tyrannulet *Phylloscartes paulistus* (V)

Recorded mostly in pairs in canopy and understorey, in mixed-species flocks but also foraging away from flocks. Fairly common at Saibadela (IPA = 0.09), recorded in the mid-storey and canopy of primary, logged and secondary forests. At Serra do Mar and Serra de Paranapiacaba, it is restricted to the lowlands, where it is locally common in appropriate habitat (large patches of lowland forest).

Grey-capped Tyrannulet *Phyllomyias griseocapilla* (NT)

Recorded in canopy mixed-species flocks in secondary forest and at forest edges. Rare in primary forest and never recorded in point counts but more common at upper elevations of the Serra do Mar and Serra de Paranapiacaba. Much more often heard than seen.

Azure Jay *Cyanocorax caeruleus* (NT)

Recorded only in edges (IPA = 0.006), logged and secondary forests in small groups (probably only one group of 4–8 present). A rare species, occurring

throughout the year in the area but detected more often when the fruits of some trees (such as *Cytharexylum myrianthum*, Verbenaceae) were ripe.

Azure-shouldered Tanager *Thraupis cyanoptera* (NT)

A common species at Saibadela (IPA = 0.06), recorded in forest edges, logged and secondary forests but also, to a lesser extent, in the canopy of the primary forest. Locally common at all elevations of Serra de Paranapiacaba and Serra do Mar. At Saibadela frequently seen eating leaves of Cucurbitaceae in orchards.

Brown Tanager *Orcheisticus abeillei* (NT)

A vagrant group was recorded in September 1994. More common at upper elevations of the Parque Estadual Intervales, where it is often recorded following mixed-species flocks in the canopy.

Black-backed Tanager *Tangara peruviana* (E)

Recorded once only while following a canopy mixed-species flock. Also recorded once only during a study of the ecology of tanagers in the highlands of Parque Intervales (Rodrigues 1995, M. Rodrigues, verbally).

Sub-species to be considered as near-threatened

Red-ruffed Fruitcrow *Pyroderus scutatus scutatus* Although the Red-ruffed Fruitcrow is not considered threatened (Collar *et al.* 1994) because four other sub-species still have large populations in Andes (Snow 1982), there is a rapid decline of the populations of *P. s. scutatus* in the Atlantic forest. This large cotinga needs mature forest for long-term survival; it is absent in fragmented forest (Aleixo and Vielliard 1995) and it is still commonly exterminated by hunting (F. Olmos, verbally). At Saibadela it is rare (IPA = 0.01) and also in forest reserves in Espírito Santo it was detected only in Sooretama Reserve (A. Chiarello, verbally). It is one of the few large fruit-eating bird species for which altitudinal migration was detected. It is fairly common during the winter when lek behaviour was observed twice. The abundance of *P. s. scutatus* was positively correlated with the number of tree species fruiting in the lowland of Intervales (Galetti 1996a).

Discussion

The importance of the Parque Estadual Intervales for the conservation of the Atlantic forest avifauna

The Parque Estadual Intervales is one of the few protected areas in the whole Atlantic forest that encompasses a large altitudinal gradient still covered by pristine forest (from 20 m to 1095 m). At least 355 species occur in the reserve, including 6 Endangered, 10 Vulnerable and 21 Near-threatened. Some are only observed in the highlands, e.g. Helmeted Woodpecker *Dryocopus galeatus* (Willis 1989), White-bearded Antshrike *Biatas nigropectus* (J. M. E. Vielliard and W. R.

Silva, unpubl. data), Crested Eagle *Morphnus guianensis* (Galetti *et al.* 1997) and Black-legged Dacnis *Dacnis nigripes* (M. Rodrigues, pers. comm.). Many species are restricted to a determined elevational zone and/or habitat such as swamps or bamboo thickets (Rodrigues *et al.* 1994a).

Other reserves that still have a large altitudinal gradient of intact forest include the Parque Estadual Carlos Botelho (22–1000 m, 37,664 ha) and Juréia Ecological Station (0–900 m, 79,830 ha) but palm harvesting and hunting in these reserves is more common than at Intervales.

The Parque Intervales is one of the few places without so-called “traditional” communities (Indians and *caiçaras*). It is no coincidence that many game species are still found in the reserve, such as the Solitary Tinamous, Jacutinga, and the Muriqui *Brachyteles arachnoides*. Other reserves in the Atlantic forest which have people living within them, e.g. Parque Nacional da Serra da Bocaina, Parque Estadual de Ilhabela, and Parque Estadual de Jacupiranga, are considered “empty forests” and hunting is still common (P. Martuscelli and F. Olmos, verbally). For instance in April 1996, eight Jacutingas were killed in Parque Ilhabela (F. Olmos, *in litt.*).

The Parque Intervales is the stronghold of highly endangered species such as the Jacutinga, Cinnamon-vented Piha, Blue-bellied Parrot, and the Black-headed Berryeater. The Jacutinga population in the Brazilian Atlantic forest is estimated at about 1500 birds (Galetti *et al.*, *in press*), most concentrated in Intervales and Parque Estadual Carlos Botelho. The area is also the stronghold of one of the most endangered primates in the world, the muriqui *Brachyteles arachnoides*. It is estimated that more than 200 muriquis (of a world population estimated at less than 700 animals) live in Intervales (Martuscelli *et al.* 1994).

The avifauna of Intervales has been studied since 1988 and there are very few areas in the Atlantic forest with such a long period of monitoring (see Willis 1979, Aleixo 1995, Aleixo and Vielliard 1995). The Parque Intervales provides excellent facilities for research and has several stations at different altitudes.

Threats and Future

The fragmentation of the Brazilian Atlantic forest is certainly the main threat to the avifauna but some species, such as cracids and tinamids, are also heavily affected by illegal hunting (see Galetti *et al.* *in press*). Lowlands were, and still are, extensively cleared for agriculture (mainly banana plantations in Vale do Ribeira) and pasture. Nowadays most of the remaining Atlantic forest is located in hilly areas difficult of access. Species restricted to lowlands are prone to extinction (Brown and Brown 1992, Mori 1989).

The excellent state of the forests along the elevational gradient of the Parque Estadual Intervales allows the existence of such a highly diverse avifauna and makes the area one of the key sites for the conservation of the Atlantic Forest avifauna (Wege and Long 1995). However, more recently, palm heart poachers (“palmiteiros”) have been harvesting palm trees within the limits of the Park (Galetti and Chivers 1995) and cattle are being introduced in secondary vegetation by authorities interested in alternatives for economic development.

Furthermore, the state government of São Paulo dismissed several rangers from Parque Estadual Intervales and it is no coincidence that just after the dis-

missal, a tapir *Tapirus terrestris* and a group of Jacutingas that had been studied for more than a year were killed at Saibadela (Galetti 1996a,b).

The main income of the population of the Vale do Ribeira (235,000 people) comes from tea and banana plantations. In the last few years banana and tea prices have dropped and the flooding of the Ribeira river destroyed several hectares of banana plantations. Consequently several labourers were dismissed and illegal harvesting of palm heart became the main income in several small villages in Sete Barras, Barra do Turvo, and Eldorado. The income of harvesting palm heart can reach US\$500 per month, more than five times the minimum wage in Brazil (Galetti 1996a). To maintain the avifauna of Parque Estadual Intervalles and the bordering reserves, the creation of new economic incentives for the area is essential. The management of palm heart has been intensively studied at Intervalles (Ribeiro *et al.* 1993) but the project was stopped by the state government to save money. It is also necessary to stimulate the production of new sources of palm heart (e.g. *Bactris*) and promote palm management in small private estates to avoid the total depletion of the natural stands of *E. edulis*. This palm is an important fruit source for birds and mammals and palm harvesting affects the population of some bird species (Galetti 1996a).

Another recent threat to Intervalles is mining and dam construction. The Parque Intervalles is located on limestone and the biggest cement company in Brazil wants to exploit the area. It argues that new jobs will be created and the mayors of the small towns close to Intervalles are supporting the proposal. The same company wants to build a series of four dams in the last free-flowing river in the state (Rio Ribeira) to produce energy for its cement industry. These four dams will flood 110 km² of forest and displace 3,000 people.

The conservation status of the whole Atlantic forest is currently on hold. The areas protected are reasonably large but none have effective protection. The number of rangers in each reserve is usually very low, most of them receiving low wages and without training. On the other hand, the rural population surrounding the reserves needs new sources of income. New alternatives must be created to secure the protection of the biodiversity and also increase the quality of life of the people living close to the reserves. Each reserve should be economically independent of the state and federal government to maintain a trained staff, rangers and at least one resident biologist. This "economical independence" of the reserves may be achieved through controlled ecotourism, but, at the moment, almost no reserve in the Atlantic forest has a non-destructive ecotourism. On the other hand, the state and federal government should provide sustainable economic alternatives for people living close to nature reserves.

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Appendix. Bird species recorded in primary and logged forests, treefalls, forest edges, second growth, pastureland and swampy areas at Saibadela, Intervaes, south-east Brazil.

Nomenclature and English names follow Sick (1993), except the Black-fronted Piping-guan where we used the name Jacutinga.

A, Abundance: c, common, recorded every day in some numbers; f, fairly common, recorded on average seldom more than one or two birds in a day; u, uncommon, recorded at least once a week; r, rare, recorded less often than once a week; x, extremely rare, generally 1–3 records for area (includes vagrants, species with insufficient habitat and poorly known species).

H, habitat: p, primary unlogged forest; 1, logged forest; 2, tall second-growth and forest edge; t, treefalls within primary and logged forests; o, overhead; n, non-forested areas (e.g. "campos", fields, pastures and areas with low bushes); fs, forest streams; w, riverine habitats, ponds, swamps.

S, Status: rs, resident, recorded in some numbers throughout the year; sm, summer migrants, species that breed in the area September–March, leaving April–August; wm, winter migrants, species regularly recorded in the area mainly or only during the winter (i.e. May–August); v, vagrants, extremely rare species (1–3 records during the study) recorded without regularity in the area. A question mark following the status code indicates there is insufficient information on the species's status in the area; however, their current status is tentatively assigned based on field data and literature.

^a The specific identity of the bird is not certain, although the presence of a bird of that genus or species group is.

Families and species	A	H	S
TINAMIDAE			
Solitary Tinamou			
<i>Tinamus solitarius</i>	c	p, 1	rs
Brown Tinamou			
<i>Crypturellus obsoletus</i>	r	p, 1	rs
Yellow-legged Tinamou			
<i>Crypturellus noctivagus</i>	c	p, 1	rs
Tataupa Tinamou			
<i>Crypturellus tataupa</i>	r	1, 2	rs
ARDEIDAE			
Great Egret			
<i>Casmerodius albus</i>	x	w	v
Striated Heron			
<i>Butorides striatus</i>	x	w	v
Capped Heron			
<i>Pilherodius pileatus</i>	x	w	v
Boat-billed Heron			
<i>Cochlearius cochlearius</i>	r	w	m?
CATHARTIDAE			
Black Vulture			
<i>Coragyps atratus</i>	u	o	rs
Turkey Vulture			
<i>Cathartes aura</i>	r	o	rs
ACCIPITRIDAE			
Plumbeous Kite			
<i>Ictinia plumbea</i>	x	o	sm
Tiny Hawk			
<i>Accipiter superciliosus</i> ^a	r	1	rs
Roadside Hawk			
<i>Buteo magirostris</i>	c	2	rs

Appendix cont.

Families and species	A	H	S
Mantled Hawk			
<i>Leucopternis polionota</i>	x	p, 1	rs
Black Hawk-eagle			
<i>Spizaetus tyrannus</i>	r	p, 1	rs?
Bicoloured Hawk			
<i>Accipiter bicolor</i>	r	p, 1	v
FALCONIDAE			
Laughing Falcon			
<i>Herpethotes cachinnans</i>	r	1, 2	rs
Collared Forest-falcon			
<i>Micrastur semitorquatus</i>	f	p, 1	rs
Barred Forest-falcon			
<i>Micrastur ruficollis</i>	u	p, 1	rs
Yellow-headed Caracara			
<i>Mitroago chimachima</i>	x	2	v
CRACIDAE			
Dusky-legged Guan			
<i>Penelope obscura</i>	u	p, 1, 2	rs
Jacutinga			
<i>Pipile jacutinga</i>	r	p, 1, 2	rs?
PHASIANIDAE			
Spot-winged Wood-quail			
<i>Odontophorus capueira</i>	f	p, 1	rs
RALLIDAE			
Uniform Crake			
<i>Amaurolimnas concolor</i>	x	p	rs?
Slaty-breasted Wood-rail			
<i>Aramides saracura</i>	c	2, w	rs
Red-and-white Crake			
<i>Laterallus leucopyrrhus</i>	r	w, n	rs
CHARADRIDAE			
Southern Lapwing			
<i>Vanellus chilensis</i>	r	2, w	v
COLUMBIDAE			
Plumbeous Pigeon			
<i>Columba plumbea</i>	f	p, 1	rs
Ruddy Ground-dove			
<i>Columbina talpacoti</i>	f	n	rs
White-tipped Dove			
<i>Leptotila verreauxi</i>	u	1, 2	rs
Grey-fronted Dove			
<i>Leptotila rufaxilla</i>	f	1, 2	rs
Ruddy Quail-dove			
<i>Geotrygon montana</i>	u	p, 1	sm?

Appendix cont.

Families and species	A	H	S
PSITTACIDAE			
Reddish-bellied Parakeet			
<i>Pyrrhura frontalis</i>	f	1, 2	rs
Blue-winged Parrotlet			
<i>Forpus crassirostris</i>	u	1, 2	rs
Plain Parakeet			
<i>Brotogeris tirica</i>	c	p, 1, 2	rs
Black-eared Parrotlet			
<i>Touit melanonota</i> ^a	x	p, 1	v?
Red-capped Parrot			
<i>Pionopsitta pileata</i>	u	p, 1	rs
Scaly-headed Parrot			
<i>Pionus maximiliani</i>	f	p, 1	rs
Vinaceous-breasted Parrot			
<i>Amazona vinacea</i>	x	p	v
Blue-bellied Parrot			
<i>Triclaria malachitacea</i>	f	p, 1	rs
CUCULIDAE			
Squirrel Cuckoo			
<i>Piaya cayana</i>	r	p, 1, 2	rs
Smooth-billed Ani			
<i>Crotophaga ani</i>	f	n	rs
Striped Cuckoo			
<i>Tapera naevia</i>	r	n	rs?
Pavonine Cuckoo			
<i>Dromococcyx pavoninus</i>	x	p	v
TYTONIDAE			
Barn Owl			
<i>Tyto alba</i>	x	n, 2	rs
STRIGIDAE			
Tropical Screech-owl			
<i>Otus choliba</i>	f	2, 1, t	rs
Long-tufted Screech owl			
<i>Otus atricapillus</i>	f	p, 1, 2	rs
Tawny-browed Owl			
<i>Pulsatrix koeniswaldiana</i>	r	p	rs
Least Pygmy-owl			
<i>Glaucidium minutissimum</i>	f	p, 1	rs
Burrowing Owl			
<i>Speotyto cunicularia</i>	x	n	rs?
Black-banded Owl			
<i>Ciccaba huhula</i>	r	p, 2	rs
Rusty-barred Owl			
<i>Strix hylophila</i>	r	p, 2	rs
NYCTIBIIDAE			
Common Potoo			
<i>Nyctibius griseus</i>	r	1, 2, t	rs?
CAPRIMULGIDAE			
Semicollared Nighthawk			
<i>Lurocalis semitorquatus</i>	c	p, 1, 2	sm

Appendix cont.

Families and species	A	H	S
Pauraque			
<i>Nyctidromus albicollis</i>	r	n	rs
APODIDAE			
White-collared Swift			
<i>Streptoprocne zonaris</i>	f	o	rs
Grey-rumped Swift			
<i>Chaetura cinereiventris</i>	f	o	rs
Ashy-tailed Swift			
<i>Chaetura andrei</i>	r	o	sm
TROCHILIDAE			
Saw-billed Hermit			
<i>Ramphodon naevius</i>	c	p, 1, 2	rs
Rufous-breasted Hermit			
<i>Glaucis hirsuta</i>	x	2	v
Dusky-throated Hermit			
<i>Phaethornis squalidus</i>	r	1, 2	rs
Black Jacobin			
<i>Melanotrochilus fuscus</i>	f	1, 2	sm
Black-throated Mango			
<i>Anthracothorax nigricollis</i>	r	2, n	sm
Violet-capped Woodnymph			
<i>Thalurania glaucopis</i>	c	p, 1	rs
White-throated Hummingbird			
<i>Leucochloris albicollis</i>	x	2	v
Versicoloured Emerald			
<i>Amazilia versicolor</i>	f	1, 2	sm
Sombre Hummingbird			
<i>Aphantochroa cirrhocloris</i>	u	1, 2	sm
TROGONIDAE			
White-tailed Trogon			
<i>Trogon viridis</i>	c	p, 1, 2	rs
Black-throated Trogon			
<i>Trogon rufus</i>	u	p, 1, 2	rs
ALCEDINIDAE			
Amazon Kingfisher			
<i>Chloroceryle amazona</i>	u	w	rs
Green Kingfisher			
<i>Chloroceryle americana</i>	u	w	rs
Green-and-rufous Kingfisher			
<i>Chloroceryle india</i>	r	fs	rs
MOMOTIDAE			
Rufous Motmot			
<i>Baryphthengus ruficapillus</i>	c	p, 1, 2	rs
BUCCONIDAE			
White-necked Puffbird			
<i>Notharchus macrorhynchus</i>	r	1, 2	sm

Appendix cont.

Families and species	A	H	S
Crescent-chested Puffbird			
<i>Malacoptila striata</i>	r	1, 2	sm
Rusty-breasted Nunlet			
<i>Nonnula rubecula</i>	x	2	v
RAMPHASTIDAE			
Spot-billed Toucanet			
<i>Selenidera maculirostris</i>	f	p, 1, 2	rs
Saffron Toucanet			
<i>Baillonius bailloni</i>	u	1, 2	rs
Channel-billed Toucan			
<i>Ramphastos vitellinus</i>	c	p, 1, 2	rs
Red-breasted Toucan			
<i>Ramphastos dicolorus</i>	r	p, 1, 2	wm
PICIDAE			
Ochre-collared Piculet			
<i>Picumnus temminckii</i>	u	1, 2	rs
Campo Flicker			
<i>Colaptes campestris</i>	r	n	rs
Green-barred Woodpecker			
<i>Chrysopytilus melanochloros</i>	r	n, 2	rs
Yellow-throated Woodpecker			
<i>Piculus flavigula</i>	r	p, 1	rs
Blonde-crested Woodpecker			
<i>Celeus flavescens</i>	c	p, 1, 2	rs
Lineated Woodpecker			
<i>Dryocopus lineatus</i>	u	1, 2	rs
Yellow-fronted Woodpecker			
<i>Melanerpes flavifrons</i>	r	p, 1, 2	rs
White Woodpecker			
<i>Melanerpes candidus</i>	r	n	rs
white-spotted Woodpecker			
<i>Veniliornis spilogaster</i>	u	1, 2	rs
Robust Woodpecker			
<i>Campephilus robustus</i>	r	p, 1, 2	rs
RHINOCRYPTIDAE			
Spotted Bamboowren			
<i>Psiloramphus guttatus</i>	x	1	v
Slaty Bristlefront			
<i>Merulaxis ater</i>	r	p, 1	rs
White-breasted Tapaculo			
<i>Scytalopus indigoticus</i>	u	t, 1, 2	rs
FORMICARIIDAE			
Spot-backed Antshrike			
<i>Hypoedaleus guttatus</i>	f	p, 1, 2	rs
Giant Antshrike			
<i>Batara cinerea</i>	r	1, 2	rs
Tufted Antshrike			
<i>Mackenziaena severa</i>	x	1, 2	v?
Spot-breasted Antwreio			
<i>Dysithamnus stictothorax</i>	c	1, 2	rs

Appendix cont.

Families and species	A	H	S
Plain Antvireo			
<i>Dysithamnus mentalis</i>	c	p, 1, 2	rs
Star-throated Antwren			
<i>Myrmotherula gularis</i>	f	p, 1	rs
Salvadori's Antwren			
<i>Myrmotherula minor</i>	x	1, 2	rs?
Unicoloured Antwren			
<i>Myrmotherula unicolor</i>	f	p, 1, 2	rs
Rufous-winged Antwren			
<i>Herpsilochmus rufimarginatus</i>	u	p, 1, 2	rs
Ferruginous Antbird			
<i>Drymophila ferruginea</i>	x	2	v
Scaled Antbird			
<i>Drymophila squamata</i>	u	t, 1, 2	rs
Streak-capped Antwren			
<i>Terenura maculata</i>	f	p, 1, 2	rs
White-shouldered Fire-eye			
<i>Pyriglena leucoptera</i>	u	t, 1, p	rs
Squamate Antbird			
<i>Myrmeciza squamosa</i>	c	p, 1, 2	rs
Cryptic Antthrush			
<i>Chamaeza meruloides</i>	x	1	v
Short-tailed Antthrush			
<i>Chamaeza campanisona</i>	c	p, 1, 2	rs
Rufous-capped Antthrush			
<i>Formicarius colma</i>	c	p, 1, 2	rs
Variegated Antpitta			
<i>Grallaria varia</i>	f	p, 1, 2	rs
Black-cheeked Gnateater			
<i>Conopophaga melanops</i>	c	p, 1, 2	rs
FURNARIIDAE			
Chicli Spinetail			
<i>Synallaxis spixi</i>	f	n	rs
Rufous-capped Spinetail			
<i>Synallaxis ruficapilla</i>	r	1, 2	rs
Pallid Spinetail			
<i>Cranioleuca pallida</i>	x	1	v
White-collared Foliage-gleaner			
<i>Anabazenops fuscus</i>	u	1, 2	rs
Black-capped Foliage-gleaner			
<i>Philydor atricapillus</i>	f	p, 1	rs
Ochre-breasted Foliage-gleaner			
<i>Philydor lichtensteini</i>	r	p, 1	rs
Buff-fronted Foliage-gleaner			
<i>Philydor rufus</i>	u	p, 1, 2	rs
White-eyed Foliage-gleaner			
<i>Automolus leucophthalmus</i>	f	p, 1, 2	rs
Pale-browed Treehunter			
<i>Cichlocolaptes leucophrus</i>	f	p, 1, 2	rs
Streaked Xenops			
<i>Xenops rutilans</i>	x	1, 2	v
Plain Xenops			
<i>Xenops minutus</i>	u	p, 1, 2	rs

Appendix cont.

Families and species	A	H	S
Rufous-breasted Leafscrapper <i>Sclerurus scansor</i>	f	p, 1	rs
Tawny-throated Leafscrapper <i>Sclerurus mexicanus</i>	r	p, 1, 2	rs?
Sharp-tailed Streamcreeper <i>Lochmias nematura</i>	f	fs, 2	rs
Plain-brown Woodcreeper <i>Dendrocincla turdina</i>	c	p, 1, 2	rs
Olivaceous Woodcreeper <i>Sittasomus griseicapillus</i>	u	p, 1	rs
White-throated Woodcreeper <i>Xiphocolaptes albicollis</i>	f	p, 1, 2	rs
Planalto Woodcreeper <i>Dendrocolaptes platyrostris</i>	f	p, 1, 2	rs
Scaled Woodcreeper <i>Lepidocolaptes squamatus</i>	x	2	v
Lesser Woodcreeper <i>Lepidocolaptes fuscus</i>	c	p, 1, 2	rs
TYRANNIDAE			
Grey-capped Tyrannulet <i>Phyllomyias griseocapilla</i>	r	1, 2	rs
Grey Elaenia <i>Myiopagis caniceps</i>	r	p, 1, 2	rs
Yellow-bellied Elaenia <i>Elaenia flavogaster</i>	u	n	rs
Highland Elaenia <i>Elaenia obscura</i>	x	2	v
Grey-hooded Flycatcher <i>Mionectes rufiventris</i>	u	p, 2	sm
Sepia-capped Flycatcher <i>Leptopogon amaurocephalus</i>	r	p, 1, 2	rs
Bay-ringed Tyrannulet <i>Phylloscartes sylviolus</i>	r	1, 2	rs
Oustalet's Tyrannulet <i>Phylloscartes oustaleti</i>	r	p, 1, 2	rs
São Paulo Tyrannulet <i>Phylloscartes paulistus</i>	f	p, 1, 2	rs
Eared Pygmy-tyrant <i>Myiornis auricularis</i>	u	t, 1, 2	rs
Eye-ringed Tody-tyrant <i>Hemitriccus orbitatus</i>	r	p	rs
Grey-headed Tody-flycatcher <i>Todirostrum poliocephalum</i>	u	1, 2	rs
Yellow-olive Flycatcher <i>Tolmomyias sulphurescens</i>	f	p, 1, 2	rs
White-throated Spadebill <i>Platyrinchus mystaceus</i>	f	p, 1, 2	rs
Russet-winged Spadebill <i>Platyrinchus leucoryphus</i>	r	p	rs
Sulphur-rumped Flycatcher <i>Myiobius barbatus</i>	r	p	rs
Bran-coloured Flycatcher <i>Myiophobus fasciatus</i>	r	n, w	rs

Appendix cont.

Families and species	A	H	S
Euler's Flycatcher			
<i>Lathotriccus euleri</i>	f	p, 1	sm
Fuscous Flycatcher			
<i>Cnemotriccus fuscatus</i>	u	p, 1	sm
Long-tailed Tyrant			
<i>Colonia colonus</i>	x	p, 1, 2	?
Cattle Tyrant			
<i>Machetornis rixosus</i>	u	n	rs
Shear-tailed Grey-tyrant			
<i>Muscipipra vetula</i>	x	2	v
Grey-hooded Attila			
<i>Attila rufus</i>	f	p, 1, 2	rs
Rufous-tailed Attila			
<i>Attila phoenicurus</i>	r	p	sm
Syristes			
<i>Syristes sibilator</i>	u	p, 1, 2	rs
Short-crested Flycatcher			
<i>Myiarchus ferox</i>	r	2, n	rs
Great Kiskadee			
<i>Pitangus sulphuratus</i>	c	2, n	rs
Boat-billed Flycatcher			
<i>Megarynchus pitangua</i>	f	2, n	rs
Vermilion-crowned Flycatcher			
<i>Myiozetetes similis</i>	u	2	rs
Three-striped Flycatcher			
<i>Conopias trivirgata</i>	u	t, 1, 2	rs
Streaked Flycatcher			
<i>Myiodynastes maculatus</i>	f	p, 1, n	sm
Piratic Flycatcher			
<i>Legatus leucophaeus</i>	u	1, 2	sm
Variegated Flycatcher			
<i>Empidonomus varius</i>	f	2, n	sm
Fork-tailed Tyrant			
<i>Tyrannus savana</i>	x	n	v
Tropical Kingbird			
<i>Tyrannus melancholicus</i>	f	2, n	rs
Chestnut-crowned Becard			
<i>Pachyramphus castaneus</i>	r	1, 2	rs
White-winged Becard			
<i>Pachyramphus polychopterus</i>	r	1, 2	sm
Black-capped Becard			
<i>Pachyramphus marginatus</i>	u	p, 1, 2	rs
Crested Becard			
<i>Pachyramphus validus</i>	f	1, 2	sm
Black-tailed Tityra			
<i>Tityra cayana</i>	x	1, 2	sm
Black-crowned Tityra			
<i>Tityra inquisitor</i>	u	p, 1, 2	sm
PIPRIDAE			
Swallow-tailed Manakin			
<i>Chiroxiphia caudata</i>	c	p, 1, 2	rs
Pin-tailed Manakin			
<i>Ilicura militaris</i>	r	p, 1	rs

Appendix cont.

Families and species	A	H	S
White-bearded Manakin			
<i>Manacus manacus</i>	x	2	v?
Greenish Manakin			
<i>Schiffornis virescens</i>	u	p, 1, 2	rs
COTINGIDAE			
Swallow-tailed Cotinga			
<i>Phibalura flavirostris</i>	x	1	v
Hooded Berryeater			
<i>Carpornis cucullatus</i>	r	p, 1	rs
Black-headed Berryeater			
<i>Carpornis melanocephalus</i>	c	p, 1	rs
Cinnamon-vented Piha			
<i>Lipaugus lanioides</i>	r	p, 1, 2	rs
Red-ruffed Fruitcrow			
<i>Pyroderus scutatus</i>	r	p	wm
Bare-throated Bellbird			
<i>Procnias nudicollis</i>	f	p, 1	rs
Sharpbill			
<i>Oxyruncus cristatus</i>	r	p, 1	rs
HIRUNDINIDAE			
Grey-breasted Martin			
<i>Progne chalybea</i>	r	2, n	sm
Blue-and-white Swallow			
<i>Notiochelidon cyanoleuca</i>	f	2, n	rs
Rough-winged Swallow			
<i>Stelgidopteryx ruficollis</i>	f	2, n	sm
CORVIDAE			
Azure Jay			
<i>Cyanocorax caeruleus</i>	r	1, 2	rs
TROGLODYTIDAE			
House Wren			
<i>Troglodytes aedon</i>	f	n	rs
MUSCICAPIDAE			
Long-billed Gnatwren			
<i>Ramphocaenus melanurus</i>	x	1	v
TURDIDAE			
Yellow-legged Thrush			
<i>Platycichla flavipes</i>	f	p, 1, 2	wm
Slaty Thrush			
<i>Turdus nigriceps</i>	x	2	v
Rufous-bellied Thrush			
<i>Turdus rufiventris</i>	c	2, n	rs
Pale-breasted Thrush			
<i>Turdus leucomelas</i>	x	2	v
Creamy-bellied Thrush			
<i>Turdus amaurochalinus</i>	x	1, 2, n	v
White-necked Thrush			
<i>Turdus albicollis</i>	c	p, 1, 2	rs

Appendix cont.

Families and species	A	H	S
VIREONIDAE			
Rufous-browed Peppershrike			
<i>Cyclarhis gujanensis</i>	x	p, 1	rs
Red-eyed Vireo			
<i>Vireo olivaceus</i>	u	1, 2	sm
PARULIDAE			
Tropical Parula			
<i>Parula pitiayumi</i>	x	2	v
Masked Yellowthroat			
<i>Geothlypis aequinoctialis</i>	u	n	rs
Golden-crowned Warbler			
<i>Basileuterus culicivorus</i>	f	1, 2	rs
River Warbler			
<i>Basileuterus rivularis</i>	c	fs, 2	rs
COEREBIDAE			
Bananaquit			
<i>Coereba flaveola</i>	c	1, 2	rs
THRAUPIDAE			
Brown Tanager			
<i>Orcheisticus abeillei</i>	x	2	v
Magpie Tanager			
<i>Cissops leveriana</i>	r	2	rs
Rufous-headed Tanager			
<i>Hemithraupis ruficapilla</i>	f	p, 1, 2	rs
Olive-green Tanager			
<i>Orthogonys chloricterus</i>	u	p, 1	rs
Flame-crested Tanager			
<i>Tachyphonus cristatus</i>	u	t, 1, 2	rs
Ruby-crowned Tanager			
<i>Tachyphonus coronatus</i>	u	1, 2	rs
Black-goggled Tanager			
<i>Trichothraupis melanops</i>	r	p, 1	rs
Red-crowned Ant-tanager			
<i>Habia rubica</i>	f	p, 1	rs
Brazilian Tanager			
<i>Ramphocelus bresilius</i>	r	n	rs
Azure-shouldered Tanager			
<i>Thraupis cyanoptera</i>	f	p, 1, 2	rs
Golden-chevroned Tanager			
<i>Thraupis ornata</i>	x	2	v
Palm Tanager			
<i>Thraupis palmarum</i>	f	2	rs
Fawn-breasted Tanager			
<i>Pipraeidea melanonota</i>	x	2	v
Violaceous Euphonia			
<i>Euphonia violacea</i>	c	p, 1, 2	rs
Chestnut-bellied Euphonia			
<i>Euphonia pectoralis</i>	c	p, 1, 2	rs
Green-headed Tanager			
<i>Tangara seledon</i>	c	p, 1, 2	rs

Appendix cont.

Families and species	A	H	S
Red-necked Tanager			
<i>Tangara cyanocephala</i>	f	p, 1, 2	rs
Chestnut-backed Tanager			
<i>Tangara peruviana</i>	x	p	v
Blue Dacnis			
<i>Dacnis cayana</i>	r	1, 2	rs?
Green Honeycreeper			
<i>Chlorophanes spiza</i>	u	p, 1	rs
Swallow-tanager			
<i>Tersina viridis</i>	u	2, n	sm
EMBERIZIDAE			
Rufous-collared Sparrow			
<i>Zonotrichia capensis</i>	f	n	rs
Blue-black Grassquit			
<i>Volatinia jacarina</i>	f	n	sm
Lined Seedeater			
<i>Sporophila lineola</i>	f	n	sm
Double-collared Seedeater			
<i>Sporophila caerulescens</i>	f	n	sm
Sooty Grassquit			
<i>Tiaris fuliginosa</i>	x	2	v
Pectoral Sparrow			
<i>Arremon taciturnus</i>	x	2	v
CARDINALIDAE			
Black-throated Grosbeak			
<i>Pitylus fuliginosus</i>	f	p, 1, 2	rs
Green-winged Saltator			
<i>Saltator similis</i>	r	2, 1	rs
ICTERIDAE			
Red-rumped Caciue			
<i>Cacicus haemorrhous</i>	f	p, 1, 2	rs
Shiny Cowbird			
<i>Molothrus bonariensis</i>	x	n	v?

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