

# The status and conservation of the endemic bird species of São Tomé and Príncipe, West Africa

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## Summary

Fieldwork on the distribution, status and ecology of the endemic bird species of São Tomé and Príncipe was conducted from June to September 1990. The results are here combined with other evidence, notably from recent ICBP-backed fieldwork. Findings largely support existing Red Data Book listings, although *Oriolus crassirostris* is now found only in remote undisturbed areas at low density, and deserves "Rare" status. Particular achievements of the 1990 fieldwork were the first observations since the 1920s of *Bostrychia bocagei*, *Lanius newtoni* and *Amaurocichla bocagii*, the first two being very rare (one seen of each) and the last patchily common (along streams), records of all three being from either Rio Xufexufe or Rio Ana Chaves or both. Primary forest, mature secondary forest and shade forest are all important to the security of the full avifauna of both islands.

Trabalho de campo sobre a distribuição, situação e ecologia das espécies endêmicas de aves de São Tomé e Príncipe foi conduzido de junho até setembro de 1990. Os resultados estão aqui combinados com outras evidências, notavelmente de trabalho de campo recente endossado pelo ICBP. Os resultados suportam principalmente as listas correntes do Livro Vermelho, apesar do *Oriolus crassirostris* só ser encontrado em áreas remotas e inalteradas numa densidade baixa, e por isso merece a categoria "Raro". As realizações de maior destaque do trabalho de campo em 1990 foram as primeiras observações depois dos 1920s de *Bostrychia bocagei*, *Lanius newtoni* e *Amaurocichla bocagii*, os primeiros dois sendo muito raros (só um indivíduo de cada tendo sido visto) e o último comum em certos lugares (ao longo dos córregos), registros de todos os três vindos ou do Rio Xufexufe ou do Rio Ana Chaves ou de ambos. Obó, capoeira alta e cafezais são todos importantes à segurança da avifauna completa de ambos ilhéus.

## Introduction

The two islands that form the Democratic Republic of São Tomé and Príncipe lie 255 km and 220 km respectively off the west coast of Gabon (Figures 1 and 2). These two volcanic islands in the Gulf of Guinea have never been connected to the African mainland nor to each other and, as a result, each support a rich endemic fauna and flora. Among birds, five monospecific genera and 26 endemic species are found on the two islands. These include 20 single-island endemics, 14 on São Tomé and six on Príncipe, with a further six being found on both islands. Seven of these species were fully documented as threatened by Collar and Stuart (1985). At that time four of these threatened birds, the Dwarf Olive Ibis *Bostrychia bocagei*, São Tomé Fiscal Shrike *Lanius newtoni*, São Tomé

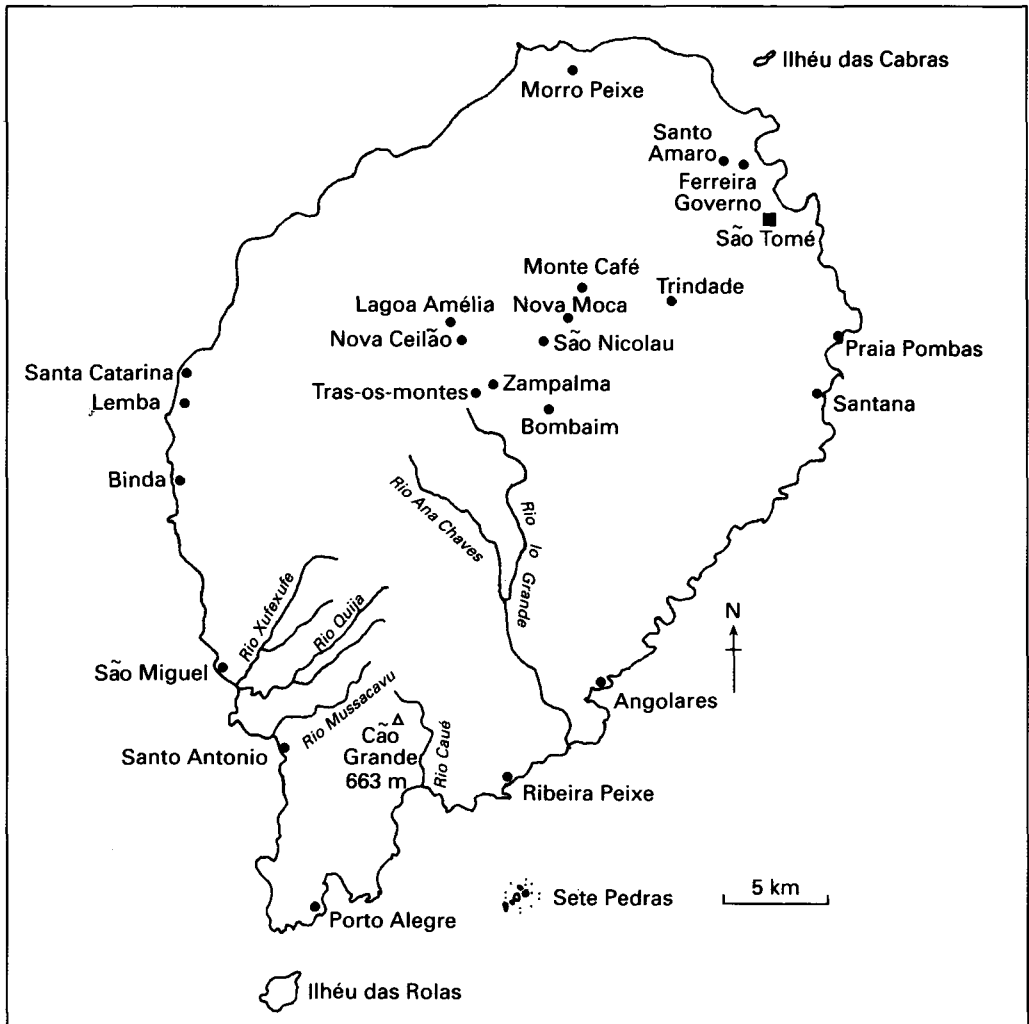


Figure 1. São Tomé.

Short-tail *Amaurocichla bocagii* and São Tomé Grosbeak *Neospiza concolor*, had not been seen for over 50 years and there was some doubt as to their continued survival. Given the uniqueness and value of their avifauna it is surprising that very few ornithologists have ever visited the islands. In 1988, the ICBP inventory of key forests ranked the rainforests of central and south-western São Tomé second out of a list of 75, highlighting their conservation importance still further (Collar and Stuart 1988).

The information available to Collar and Stuart (1985) was out of date and so their accounts contained very little on the present distribution and abundance of the endemic birds. Since 1987, however, there has been a series of ICBP projects to investigate these species (Burlison and Jones 1988, Jones and Tye 1988) and to

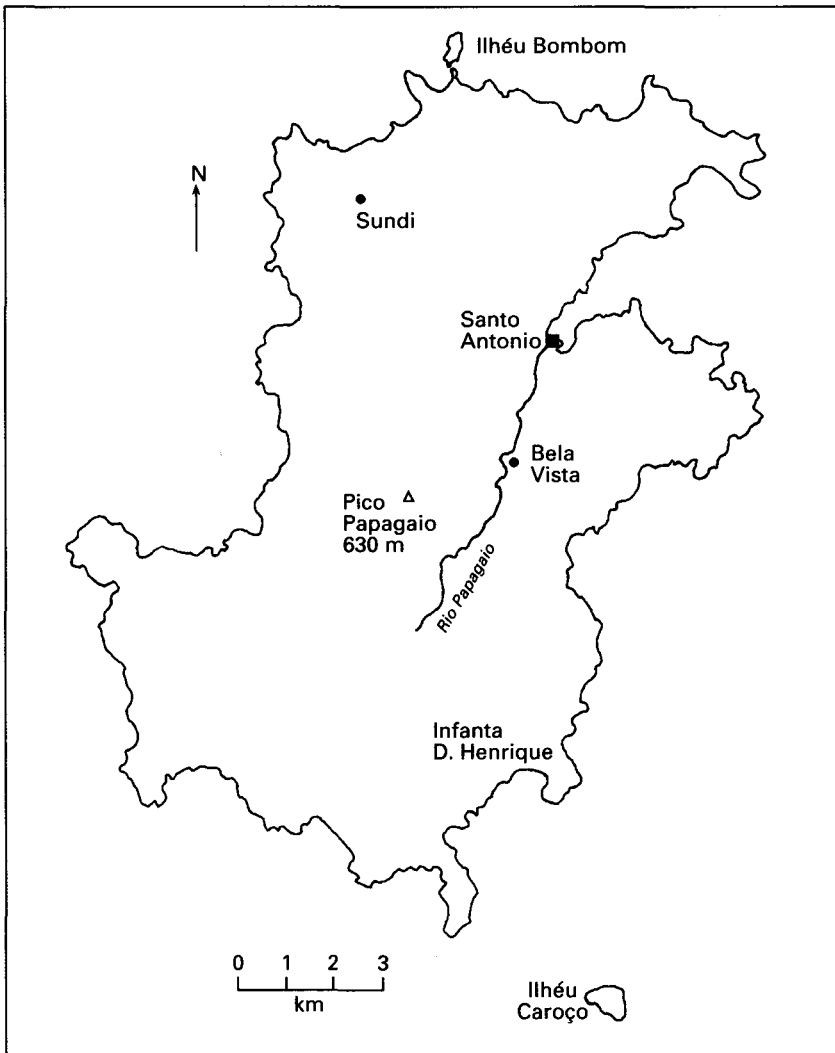


Figure 2. Príncipe.

start a conservation education programme with EEC support (Harrison and Steele 1989). This involvement in the islands continued with a University of East Anglia–ICBP expedition in 1990. This expedition spent 13 weeks on the island from June to September, surveyed the lowland rainforest in the central and south-western areas which was last visited by an ornithologist in 1928–1929, and also studied the conservation importance of other habitat types including areas of montane forest, secondary forest, savanna and shade forest (Atkinson *et al.* 1990, in prep.). The ibis, fiscal shrike and short-tail were rediscovered by this expedition and this paper aims to bring together all the recent information regarding the present status and conservation of the endemic bird species.

## Background information

The islands were a Portuguese colony until 1975 when they were granted independence. The islands' economy depended on the export of cocoa and in the first part of this century São Tomé was the largest cocoa exporter in the world. As a result the islands' original vegetation, lowland and montane rainforest, was extensively cleared and by the 1940s virtually all the accessible forest had disappeared.

Many plantations were abandoned at independence in 1975, and the destruction of primary rainforest on the island has declined dramatically except at several key sites in the north-central area of the island. At present the abandoned plantations have regenerated into secondary forest and this forest is therefore probably in its best condition since the late 1800s. The last surviving area of lowland primary rainforest is in the inaccessible central region of the island and the upper half of the catchments of the Rio Xufexufe and Rios Io Grande and Ana Chaves. Montane rainforest (800–1,400 m) remains in the mountainous interior and also forms the northern boundary of the main primary forest block, and it is in this latter area that the forest is most threatened by agricultural development.

The most recent estimates of the extent of primary forest comes from a report by the Bureau pour le Developpement de la Production Agricole (BDPA 1985). Most of the primary rainforest is in mountainous areas which are unsuitable for cultivation. BDPA (1985) and Interforest AB (1990) recommend that 245 km<sup>2</sup> on São Tomé and 45 km<sup>2</sup> on Príncipe be specifically protected as "Zonas Ecológicas". However, demand for wood comes from a number of sources, sawn wood for construction and firewood for industrial and domestic use. If not carefully managed the demand for wood would threaten many areas of forest on São Tomé. Until recently the exploitation has been haphazard and there was no unified forestry plan. However, through the setting up of the Comissão de Coordenação de Florestas (CCF) forest development will now be done to plan. At present the plantations in the vicinity of Milagrossa are being cleared and wood stockpiled in the city. All this wood is being extracted under licence (P. Spring pers. comm. 1991). One of the first tasks of the CCF was to commission a forest inventory, which was produced in 1990. Reassuringly this report recommended that the central and south-western areas of rainforest in São Tomé be protected (Interforest AB 1990).

Like São Tomé, Príncipe was once almost entirely covered by rainforest, but this was largely destroyed to make way for cash-crop plantations and during a campaign to eradicate sleeping sickness (Jones and Tye 1988). Exell (1944, 1956) found primary rainforest on only the steepest slopes of the south-west and montane-type forest close to the summit of the Pico do Príncipe (948 m).

## History of ornithological studies

The earliest records of São Tomé's endemics come from collectors, foremost amongst whom were Francisco Newton and José Correia, although Boyd Alexander also made a valuable contribution (Bannerman 1914a,b). Newton collected all the endemics in the 1880s and 1890s and he provided the only record of São

Tomé Grosbeak (see, e.g., Bocage 1891). Correia visited the islands in 1928–1929 collecting for the American Museum of Natural History (Amadon 1953). Of the four very rare endemics he obtained specimens of the Dwarf Olive Ibis, São Tomé Fiscal Shrike, and São Tomé Short-tail, but did not find the São Tomé Grosbeak although he was aware that it existed (Correia 1928–1929). These are the last records of these three great rarities until 1990 when they were rediscovered by the UEA/ICBP expedition (Atkinson *et al.* 1991), although the continued existence of the ibis had been indicated two years earlier in local reports to Burlison and Jones (1988).

After Correia the next major ornithological survey did not occur until 1949, when an Oxford University team spent a month on the islands, recording most of the commoner endemics and also the Giant Sunbird *Dreptes thomensis* (Snow 1950). René de Naurois made numerous visits to São Tomé between 1970 and 1973 and produced a long series of papers on many of the endemic species. São Tomé then became a focus of attention for ICBP with visits being made to the island, 1987–1989, by Jones and Tye (1988), Burlison and Jones (1988), and Harrison and Steele (1989). However, owing to the problems of time, weather and access, none of these visits allowed for time to be spent investigating the forests of central and south-western São Tomé, which thus became the target of our own project.

The history of ornithological work on Príncipe again began with collectors. Dohrn (1866) and Keulemans (1866) redescribed all previously discovered endemics and named Dohrn's Thrush-babbler *Horizorhinus dohrnii*. L. Fea in 1901 collected a specimen of the rare endemic subspecies of the Olive Ibis *Bostrychia olivacea rothschildi* which has not been seen since (Jones and Tye 1988). Correia, Snow and de Naurois all visited the island and found all the endemics to be common.

Unlike São Tomé, the avifauna of Príncipe is still relatively unknown. Jones and Tye (1988) and Harrison and Steele (1989) each spent five days on Príncipe and the UEA/ICBP expedition four days. The endemic species were found to be common in forest regrowth and plantations, but none of the groups gained access to primary forest. The southern and western areas of Príncipe are mountainous and covered with primary rainforest. These areas have never been explored adequately because of problems with access, and so much of what is known about the status of the endemics comes from plantations and forest regrowth in the northern and eastern parts of Príncipe.

The following section reviews the current status of the endemic birds of São Tomé and Príncipe. These species accounts are based mainly on visits since 1985 though earlier works have been referred to if it was felt necessary. Brief ecological notes published recently have been included.

## Species accounts

### *Dwarf Olive Ibis* *Bostrychia bocagei*

*Distribution* Endemic to São Tomé, and treated as a threatened species (category "Indeterminate") by Collar and Stuart (1985). Discovered by Newton in 1888, he collected probably nine specimens mainly in the south of the island

(Collar and Stuart 1985) though one record from Triumpho in the north-east is surprising. The only other record of this species comes from Correia who collected a female in primary forest around Roça Jou (Correia 1928–1929). All records come from lowland primary rainforest despite extensive searching in high-altitude areas by Correia (1928–1929), de Naurois (1983), Jones and Tye (1988), Harrison and Steele (1989) and ourselves. There are several recent reports of this species. Hunters in Santo Antonio and São Miguel know this species and have seen it in the Roça Jou area (Jones and Tye 1988). In 1989 there was a report of three birds being seen on lava beds on the Rio Io Grande (B. Schätti *in litt.* to N. J. Collar, J. Haft *in litt.* to PWA) but this record has not yet been published. The only confirmed recent record is ours, of one individual seen in primary forest along the Rio Ana Chaves on 17 August 1990 (Atkinson *et al.* 1990).

**Population** Not known. Now evidently an exceedingly rare inhabitant of lowland primary rainforest.

**Ecology** Previous records of this species record only that it inhabits primary rainforest. The individual seen in 1990 was flushed from a small forest stream on the steep valley side of the Rio Ana Chaves. It perched on a branch 15 m off the ground and allowed close approach. It did not call.

**Threats** Destruction of lowland primary forest is the main threat to this species. At present there is little danger of this happening owing to the inaccessibility of these areas.

#### *São Tomé Green Pigeon* *Treron sanctithomae*

**Distribution** Endemic to São Tomé. Formerly found on Ilhéu das Rolas but now extinct there (Bocage 1903), as we were able to confirm. On São Tomé frequent to common in both primary and secondary forest (Jones and Tye 1988, pers. obs.). Occurs to at least 1,600 m at Lagoa Amélia (Figure 3).

**Population** Considered “abundant” in February at Calvário by Harrison and Steele (1989), and 10 birds were seen at Lagoa Amélia by Sargeant and Alexander-Marrack (1990). In 1990 we found this species common in forested habitats. De Naurois (1983) considered it to be commonest between 300 and 1,400 m.

**Ecology** This species is usually found high up in the canopy (Jones and Tye 1988, Harrison and Steele 1989, pers. obs.). Food includes fruits from banana, *Musanga* and *Ficus* (Correia 1928–1929, Jones and Tye 1988). The breeding season extends from the end of November to April–May (de Naurois 1983).

**Threats** This pigeon is a favoured quarry species, and we found it the most commonly shot pigeon at the present time. Hunting pressures do not, however, seem to be affecting the population greatly but any intensification would give cause for concern.





Figure 3. The crater at Lagoa Amélia with surrounding primary forest. (Photo P. W. Atkinson)

*São Tomé Bronze-naped Pigeon* *Columba malherbii*

**Distribution** Endemic to São Tomé, Príncipe and the small Gulf of Guinea island Pagalu, which belongs to Equatorial Guinea (although for the purposes of this paper the species is regarded as endemic to São Tomé and Príncipe). On São Tomé found in all forest areas and in forest scrub in the northern savannas (Jones and Tye 1988, pers. obs.). Now extinct on Ilhéu das Rolas. On Príncipe recent surveys have found it in plantations and forest regrowth (Jones and Tye 1988, pers. obs.).

**Population** On São Tomé frequent to common in forest habitats. These include Lagoa Amélia, Monte Café, Ribeira Peixe, São Miguel, Santo Amaro and plantations in the south-east. At Morro Peixe we found it very common in forest scrub. On Príncipe frequent to common in plantations in the north of the island. The present distribution in the south of the island is unknown but it was recorded from the higher areas by Keulemans (1866).

**Ecology** This species inhabits dense undergrowth and forages on the ground (Günther and Feiler 1985, Eccles 1988, pers. obs.) and in groups of up to 24 birds high up in trees (Jones and Tye 1988). Breeds between October and February (Jones and Tye in prep.).

**Threats** We saw this species being hunted for food in the south-west of São Tomé. At present it is common and hunting levels are not considered to threaten this species.

*Maroon Pigeon* *Columba thomensis*

**Distribution** Endemic to São Tomé and the largest pigeon in West Africa, treated as threatened (category "Vulnerable") by Collar and Stuart (1985). Formerly found on the Ilhéu das Rolas but now extinct there (Bannerman 1931). Most records come from primary forest at mid- to high-altitude areas where this species is common (e.g. de Naurois 1983, 1988, Jones and Tye 1988, Harrison and Steele 1989). There were no recent lowland records until de Naurois (1988) reported seeing immature birds at the Rio Caué and São Miguel in the 1970s.

We found the Maroon Pigeon to be commonest at high altitudes (1,600 m) especially in the Lagoa Amélia–Calvário area where up to 15 birds were seen in a day. There are also records from cultivated areas near Lagoa Amélia (Alexander-Marrack 1990, pers. obs.) and from forest regrowth near Nova Moca (Sargeant and Alexander-Marrack 1990). In lowland areas we recorded them from both the south-west and south-east of the island; two birds were seen in bamboo forest between the Rio Quija and the Rio Xufexufe (5 m), two birds along the Rio Xufexufe and four single birds along the Rio Ana Chaves (300 m).

**Population** Although common at high altitudes the main population of this species is restricted to a very small area of mid- to high-altitude primary forest. It is doubtful that the lowland areas are capable of supporting a viable population of this pigeon, as the habitat is unsuitable or too fragmented. Most records are of immature birds (de Naurois 1988), and their presence is probably a result of post-juvenile dispersal.

**Ecology** Very little is known about the ecology of this pigeon. Snow (1950) recorded berries of *Schlefflera manni* in the crops of four specimens. Jones and Tye (in prep.) report that the diet includes other fruit from *Cinnamomum zeylanicum*, *Trema guineense* and *Alchornea* sp. Flocks form in fruiting trees in May (Harrison and Steele 1989).

**Threats** The Maroon Pigeon is a favoured quarry species. At Santo Antonio hunters reported killing this species whenever they could find it, but this was rarely. Snow (1950) reported it still common in 1949 despite substantial hunting pressure. De Naurois (1983) considered that it had become rare by 1973 due to hunting, but we found that it is still hunted in the Lagoa Amélia area by the inhabitants of a nearby roça (plantation), who have been granted permission to catch this species. However, at present, these hunting pressures are not endangering this bird, although any intensification would give great cause for concern, especially as this species is so restricted in its distribution on the island.

*São Tomé Scops Owl* *Otus hartlaubi*

**Distribution** Endemic to São Tomé, and treated as a threatened species (category "Rare") by Collar and Stuart (1985). There have been reports of a small unidentified owl from the airport on Príncipe which could be this species (de Naurois 1975a). In São Tomé widespread but never common. We recorded 29 birds in most habitats with tall trees including high- and low-altitude primary



and secondary forest, but not shade forest. Other recent records confirm this pattern with birds being seen or heard at Calvário and Lagoa Amélia (Harrison and Steele 1989), Bom Succeso (Burlison and Jones 1988) and Lagoa Amélia (Alexander-Marrack 1990). Calls heard at Ribeira Peixe could have been this species (Jones and Tye 1988).

On Príncipe despite extensive searching at night in the region of the airport and Bombom and in habitat similar to that found in São Tomé we heard no birds calling.

*Population* We conducted surveys at night to determine the number of birds calling in three particular habitats and areas: montane rainforest at Lagoa Amélia, lowland secondary forest along the Rio Quija, and lowland primary forest along the Rios Xufexufe and Ana Chaves. The number of birds calling in each habitat was similar and the average number calling at each site was 2.6. Similar surveys in working plantations and other disturbed habitats found no birds, although Jones and Tye (1988) report a call which was probably this species at Ribeira Peixe, a working oil palm plantation. The guide used by Harrison and Steele (1989) remarked that he only rarely sees this species and then only as a pair and away from disturbance. It is not known if both sexes call and how far the call travels, so a population estimate is not possible.

*Ecology* Analysis of stomach contents revealed that the diet includes grasshoppers, beetles, adult Lepidoptera and probably small lizards (de Naurois 1975a). We found that it calls frequently from one hour before dusk to one hour after dawn and occasionally during the day. Alexander-Marrack (1990) recorded two birds countersinging at Lagoa Amélia. These two individuals were singing from trees at heights of 20 m and 3 m respectively. The only bird we saw was at 4 m.

*Threats* Not immediately threatened but a species which is sensitive to disturbance (de Naurois 1975a). Clearance of undisturbed forest habitat will be a threat to this owl.

#### *São Tomé Spinetail* *Chaetura thomensis*

*Distribution* Endemic to São Tomé and Príncipe. On São Tomé recorded in all habitats (including savanna) and at all altitudes. Commonest at moderate altitudes (800–1,200 m) in the north-centre of the island and lower down in the west near Binda and at sea level at Santo Antonio. On Príncipe found over plantations and forest regrowth.

*Population* This species is common on both islands.

*Ecology* Exploits a niche similar to the other species of swift found on the island. Feeds in groups of up to 30 birds but usually in pairs either close to the ground or high above the canopy of the forest. We recorded it feeding with Little Swift *Apus affinis* on several occasions.

*Threats* None known.

*São Tomé Fiscal Shrike* *Lanius newtoni* (Figure 4)

*Distribution* Endemic to São Tomé, and treated as a threatened species (category “Indeterminate”) by Collar and Stuart (1985). There have only ever been 20 records of this bird. It was originally discovered by Newton in 1888 when he collected six specimens, one from São Miguel, three from the Rio Quija, one locality known as “Zungui” and one unknown locality (Bocage 1891, 1903, Collar and Stuart 1985). This species was not seen for a further four decades until Correia collected 13 birds (Correia 1928–1929). He shot 12 birds in primary forest in the Roça Jou and Rio Quija area and one in the hills above the Rio Io Grande. After 1928 there were no other sightings – Günther and Feiler (1985) regarded it as extinct – until we discovered and trapped one bird in primary forest on 29 July 1990 along a tributary near the source of the Rio Xufexufe. Hunters at Santo Antonio and Santa Catarina were questioned and it was found that they did not know this species.

*Population* Not known. Correia’s (1928–1929) testimony is that it was “not very common” in forest along the Rio Quija in the late 1920s. These areas were surveyed by the UEA/ICBP expedition, but despite extensive searching it was not found. It must now be considered a very rare primary forest species.

*Ecology* No previous information is available on the ecology of this species other than it dwelt in the “obó” (primary forest) (Correia 1928–1929). Our surveys suggest that it must be restricted to undisturbed lowland primary rain-



Figure 4. São Tomé Fiscal Shrike *Lanius newtoni*. Adult female, Rio Xufexufe, São Tomé, July 1990. (Photo P. W. Atkinson)

forest. It was considered to be probably a mid- to low-storey species, often skulking in low bushes, making it a difficult species to see. The one individual observed foraged on the rocks of the stream, hopping between boulders searching for food items. The prey was not determined but it was once seen to try and catch a passing flying insect. The bird was heard to emit a low squawk on several occasions and made a scolding churring sound while being handled.

**Threats** The causes of this bird's rarity remain unknown; the actual population must be extremely small owing to the restricted amount of habitat remaining. Any clearance of lowland primary forest would seriously threaten this species.

*São Tomé Thrush* *Turdus olivaceofuscus*

**Distribution** Endemic to São Tomé and Príncipe, and treated as near-threatened by Collar and Stuart (1985). The Príncipe race *xanthorhynchus* has been considered extinct but R. de Naurois (*in litt.* 1991) believes that it still lives in the forested south and west of the island. The São Tomé race *olivaceofuscus* is found in all forested habitats, including patches of dry woodland in the savanna.

**Population** This species is found in all forested habitats though our surveys showed that lowland primary forest and lowland shade forest are its most important habitat. Although widespread, it occurs at low densities and the actual population size must be fairly small.

**Ecology** Occupies a typical thrush niche. Forages on ground in leaf-litter, and stomach contents have included beetles, snails, a worm and fruit pulp (de Naurois 1984c). Breeding commences at the end of July and finishes in January with a peak in October to December; the nest is usually found between 0.5 and 3 m off the ground but heights of 10–12 m have been recorded (de Naurois 1984c).

**Threats** We noted that the removal of shade trees from cocoa plantations will cause the species to disappear from this habitat.

*Dohrn's Thrush-babbler* *Horizorhinus dohrni* (Figure 5)

**Distribution** Endemic to Príncipe. Recent visits show it to be fairly widespread in cocoa plantations and forest regrowth (Jones and Tye 1988, pers. obs.).

**Population** Abundant in cocoa plantations and forest regrowth (Jones and Tye 1988, pers. obs.).

**Ecology** Mainly found in the understorey of bushes, in the bases of the crowns of taller trees, and also low among lianas where it is very secretive (Jones and Tye 1988). Food includes invertebrates but also berries and seeds. Jones and Tye (1988) remark that most individuals had a yellow wash on the undersides.

**Threats** We believe that any increase in pesticide use will cause this species to disappear from those areas in which it is applied.



Figure 5. Dohrn's Thrush-babbler *Horizorhinus dohrnii*. Bombom, Príncipe, September 1990. (Photo P. W. Atkinson)

*São Tomé Prinia* *Prinia molleri*

*Distribution* Endemic to São Tomé. Found in all habitats and at all altitudes.

*Population* Extremely common in all disturbed and edge habitats such as savanna, plantations, farmland and gardens. Found at all altitudes from sea level to the top of the Pico (Snow 1950). In forested areas "frequent to common" (de Naurois 1984b, Jones and Tye 1988) though we found it rare and locally distributed in the primary forest along the Rio Xufexufe and Rio Ana Chaves.

*Ecology* The species is found low in the undergrowth where it takes its food from the underside of leaves or from the ground, stomach contents including beetles, caterpillars and vegetable matter (de Naurois 1984b). An extremely vocal bird, it uses conspicuous perches and is found in groups of up to 17 birds though usually in groups of 5–6 individuals (pers. obs.). We witnessed the communal display of up to 13 birds at Santo Amaro in August. De Naurois (1984b) reviews the breeding data and describes the nest and eggs. Breeding commences at the end of July and ends in early January.

*Threats* None known. This species is widespread and has readily adapted to make use of man-made habitats.

*São Tomé Short-tail* *Amaurocichla bocagii* (Figure 6)

*Distribution* Endemic to São Tomé, and treated as a threatened species (category "Indeterminate") by Collar and Stuart (1985). Prior to the UEA/ICBP expedition there had only been six records. F. Newton discovered this species,



Figure 6. São Tomé Short-tail *Amaurocichla bocagii*. Rio Xufexufe, São Tomé, July 1990. (Photo P. W. Atkinson)

collecting three males between 1890 and 1891 in forest at São Miguel, Juliana de Sousa and Binda (Bocage 1903, de Naurois 1982). The only other records are of three birds collected from the Rio Quija (Correia 1928–1929). Günther and Feiler (1985) judged it extinct. In 1987 one individual was reported from the Rio Caué (Eccles 1988).

Our expedition discovered two populations along the Rios Xufexufe and Ana Chaves. This species is very vocal and is restricted to riverine habitats (see Ecology below). After studying the 1987 report in light of these discoveries and checking the site where Eccles (1988) saw the bird, we feel that the record is inconclusive. The description does not rule out the São Tomé Seedeater and the call described better fits this species than the Short-tail. The behaviour is also out of character for what we observed in this species: we never recorded it flying more than 3 m above the ground and when one did take wing it was a very weak flight and not at all fast, quite unlike the fast and direct flight described by Eccles (1988). Moreover, the habitat at the Rio Caué is unlike habitat along the Rios



Xufexufe and Ana Chaves. It is surrounded by mangrove swamp and does not seem suitable for the Short-tail, based on our own findings. Eccles (1988) also omits mention of two of the most important and obvious features of the birds we saw and trapped, namely the long legs and the long bill.

No birds were found along the Rio Quija where this species was last certainly encountered (Correia 1928–1929), and disturbance in the intervening period may have been a factor in the possible extinction of this population.

*Population* We carried out transect surveys along rivers and tributaries. On the Rio Xufexufe 4.1–6.3 pairs per km of river were recorded and on the Rio Ana Chaves 5.6 pairs.

*Ecology* We found this species to be restricted to riparian habitats within primary forest. All the birds recorded were no more than 7–10 m away from either a river or a forest stream, and were usually seen in singles or pairs though one group of three was recorded. It seemed that each pair had a territory along a length of river. They are most active at dawn and dusk, which explains the unusually large eye, though were often seen feeding during the day. Despite reference to its elusive nature (Collar and Stuart 1985) in July–August the bird was easily located by listening for the call, a loud, high-pitched, forced ‘tsee’, usually delivered from a conspicuous boulder. Both sexes called. Males held territories along the river and sang during the night, this being a longer version of the call. A typical singing post is a branch about 3 m off the ground and only a few metres away from the river.

All records of this bird were from areas of running water with overhanging vegetation and moss-covered rocks. Birds were seen to feed on gravel beds to the side of the river (very much confirming the brief notes by Correia 1928–1929: see Collar and Stuart 1985), flicking aside gravel and fallen leaves to find insects. They also foraged on the moss covering boulders, probing and picking out prey items. The birds were reluctant to fly, and when they did it was only for a few metres before settling on the ground again. When alarmed they often ran in preference to flying.

*Threats* Disturbance and destruction of lowland primary forest are the main threats to this species. At present there is little danger of this happening due to the inaccessibility of these areas.

#### *São Tomé Paradise Flycatcher* *Terpsiphone atrochalybeia*

*Distribution* Endemic to São Tomé, and treated as near-threatened by Collar and Stuart (1985). Found in forest, forest edge and plantations. In savanna it can be found in patches of dry woodland, maize fields and grassy areas (de Naurois 1984a, Jones and Tye 1988, pers. obs.). Present at altitudes of at least 1,600 m in the Lagoa Amélia–Calvário area (Jones and Tye 1988, Harrison and Steele 1989, Sargeant and Alexander-Marrack 1990).

*Population* Common in all habitats with a forest structure. Our surveys showed this species to be commonest in shaded lowland cocoa plantations with a high



density of approximately 125 birds per km<sup>2</sup>. In plantations without shade trees this species was found to be absent. Primary and secondary forest held similar numbers of birds with a density of approximately one-third that of shade forest. However, we found it uncommon at high altitudes in the Lagoa Amélia area with only 1–2 birds being recorded per day.

*Ecology* Usually seen in singles or in small groups in the low- to mid-storey of the forest. Often seen flycatching from an exposed perch along the side of rivers, flying down and picking insects off the surface of the water (Burlison and Jones 1988, pers. obs.).

In plantations, shade trees are essential for this species to occur (pers. obs.). A decline in the early 1970s was attributed to extensive pesticide use in plantations (de Naurois 1984a) – it was this that led to the species being listed as near-threatened – but it has now recovered to its former levels (Jones and Tye 1988). Alexander-Marrack (1990) recorded fledglings in August and a female collecting small twigs.

*Threats* Not immediately threatened. A major part of the population is found in secondary forest and plantations. The demand for wood is such that secondary forest areas and shade forest in plantations are at present being felled. If this is extensively practised a large amount of available habitat will be lost for the flycatcher. Pesticide use, if on the scale used in the 1970s, will again cause the population in plantations to crash.

*Príncipe Sunbird* *Nectarinia hartlaubi*

*Distribution* Endemic to Príncipe. Occurs in primary and secondary forest, plantations (cocoa and coconut), cultivated areas and gardens (Jones and Tye 1988, pers. obs.).

*Population* Common to abundant in plantations and forest regrowth (Jones and Tye 1988). Uncommon in cultivation and gardens (pers. obs.).

*Ecology* Apparently breeds throughout the year (Keulemans 1866). Harrison and Steele (1989) report seeing a nesting pair in February. Diet includes small insects and banana nectar (Keulemans 1866, Snow 1950). Probes into the ends of broken twigs (Jones and Tye 1988).

*Threats* None known.

*São Tomé Sunbird* *Nectarinia newtoni*

*Distribution* Endemic to São Tomé. Inhabits forest, forest edge, plantations, gardens and areas of dry woodland in the savanna.

*Population* Abundant in high-altitude coffee plantations in the Monte Café area (Jones and Tye 1988). In July–August congregates in groups of up to 30 birds in flowering *Erythrina* trees (pers. obs.). Common in cocoa plantations, primary

forest, secondary forest and dry woodland. This species is not affected by the lack of shade trees in cocoa plantations (pers. obs.).

*Ecology* Inhabits the lower storey of the forest where it gleans insects from leaves (Jones and Tye 1988) but also feeds high in trees which are in flower (pers. obs.). Jones and Tye (1988) found it often associates with other species such as São Tomé Speirops and São Tomé White-eye though we did not witness this in June–September. Breeding data are scarce but nests with eggs have been recorded between October and April (Correia 1928–1929, Amadon 1953). We trapped several juveniles in July and other young birds have been recorded between June and April (Frade 1958, Günther and Feiler 1985, Eccles 1988, Jones and Tye 1988).

*Threats* None known.

*Giant Sunbird* *Dreptes thomensis* (Figure 7)

*Distribution* Monospecific genus endemic to São Tomé, treated as near-threatened by Collar and Stuart (1985) and, following Jones and Tye's (1988) failure to find it, elevated to threatened status by Collar and Andrew (1988). This is the largest West African sunbird and is restricted to primary forest although there have been rare sightings from cultivated areas. Burlison and Jones saw this



Figure 7. Giant Sunbird *Dreptes thomensis*. Lagoa Amélia, São Tomé, July 1990. (Photo N. B. Peet)

species at Lagoa Amélia in 1988, and in 1990 we found it to be common in mid- to high-altitude forest in the same area. One probable sighting in 1990 of two birds came from a cultivated area at Nova Ceilão, which is 1 km away from Lagoa Amélia and was probably a pair resident in the nearby primary forest.

In lowland forest we found this species common in primary forest and forest scrub along the Rios Xufexufe and Ana Chaves, but absent from mature undisturbed secondary forest surrounding the Rio Quija.

*Population* An excess of females was recorded in each of the three sites in the ratio of approximately 2:1, which suggests that males may be polygynous. At Lagoa Amélia five birds (one male and four females) were colour-ringed, and at least seven birds were observed feeding in an area of 0.25 ha. In lowland rainforest the distribution was extremely patchy. On the Rio Xufexufe transects along rivers produced similar densities to those encountered at Lagoa Amélia, while transects along streams with an increased density of shrubs and flowering plants indicated higher concentrations of birds exploiting the abundant food resource.

*Ecology* This species has expanded the usual sunbird niche and feeds in a variety of ways. We recorded several feeding methods. At Lagoa Amélia probing into flowers and gleaning from the underside of leaves was the commonest form of feeding. In lowland forest birds tended to be found either in the top of the canopy, creeping along branches probing into epiphytes and bark, or very low down feeding by probing into flowers or hover-gleaning from the underside of leaves.

Jones and Tye (in prep.) suggest that this species is apparently territorial but we recorded two males, both of which were apparently paired, in the same area at Lagoa Amélia. We heard males singing from the beginning of August.

*Threats* From our observations and those of Burlison and Jones (1988) it seems that any clearance of primary forest would seriously endanger this species. It is now absent from the Rio Quija where it was formerly found (Correia 1928–1929), even though these areas have been left undisturbed for a considerable length of time. It is probably most threatened in the area of Lagoa Amélia owing to encroaching cultivation which is now 500 m away from the crater itself.

We recommend that despite its local abundance this species retain its threatened status and be given the IUCN category "Rare".

### *São Tomé White-eye* *Zosterops ficedulinus*

*Distribution* Endemic to São Tomé and Príncipe with a separate subspecies on each, and treated as a threatened species (category "Indeterminate") by Collar and Stuart (1985). On São Tomé, *Z. f. feae* occurs in forest habitat including patches of dry woodland in the savanna (Jones and Tye 1988, Harrison and Steele 1989, pers. obs.). On Príncipe *Z. f. ficedulinus* was considered to inhabit forests of the hilly interior and to be less common in the lower areas (Dohrn 1866, Keulemans 1866, Bannerman 1914a). It has not been seen since being recorded by de Naurois in the 1970s (de Naurois 1983).

**Population** On São Tomé this species seems to have suffered a serious decline. Once common (Correia 1928–1929, Amadon 1953), it proved “not common” and restricted to forest habitats at mid- to high altitudes in the 1970s (de Naurois 1983); and while Jones and Tye (1988) found it to be “common to abundant” in areas of forest regrowth and plantations at Monte Café, Nova Moca, Bombaim and on the west coast near Binda, in 1990 we found it to be extremely rare: after three months’ survey work it had been recorded from only four sites, Lagoa Amélia, Bombaim, Santa Catarina and along the Rio Ana Chaves. We failed to find it at Nova Moca and Monte Café, although Alexander-Marrack (1990) reports seeing a flock at the former site and at Santa Catarina in August 1990. Sargeant and Alexander-Marrack (1990) recorded three groups of 4–6 birds in forest above Nova Moca and Lagoa Amélia. Harrison and Steele (1989) found it to be frequent to common in the northern savannas in January and February 1989; yet despite spending considerable time in the savanna during our visit, we were unable to locate the species there.

Jones and Tye (1988) considered that this species had “appeared to recovered to its former levels” but on recent evidence it is still uncommon and localized.

**Ecology** Found in groups of up to 20 birds and often associated with other species such as São Tomé Speirops, São Tomé Prinia, São Tomé Paradise Flycatcher and São Tomé Sunbird (Jones and Tye 1988, pers. obs.). Gleans insects from leaves. Breeding data are scarce but Harrison and Steele (1989) noted fledglings in February.

**Threats** The spatial and temporal patchiness of this species gives cause for concern. The major part of the population seems to be restricted to primary and secondary forest areas at mid- to high altitudes where it is not a common species. Such areas are at present the most threatened habitat and are being cleared for cultivation. This will have a serious impact on the population. Reasons for its continued scarcity in suitable habitat are unclear.

#### *Príncipe Speirops Speirops leucophaeus*

**Distribution** Endemic to Príncipe. Occurs in forest regrowth and plantations (Jones and Tye 1988, pers. obs.).

**Population** De Naurois (1983) described this species as abundant at all altitudes in the 1970s. Recent visits to Príncipe have found it frequent to common in forest regrowth and in cocoa plantations (Jones and Tye 1988, pers. obs.).

**Ecology** This species is usually found in groups of up to 15 birds, feeding on insects, spiders, berries, seeds and other vegetable matter. Breeds June to September (Keulemans 1866).

**Threats** Occasionally killed for food (Jones and Tye 1988), but this practice does not seem widespread and does not constitute a grave threat. However, Jones and Tye (1988) recommended the inclusion of the Príncipe Speirops in the next edition of the Red Data Book owing to its small, apparently reduced population

and vulnerability to plantation development and pesticide use; Collar and Andrew (1988) accepted this view.

#### *São Tomé Speirops Speirops lugubris*

**Distribution** Endemic to São Tomé. Found in all habitats with tall trees including dry forest in the savanna and at all altitudes (Snow 1950, Günther and Feiler 1985, Jones and Tye 1988, pers. obs.). Formerly found on Ilhéu das Rolas but now extinct there (Bocage 1903, pers. obs.).

**Population** De Naurois (1983) considered this species “very abundant” at all altitudes in the 1970s. Jones and Tye (1988) found it common to abundant in habitats with tall trees. Our surveys showed it to be commonest at high altitudes. Jones and Tye (1988) considered that it was perhaps commoner in the south of the island.

**Ecology** Forms parties with other species such as São Tomé White-eye, Giant Weaver, São Tomé Paradise Flycatcher, São Tomé Sunbird and São Tomé Oriole (Jones and Tye 1988, pers. obs.). The niche it inhabits is very similar to that of São Tomé White-eye (Jones and Tye 1988, pers. obs.). Analysis of one specimen’s stomach contents found vegetable matter, and it has been recorded feeding on small berries (Correia 1928–1929, Alexander-Marrack 1990, pers. obs.). We also saw it gleaning insects from leaves and one bird was seen carrying a caterpillar. It imitates other bird species’ calls, including São Tomé Seedeater, São Tomé Oriole and Emerald Cuckoo *Chrysococcyx cupreus* (Atkinson *et al.* in prep.). One bird was carrying nesting material in December 1989 (Sargeant and Alexander-Marrack 1990).

**Threats** None known.

#### *São Tomé Seedeater Polioispiza rufobrunnea*

**Distribution** Endemic to São Tomé, Príncipe and the Príncipe islet named Ilhéu Bonne Joquei with a subspecies on each (de Naurois 1975b). The Príncipe race, *P. r. rufobrunnea*, seems to have suffered a decline during the last 100 years. Keulemans (1866) described it as being very common in forest habitats on the west side of the island and as occurring in bushes on the west coast. Since then J. G. Correia collected several specimens (Amadon 1953) and Snow (1950) seems to have found it common, recording it from several habitats including coconut plantations and forest edge. De Naurois (1975b) visited the island several times and found it common in 1970 but uncommon in 1972–1973. Jones and Tye (1988) saw only one group of birds in the east of the island. We did not record this subspecies.

On São Tomé *P. r. thomensis* is found in all forested habitat where it is abundant at all altitudes (de Naurois 1983, Jones and Tye 1988, pers. obs.). Formerly found on Ilhéu das Rolas it is now extinct there (Bocage 1903, pers. obs.). *P. r. fradei*, from Ilhéu Bonne Joquei, occurs in oil palm forest and maybe elsewhere on the island (de Naurois 1975b).

**Population** On Príncipe now virtually extinct in accessible areas but probably still occurs on the west side of the island. On São Tomé it is widespread and abundant in forest habitats. On Ilhéu Bonne Joquei de Naurois (1975b) estimated a total for the island of 150–200 birds.

**Ecology** Usually found in singles or pairs though parties of up to 15 have been recorded (pers. obs.). Stomach contents include seeds and it has been observed to eat insects, *Musanga* and pawpaw *Carica papaya* fruit and leaves (de Naurois 1975b, Jones and Tye 1988, Burlison and Jones 1989). It also creeps up trees probing into the bark (pers. obs.). The nest and eggs are described in de Naurois (1975b). Breeding data show a season from May to January with a lull in September (de Naurois 1975b).

**Threats** None known on São Tomé and Ilhéu Bonne Joquei. On Príncipe the reasons for decline are unknown. Jones and Tye (in prep.) note that there must be grounds for concern over the long-term survival of this subspecies.

#### *São Tomé Grosbeak* *Neospiza concolor*

**Distribution** Monospecific genus endemic to São Tomé, and treated as a threatened species (category "Indeterminate") by Collar and Stuart (1985). This species has only been seen by F. Newton who collected three specimens (Bocage 1891, 1903, Collar and Stuart 1985). Newton collected the first specimen in 1888 at Angolares in the south-east of the island. In 1890 he collected a further two specimens in the forests in the São Miguel and Rio Quija area. These areas have since been searched by Snow (1950) and in the 1970s by de Naurois (1975b) but no further sightings have been made. Our expedition in 1990 spent seven weeks in this area but was unable to find this species.

**Population** Not known. Hunters were not aware of this species in the villages of São Miguel and Santo Antonio, both of which are near where Newton collected the two specimens. There is some doubt as to its continued survival and the possibility that it is extinct has been raised by various authors (Snow 1950, de Naurois 1975b, 1983) though others think that there is a chance of its continued survival (Collar and Stuart 1985, Jones and Tye 1988). We also consider that this species may still survive in the lowland primary forest in the central and south-western part of São Tomé, since lowland primary rainforest is still a very under-explored habitat.

**Ecology** Inhabits forests (Bocage 1891, Collar and Stuart 1985).

**Threats** None known, although the species presumably suffered when primary forest was extensively cleared in the early 1900s (see Collar and Stuart 1988).

#### *Príncipe Golden Weaver* *Ploceus princeps*

**Distribution** Endemic to Príncipe. Occurs in all habitats with tall trees including plantations, secondary forest, villages and gardens (Jones and Tye 1988).



*Population* Abundant in all habitats with trees (Jones and Tye 1988, pers. obs.).

*Ecology* Occurs singly but usually in groups of up to 30 birds (pers. obs.) and occasionally associates with Dohrn's Thrush-babbler and Príncipe Glossy Starling (Jones and Tye 1988). Food includes fruit, seeds and insects including beetles (Keulemans 1866). Breeds all year with a peak in July to August (Keulemans 1866).

*Threats* None known.

*Giant Weaver* *Ploceus grandis*

*Distribution* Endemic to São Tomé. Found in plantations, secondary forest and dry woodland in the savanna. Uncommon in primary forest but more frequent in scrub along rivers with surrounding primary forest (pers. obs.). Restricted to lower altitudes, although reported up to 1,500 m by de Naurois and Wolters (1975). Now extinct on Ilhéu das Rolas (pers. obs.).

*Population* This species, often found in small groups, is common in secondary forest and in oil palm plantations. In savanna commonly found in scrub and patches of dry woodland.

*Ecology* The diet is varied and includes seeds, oil palm nuts, beetles and molluscs (Jones and Tye in prep.).

*Threats* None known.

*São Tomé Weaver* *Thomasophantes sanctithomae*

*Distribution* Monospecific genus endemic to São Tomé. Found in all forested habitats, plantations, savanna and the city (de Naurois 1983, Jones and Tye 1988, pers. obs.).

*Population* Common to abundant in forest and plantations. Frequent in savanna inhabiting forest scrub, patches of dry woodland and cultivation (Jones and Tye 1988, pers. obs.).

*Ecology* Usually found in small groups of up to 10 (Jones and Tye 1988) and calls frequently. It gleans insects from leaves (pers. obs.), runs along tree branches in the manner of a nuthatch (Sittidae) and pecks pieces off dead branches (Snow 1950). Food includes insects, caterpillars, seeds and *Erythrina* nectar. Male observed constructing nests in mid-August and late December high up in trees (Alexander-Marrack 1990, Sargeant and Alexander-Marrack 1990). The nest and eggs are described by Bocage (1903) and Snow (1950).

*Threats* None known.

*Príncipe Glossy Starling* *Lamprotornis ornatus*

**Distribution** Endemic to Príncipe, where it is one of the commonest birds. Found in cultivated land, plantations, forest regrowth and primary forest. Recorded to at least 650 m (Jones and Tye 1988).

**Population** Abundant to very abundant in habitats with tall trees.

**Ecology** Occurs in groups of up to 30 birds, usually high up in trees (Jones and Tye 1988, pers. obs.); roosts on the Pico Papagaio at night and is conspicuous at this time flying in groups of up to 15 (Jones and Tye 1988). Breeds October to May (Keulemans 1866).

**Threats** None known.

*São Tomé Oriole* *Oriolus crassirostris*

**Distribution** Endemic to São Tomé. Found in both primary and undisturbed secondary forest. Our records are from primary forest at Lagoa Amélia (1,600 m), along the Rio Ana Chaves and the Rio Xufexufe. Also found in undisturbed mature secondary forest areas around Binda (Jones and Tye 1988, pers. obs.), near Santa Catarina (Alexander-Marrack 1990), Ermelinda (Jones and Tye 1988), Rio Quija (pers. obs.), Nova Moca (Sargeant and Alexander-Marrack 1990) and Zampalma and São Nicolau (Eccles 1988).

De Naurois (1984d) is the only author to have seen this species in cocoa plantations. Recent surveys now show this species to be absent from such areas (Jones and Tye 1988, pers. obs.). One remarkable record comes from savanna at Morro Peixe in the north of the island where we saw two birds in September 1990.

**Population** A low-density species. Between Lemba and Binda on the west coast a density of 1–2 pairs per 25 ha is estimated (de Naurois 1984d, Jones and Tye 1988). We found it common in primary forest in the south-west of the island, and in high areas around Lagoa Amélia and Nova Moca (also Sargeant and Alexander-Marrack 1990).

**Ecology** Usually seen in singles or pairs in the mid-storey of the forest (de Naurois 1984d, Jones and Tye 1988, pers. obs.). Food includes seeds, Hemiptera, Coleoptera and berries (de Naurois 1984d, pers. obs.). De Naurois (1984d) considered this species to breed between August and December, but we saw young at the beginning of July.

**Threats** De Naurois (1984d) considered that this species has declined due to pesticide use. It has not recolonized plantations in which it was formerly found and it is now only found in remote undisturbed areas. Any development of these areas will seriously endanger this species. We therefore recommend that it be given full Red Data Book status under the classification "Rare".

*Príncipe Drongo* *Dicurus modestus*

*Distribution* Endemic to Príncipe. Widespread in the north of the island. Occurs in the town Santo Antonio, cocoa plantations and in cultivation (Jones and Tye 1988, pers. obs.). At least formerly common in primary forest (Keulemans 1866) and its status there has probably not changed.

*Population* Frequent to common in pairs around Santo Antonio and in cultivation surrounding the city (Jones and Tye 1988, pers. obs.). Inconspicuous in forest regrowth and plantations but probably common.

*Ecology* We often saw it perching on telegraph wires and buildings from where it sallied to catch insects in the manner of a flycatcher; in cocoa plantations and secondary forest it occupied the low storey, making it a difficult species to see.

*Threats* Jones and Tye (1988) recommended its inclusion in the Red Data Book as increased pesticide use would decimate its invertebrate prey and cause this species to disappear from cultivated land; Collar and Andrew (1988) listed it as near-threatened.

## Discussion

At present many of the endemic birds of São Tomé and Príncipe remain common (see Table 1). The abandonment of many plantations at independence has meant that São Tomé has forest cover similar to that in the late 1800s. This secondary forest not only provides suitable habitat for several endemic species but also acts as a protective buffer around the remaining primary forest. Several endemic species have exploited mature secondary forest where the habitat structure of plantations has been lost. Mature secondary forest is especially important to the São Tomé Scops Owl, São Tomé Thrush and Giant Weaver, species which occur at low densities. The owl and the thrush are equally common in primary forest but would suffer significant population reductions if the secondary forest was destroyed. The Giant Weaver appears to prefer secondary forest and shade forest, and whilst not totally confined to secondary habitats it would become seriously at risk if all areas of secondary forest were cleared. This habitat also provides a valuable subsidiary habitat for the São Tomé Oriole. The extent of forest regrowth on the island at present and the low exploitation rates in most areas mean that it is a relatively secure habitat. Former plantations are being cleared and the amount of secondary forest will decrease. Plantations should be planted in such a way that the endemic bird species can exist in them.

The primary forest species on the island are the São Tomé Fiscal Shrike, São Tomé Short-tail, Dwarf Olive Ibis, Giant Sunbird, Maroon Pigeon and São Tomé Grosbeak. Destruction of even the smallest amounts of the relatively limited area of remaining primary forest could jeopardize the future of all these species. In addition the São Tomé Oriole and São Tomé Scops Owl would become seriously threatened if the remaining primary forest was lost. It is important that all the remaining primary forest on the island be given adequate protection. At present, the forests of the south-western areas are not under threat as access to them is

Table 1. The endemic birds of São Tomé and Príncipe.

RDB	Species	Distribution	Habitat			
			Pri	Sec	Pla	Sav
I	Dwarf Olive Ibis	ST	+	-	-	-
	São Tomé Green Pigeon	ST	++	++	+	-
	São Tomé Bronze-naped Pigeon	ST P	++	++	++	++
V	Maroon Pigeon	ST	++	+	-	-
R	São Tomé Scops Owl	ST	++	++	+	-
	São Tomé Spinetail	ST P	++	++	+++	++
I	São Tomé Fiscal Shrike	ST	+	-	-	-
+	São Tomé Oriole	ST	+++	++	-	+
+**	Príncipe Drongo	P	*	+++	+++	
	Príncipe Glossy Starling	P	*	+++	+++	
nt	São Tomé Thrush (race <i>olivaceofuscus</i> )	ST	+++	+++	+++	++
	(race <i>xanthorhynchus</i> )	P	*	-	-	
I	São Tomé Short-tail	ST	++(R)	-	-	-
	Dohrn's Thrush-babbler	P	+++	+++	+++	
nt	São Tomé Paradise Flycatcher	ST	+++	+++	+++	++
	Príncipe Sunbird	P	*	+++	+++	
	São Tomé Sunbird	ST	+++	+++	+++	+++
nt*	Giant Sunbird	ST	++	+	-	-
I	São Tomé White-eye (race <i>ficedulinus</i> )	P	*	-	-	-
	(race <i>feae</i> )	ST	++	++	++	+
+	Príncipe Speirops	P	*	++	++	
	São Tomé Speirops	ST	+++	+++	+++	++
	São Tomé Seedeater (race <i>rufobrunnea</i> )	P	*	+	+	
	(race <i>thomensis</i> )	ST	+++	+++	+++	+
	Príncipe Golden Weaver	P	+++	+++	+++	
	São Tomé Weaver	ST	+++	+++	+++	++
	Giant Weaver	ST	+	+++	++	++
I	São Tomé Grosbeak	ST	*(?E)	-	-	-

RDB, Red Data Book status (Collar and Stuart 1985): I = Indeterminate; V = Vulnerable; R = Rare; nt = near-threatened; \* = upgraded to threatened by Collar and Andrew (1988); \*\* = accepted as near-threatened by Collar and Andrew (1988); + = candidate (Jones and Tye 1988; this review).

Distribution: ST = São Tomé; P = Príncipe.

Habitat: Pri = Primary forest; Sec = Secondary forest; Pla = Plantations; Sav = Savanna; R = restricted to riparian areas within habitat; E? = Extinct? +++ = abundant; ++ = common; + = rare; - = absent; \* = status unknown.

very difficult. However, where primary forest is close to centres of human population, particularly along the northern edge around Lagoa Amélia, destruction is occurring. The high-altitude primary forest at Lagoa Amélia is the stronghold of the Maroon Pigeon and supports substantial populations of the São Tomé Scops Owl, São Tomé Oriole and the Giant Sunbird. It is also an area of great natural beauty. Agriculture represents the main threat to the area. One possible solution which could be employed is the construction of a nature trail where visitors could experience the rainforest environment and see several very rare species. If such a scheme were properly controlled it could provide the island with an income from natural history tourism.

Apart from forest destruction the major problem facing the islands' endemic birds is the removal of shade forest from cocoa and coffee plantations. These

crops have been traditionally grown beneath trees whose canopy provides shade. This makes for a forest-type habitat and results in suitable conditions for many of the commoner endemics, especially the São Tomé Weaver, São Tomé Paradise Flycatcher, São Tomé Seedeater and São Tomé Sunbird. Our work showed that lack of shade trees reduces not only the species' populations but also species diversity. Shade trees in plantations are a valuable source of timber for the islands. If, as suggested by Interforest AB (1990), a rotational system were adopted, with replanting of shade trees after removal, this would provide a sustainable timber resource as well as minimizing the damage to the associated bird populations. Such a system would also reduce the pressures to remove trees from the major forest block.

It is not easy to explain the apparent decline in the São Tomé White-eye on São Tomé since Jones and Tye (1988) found it common to abundant in areas of forest regrowth and plantations and Harrison and Steele (1989) found it frequent to common in the northern savannas. However, it is possible that a certain amount of confusion has occurred with the similar São Tomé Speirops, particularly where the two species associate in parties. The use of the terms "common" and "abundant" to classify the number of birds observed may lead to an overestimation of a species's abundance. The White-eye is usually found in small parties and under Jones and Tye's classification 10–100 birds seen or heard in suitable habitat on a single day warrants the category "abundant". Thus a single party of 10 birds seen in a day would lead to the White-eye being classified as abundant, which would be misleading. In such cases it may be important to note not just the number of birds in a party but also the number of parties seen.

The situation on Príncipe is generally encouraging. All the endemic species have adapted to man-altered habitats and are amongst the commonest birds on the island. However the failure of recent visitors to find the endemic races of São Tomé Thrush, São Tomé White-eye and the endemic subspecies of Olive Ibis, coupled with the rarity of the São Tomé Seedeater, indicates a need for continuing concern from conservation organizations over the status of several species. The listing in Collar and Andrew (1988) of Príncipe Drongo (near-threatened) and Príncipe Speirops (threatened) reflects their potential vulnerability to pesticides rather than any actual decline in status. The southern areas of the island, which contain the remaining primary forest, have not been adequately explored since the mid-late 1800s and probably contain populations of these rare species.

São Tomé has recently held democratic elections for the first time. The attitude of the former government towards conservation was encouraging and it is to be hoped that the new government will draw up a body of law which will help protect the primary forest areas and the associated bird species. The avifauna of the islands is an exceptionally valuable resource and the recent introduction of wildlife tourism will hopefully ensure that the forests are given adequate protection.

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## References

- Alexander-Marrack, P. (1990) Unpublished report on a visit to São Tomé 18–22 August 1990.
- Amadon, D. (1953) Avian systematics and evolution in the Gulf of Guinea. The J. G. Correia collection. *Bull. Amer. Mus. Nat. Hist.* 100: 393–451.
- Atkinson, P. W., Dutton, J. S. and Sequeira, V., eds. (1991) *UEA Expedition to São Tomé e Príncipe June–September 1990. Preliminary report.* University of East Anglia São Tomé Expedition, São Tomé, RDSTP.
- Atkinson, P. W., Peet, N. B. P. and Alexander, J. M. W. (in prep.) *The birds of São Tomé and Príncipe. Report of the UEA São Tomé Expedition 1990.* Cambridge, U.K.: International Council for Bird Preservation (Study Report).
- Bannerman, D. A. (1914a) Report on the birds collected by the late Mr Boyd Alexander (Rifle Brigade) during his last expedition to Africa. Part 1. The birds of Prince's Island. *Ibis* (10)2: 596–631.
- Bannerman, D. A. (1914b) Report on the birds collected by the late Mr Boyd Alexander (Rifle Brigade) during his last expedition to Africa. Part 2. The birds of St Thomas' Island. *Ibis* (10)3: 89–121.
- Bannerman, D. A. (1931) The Maroon Pigeon of São Tomé. *Ibis* (13)1: 652–654.
- BDPA (1985) *Potencialidades agrícolas: República Democrática de São Tomé e Príncipe.* Paris: Bureau pour le Développement de la Production Agricole.
- Bocage, J. V. B. (1891) Oiseaux de l'île St Thomé. *Jorn. Acad. Sci. Lisboa* (2)2: 77–87.
- Bocage, J. V. B. (1903) Contribution à la faune des quatre îles du Golfe du Guinée. *Jorn. Acad. Sci. Lisboa.* (2)7: 25–59, 65–96.
- Burlison, J. P. and Jones, P. J. (1988) A report on the forestry resources and their present utilisation in the Democratic Republic of São Tomé and Príncipe. Gland: International Union for Conservation of Nature and Natural Resources.
- Collar, N. J. and Stuart, S. M. (1985) *Threatened birds of Africa and related islands.* Cambridge, U.K.: International Council for Bird Preservation.
- Collar, N. J. and Andrew, P. (1988) *Birds to watch: the ICBP world checklist of threatened birds.* Cambridge, U.K.: International Council for Bird Preservation (Techn. Publ. 8).



- Collar, N. J. and Stuart, S. M. (1988) *Key forests for threatened birds in Africa*. Cambridge, U.K.: International Council for Bird Preservation (Monogr. 3).
- Correia, J. G. (1928–1929) Field notes and diary from the expedition to San Thome and Principe islands. Unpublished typescript held by the American Museum of Natural History, New York.
- Dohrn, H. (1866) Synopsis of the birds of Ilha do Príncipe, with some remarks on their habits and descriptions of new species. *Proc. Zool. Soc. London* 1866: 324–332.
- Eccles, S. D. (1988) The birds of São Tomé – record of a visit, April 1987, with notes on the rediscovery of Bocage's Longbill. *Malimbus* 10: 207–217.
- Frade, F. (1958) Aves e mamíferos das Ilhas de São Tomé e do Príncipe – notas de sistemática e de protecção à fauna. *Conferencia Internacional dos Africanistas Ocidentais, Lisboa* 4: 137–150.
- Frade, F. and Santos, J. V. (1977) Aves de São Tomé e Príncipe. *Garcia de Orta, Ser. Zool.* 6: 3–17.
- Günther, R. and Feiler, A. (1985) Die Vögel der Insel São Tomé. *Mitt. zool. Mus. Berlin*. 61 Suppl: *Ann Orn.* 9: 3–28.
- Harrison, M. J. S. and Steele, P. (1989) ICBP/EEC forest conservation mission to São Tomé and Príncipe. January–March 1989. Report on conservation education and training. Cambridge, U.K.: International Council for Bird Preservation.
- Interforest AB (1990) Democratic Republic of São Tomé and Príncipe, 1: results of national forest inventory; 2: national forest inventory, study of supply and demand of primary forest products – conclusions and recommendations. São Tomé: Interforest AB.
- Jones, P. J. and Tye, A. (1988) *A survey of the avifauna of São Tomé and Príncipe*. Cambridge, U.K.: International Council for Bird Preservation (Study Report 24).
- Jones, P. J. and Tye, A. (in prep.) *Check-list of the birds of São Tomé and Príncipe*.
- Keulemans, J. G. (1866) Opmerkingen over de vogels van de Kaap-Verdische Eilanden en van Prins-Eiland in de Bogt van Guinea gelegen. *Ned. Tijds. Dierk.* 3: 374–401.
- de Naurois, R. (1973) Les ibis des îles de São Tomé et du Príncipe: leurs place dans le groupe *Bostrychia* (= *Lamprolaima*). *Arq. Mus. Bocage* (2)4: 157–173.
- de Naurois, R. (1975a) Le 'Scops' de l'île de São Tomé *Otus hartlaubi* (Giebel). *Bonn. zool. Beitr.* 26: 319–355.
- de Naurois, R. (1975b) Les Carduelinae des îles de São Tomé et Príncipe (Golfe de Guinée). *Ardeola* 21: 903–931.
- de Naurois, R. (1982) Une énigme ornithologique: *Amaurocichla bocagii*, Sharpe, 1892. *Bull. IFAN* 44 Sér. A.: 13–25.
- de Naurois, R. (1983) Les oiseaux reproducteurs des îles de São Tomé et Príncipe: liste systématique commentée et indications zoogéographiques. *Bonn. zool. Beitr.* 34: 129–148.
- de Naurois, R. (1984a) La moucherolle endémique de l'île de São Tomé, *Terpsiphona atrochalybeia* (Thomson 1842). *Alauda* 52: 31–44.
- de Naurois, R. (1984b) *Prinia mollerii* Bocage, 1887, endémique de l'île de São Tomé. *Riv. ital. Orn.* 54: 191–206.
- de Naurois, R. (1984c) Les *Turdus* des îles de São Tomé et Príncipe: *T. o. olivaceofuscus* (Hartlaub) et *T. olivaceofuscus xanthorhynchus* Salvadori (Aves, Turdinae). *Rev. Zool. Afr.* 98: 403–423.
- de Naurois, R. (1984d) Le loriot endémique de l'île de São Tomé *Oriolus crassirostris* (Hartlaub) (Golfe de Guinée). *Cyanopica* 3: 121–134.
- de Naurois, R. (1988) Les Columbidae des îles de S. Tomé et Príncipe. *Cyanopica* 4: 218–242.
- de Naurois, R. and Wolters, H. E. (1975) The affinities of the São Tomé Weaver *Textor Grandis* (Gray, 1844). *Bull. Brit. Orn. Club* 95: 122–126.

Sargeant, D. and Alexander-Marrack, P. (1990) Unpublished manuscript detailing a bird-watching trip to São Tomé, 23–25 December 1989.

Snow, D. W. (1950) The birds of São Tomé and Príncipe in the Gulf of Guinea. *Ibis* 92: 579–595.

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