

# Birds of Tapuafu peninsula, Roti island, Lesser Sundas, Indonesia

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Roti island lies 10 km south of West Timor in the Lesser Sundas, Indonesia. Its bird fauna is poorly known. During 16–23 December 2004, 104 bird species were observed on the northern Tapuafu peninsula, including 32 new island records. Eight species of conservation importance were recorded: Yellow-crested Cockatoo *Cacatua sulphurea* (Critically Endangered), Timor Green Pigeon *Treron psittacea* (Endangered) and six Near Threatened species: Black Cuckoo Dove *Turacoena modesta*, Pink-headed Imperial Pigeon *Ducula rosacea*, Darter *Anhinga melanogaster*, Olive-shouldered Parrot *Aprosmictus jonquillaceus*, Orange-sided Thrush *Zoothera peronii* and White-bellied Bushchat *Saxicola gutturalis*.

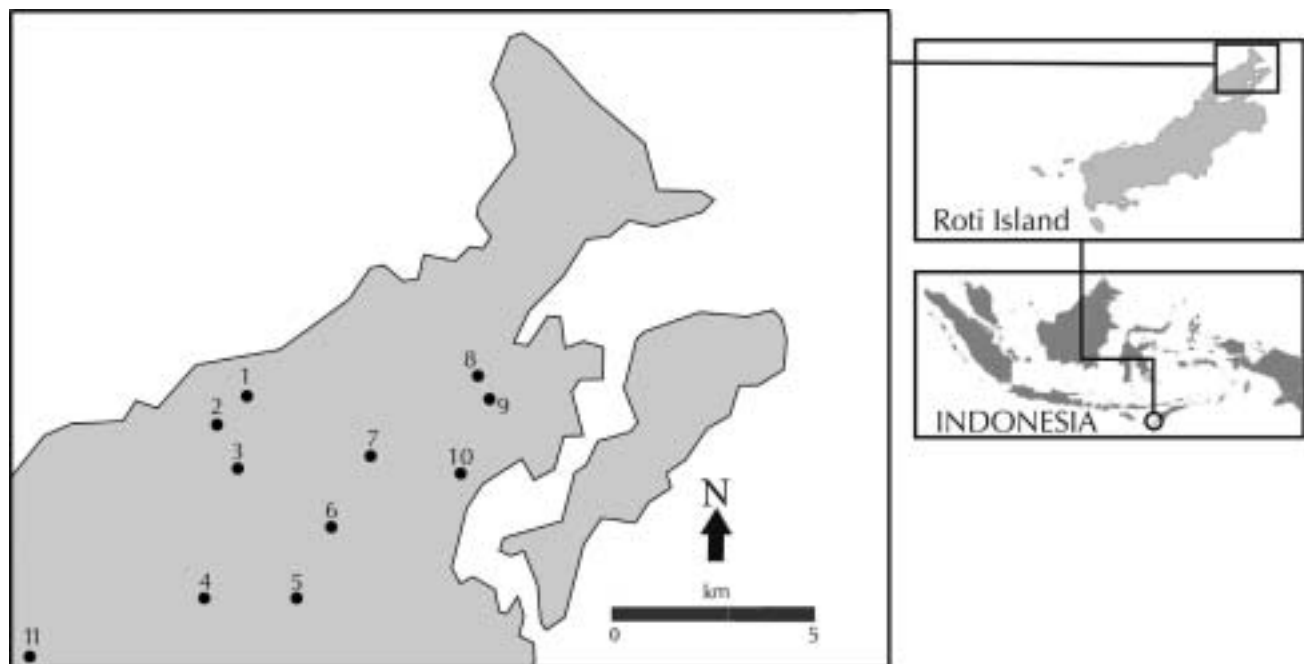
## INTRODUCTION

Roti is a small island that lies 10 km south of the south-west part of Timor island and 12 km south of Semau in the central Lesser Sundas, Indonesia (Fig. 1). The island is 45 km long, 10–15 km wide, and has an area of 1,226 km<sup>2</sup> (Monk *et al.* 1997). The island is low with a maximum elevation of 440 m, and it is entirely formed by coralline limestone. Two long bays and associated mudflats almost bisect the northern peninsula, which covers c.150 km<sup>2</sup> and is known locally as Landu in the East Roti sub-district. Nine small islands are associated with Roti, including Ndana island (c.15.6 km<sup>2</sup>), Dao island (c.12 km<sup>2</sup>), Nusa island (c.9 km<sup>2</sup>), Doö island (c.3 km<sup>2</sup>) and Batu Heliana (c.0.05 km<sup>2</sup>).

FAO/UNDP (1982) proposed two key protected areas, both on Roti's northern Tapuafu peninsula: a 60 km<sup>2</sup> Wildlife Sanctuary covering 'Tanjung Pakuatu',

and a 10 km<sup>2</sup> Game Reserve named 'Landu mangrove swamp'. They noted that undisturbed dry forests, extensive mangrove and large lakes including Lake Oendui ('Oindoei' in Mees 1975) occurred, and that the region was thought to be rich in wildlife (FAO/UNDP 1982).

The birds of Roti have been little studied. Ten Kate collected 14 species on Roti in 1891–1893 (see Büttikofer 1892, Mees 1975). Father J. A. J. Verheijen visited in March–April 1969 and listed 90 species, including 45 species that were collected and later deposited at the Leiden Museum, 33 species that were observed and 12 species that were reported by local informants. Verheijen collected on Dao, Doö and Nusa islands and apparently 'not the zoologically most interesting part' of Roti according to Mees (1975). G. F. Mees curated Verheijen's collection, and commented on his manuscript which was eventually published in 1976 (Verheijen 1976). Mees (1975) considered



**Figure 1.** Map showing the location of the Tapuafu peninsula and Roti island in the Lesser Sundas, Indonesia. Site numbers: 1. 3 km north-west of Sipu; 2. Lake Muke; 3. 2 km north-west of Sipu; 4. Lake Oendui; 5. Daurendaye; 6. Dead Sea; 7. Olokama; 8. Lake Oeina Lay; 9. Lake Oeina; 10. Lake Lendoen; 11. Pantai Baru.

**Table 1.** Summary of sites mentioned in the text.

Site	Coordinates	Dates visited; notes
3 km north-west of Sipu	10°30'56"S 123°18'07"E	18 and 20 December; an extensive area of mature tropical dry forest (to 25 m tall) adjacent to the western shores of the Dead Sea; 1 ha of sandflats
Lake Muke	10°31'19"S 123°17'41"E	20 December; a large 70 ha shallow saline lake, with extensive grit and mudflats; fringed by a thin band of mangrove and extensive tropical dry forest
2 km north-west of Sipu	10°31'54"S 123°17'59"E	18 and 20 December; an extensive woodland dominated by <i>Schleichera oleosa</i> , scattered figs and <i>Sterculia foetida</i> trees; old swidden fields dominated by dense <i>Lantana camara</i> thickets
Lake Oendui	10°33'38"S 123°17'30"E	16–22 December; a relatively large 50–100 ha permanent freshwater lake with weed patches surrounded by 40 ha blacksoil plain, savanna and extensive tropical dry forest on low karst hills
Daurendale	10°33'38"S 123°18'50"E	16–23 December; village land with tall figs and <i>Sterculia foetida</i> , surrounded by dry forest on karst limestone
Dead Sea (Laut mati) (south shore)	10°32'41"E 123°19'20"E	17 and 21 December; a large 1,000–1,200 ha saline lake on karst limestone, with four large islets, fringed by rocky headlands, shell and mudflats. Surrounding vegetation is dominated by tropical dry forest (to 15 m tall), woodland and small patches of mangrove, paperbark <i>Melaleuca</i> sp. swamp and dense palm <i>Corypha</i> sp. groves
Olokama	10°31'44"S 123°19'54"E	21 December; site of a former hamlet, lying on the central east, muddy and gritty shores of the Dead Sea; terrestrial habitats include extensive savanna and woodland dominated by <i>Corypha</i> sp. and <i>Schleichera</i> sp.
Lake Oeina Lay	10°30'49"S 123°21'34"E	21 December; a c.200 ha saline lake with one small islet, surrounded by tropical dry forest and a 5 ha saltpan; 500 m north-west of Lake Oeina
Lake Oeina	10°30'58"S 123°21'38"E	21 December; a 5–10 ha deep freshwater lagoon fringed by mangrove and saltbush, and extensive tropical dry forest and woodland
Lake Lendooen	10°31'58"S 123°21'12"E	19 December; a deep 6 ha freshwater lagoon fringed by <i>Typha</i> reedbeds (0.5 ha), 60 m high karst cliffs on north shore, paperbark swamp (4 ha), extensive tropical dry forest and woodland with dense <i>Lantana camara</i> shrub layer
Pantai Baru	10°35'00"S 123°15'00"E	A major harbour and small village on south-eastern edge of a large bay

records to be unconfirmed if they were not backed by specimens, and presumably was motivated to publish an account of Roti's birds—after reading Verheijen's manuscript—in an attempt to clarify the scientific record. Ron Johnstone surveyed birds over 13 days in central and southern Roti and Pulau Ndana and Batu Heliana during October 1990. Paul Jepson surveyed birds in central Roti over four days in September–October 1993. These two authors published a joint paper based on their surveys which documented the 86 species that they recorded (incorrectly given as 83 species in the abstract) and included 119 bird species in a review of the island's avifauna (Johnstone and Jepson 1996). Johnstone and Darnell (1997) described a new race of Southern Boobook *Ninox novaeseelandiae*.

This paper documents the status and habitat use of birds on the Tapuafu peninsula of northern Roti, with particular emphasis on threatened, restricted-range and forest birds plus waterbirds.

## METHODS

I visited Roti island for eight days during 16–23 December 2004. Birds were observed with 8×32 binoculars during daily walks of 5–15 km from Daurendale hamlet (Sotimori village, East Roti subdistrict) through woodland and forest, and visiting saline and freshwater lakes (see sites in Table 1). Bird calls were recorded with a Sony cassette recorder, and footage of a small number of species was taken with a digital video recorder. Coordinates were measured with a Global Positioning System. Seabirds were recorded

along the 50 km Bolok (West Timor)–Pantai Baru (Roti) route, and limited observations were made along roads between Pantai Baru and Daurendale. Taxonomy follows Inskipp *et al.* (1996), restricted-range status follows Stattersfield *et al.* (1998), and IUCN Red List status follows BirdLife International (2004, 2005).

## RESULTS

The following list provides details of records of threatened, restricted-range and forest birds, plus significant records of other species. A total of 104 species were found, including 32 new island records. Birds of conservation importance that were recorded include Yellow-crested Cockatoo *Cacatua sulphurea* (Critically Endangered), Timor Green Pigeon *Treron psittacea* (Endangered) and six Near Threatened species: Black Cuckoo Dove *Turacoena modesta*, Pink-headed Imperial Pigeon *Ducula rosacea*, Darter *Anhinga melanogaster*, Olive-shouldered Parrot *Aprosmictus jonquillaceus*, Orange-sided Thrush *Zosteronotus peronii* and White-bellied Bushchat *Saxicola gutturalis*. Square brackets in the list below indicate species not recorded in the present survey. Waterbird records are summarised in Table 2. The appendix lists all 145 species now confirmed for Roti, and a further seven species noted by Verheijen (1976) which require further information to verify their presence on Roti.

### RED JUNGLEFOWL *Gallus gallus*

A male observed north of Olokama is the first confirmed record from mainland Roti. This species is

probably uncommon on Roti because only a few were heard. Verheijen (1976) stated that the species 'is well known on Roti'. Johnstone and Jepson (1996) saw two birds on Batu Heliana.

**RAINBOW BEE-EATER** *Merops ornatus*

This species was frequent in small groups of 3–15 birds in all habitats. It has been considered an Australian winter migrant to the Lesser Sundas (e.g. Johnstone and Jepson 1996, Coates and Bishop 1997). Verheijen (1976) noted that 'nesting holes of a *Merops* species are found in Dengka [a district in western Roti]' suggesting that the species is probably a breeding resident. However, in the Lesser Sundas, it sometimes makes nest holes without laying eggs (R. Johnstone *in litt.* 2005), so confirmation of breeding on Roti is needed.

**RAINBOW LORIKEET** *Trichoglossus haematodus*

This lorikeet was surprisingly uncommon with only two brief observations of pairs in dry woodland near Olokama. The birds had orange-red breasts, similar to, but perhaps brighter than, those of the race *capistratis* which is endemic to Timor.

**YELLOW-CRESTED COCKATOO** *Cacatua sulphurea*

Critically Endangered. On Roti, this species is apparently uncommon. One was heard at Dead Sea on 17 December 2004; a pair was observed in flight 3 km north-west of Sipu on 18 December 2004; one was seen at Lake Lendoon on 19 December 2004; and one was disturbed from tropical woodland near Lake Oeina on 21 December 2004. Local people at Daurendale had a male and a female taken from nest holes, and an additional bird had recently died. Demand for the capture of birds for trade is driven by regional traders from Baa (Roti) or Kupang (West Timor).

**OLIVE-SHOULDERED PARROT** *Aprosmictus jonquillaceus*

Restricted-range; Near Threatened. This parrot was relatively uncommon but widespread in tropical forest and woodland, where singles and small groups of 3–5 were recorded daily.

[SOUTHERN BOOBOOK *Ninox novaeseelandiae*

No owls were observed during this visit to Roti. The endemic race *rotiensis* is known from a single specimen collected near Pantai Baru (Johnstone and Darnell 1997) and may have a limited range on the island (R. Johnstone *in litt.* 2005).]

**BLACK CUCKOO DOVE** *Turacoena modesta*

Restricted-range; Near Threatened. This species was uncommon in tropical dry forest and woodland. Two singles and a pair were observed 3 km north-east of Sipu on 18 December 2004; one was heard at Lake Lendoon on 19 December 2004 giving an accelerating series of *hoo-wuk* calls that diminished in volume through the series; and a pair were seen at a fruiting fig tree near Sipu. Black Cuckoo Dove has recently been recorded from Jaco and Atauro island (Trainor and Soares 2004) and occurs on Timor and Wetar (Coates and Bishop 1997). Although generally known to local communities elsewhere, my guide from Sipu hamlet had never seen Black Cuckoo Dove.

**TIMOR GREEN PIGEON** *Treron psittacea*

Restricted-range; Endangered. This species is apparently rare on Roti: one was recorded in a fruiting fig tree, 2 km north-west of Sipu on 20 December 2004. Known locally as 'rekus', the meat of Timor Green Pigeon is regarded as delicious by local people, who selectively target them. This is the first Roti record since Verheijen collected a male near Baa in 1969 (Mees 1975).

**PINK-HEADED IMPERIAL PIGEON** *Ducula rosacea*

Restricted-range; Near Threatened. This large pigeon was generally uncommon, with several records daily of singles and pairs. One bird was observed eating the fruit of a *Corypha* sp. palm. This species is a major target for hunters on the Tapuafu peninsula. The imperial pigeon observed by Verheijen (1976) at Nusa island was presumably this species.

[BEACH THICK-KNEE *Esacus neglectus*

Near Threatened. One captured on Nusa island was shown to Verheijen (1976), and he saw one other bird, plus a group on the beach of Dengka. Johnstone and Jepson (1996) reported five from Ndana island, indicating that this species is locally common in the area.]

**RED-CAPPED PLOVER** *Charadrius ruficapillus*

This species has long been considered an Australian winter visitor (White and Bruce 1986, Coates and Bishop 1997), but with at least 73 birds (usually paired and in breeding plumage) recorded at several lakes, and an estimated 100 birds observed around the Dead Sea, it is probably resident on Roti. No nests were discovered, but it does breed on Timor (Olsen and Trainor 2005, Trainor 2005). Verheijen (1976) observed a 'pair of small plovers on Roti' but was unsure of their identity; these birds were possibly Red-capped Plover.

**AUSTRALASIAN GREBE** *Tachybaptus novaehollandiae*

At least four birds showing the diagnostic yellow iris and black neck of this species were recorded at Lake Oendui on 22 December 2004, together with an estimated 45 Little Grebes *T. ruficollis*. Australasian Grebe is rare in the Lesser Sundas, with recent records from Timor-Leste (Trainor 2005) and the Tanimbar islands (Coates and Bishop 1997).

**DARTER** *Anhinga melanogaster*

Near Threatened. This species was recorded relatively frequently at the Tapuafu wetlands, with three males and four females at Lake Oendui, and others present on two other lakes (Table 1). These birds were of the Australian race *novaehollandiae*: males have a black head with a long white stripe behind the eye, and females have a white neck and chest.

**ROYAL SPOONBILL** *Platalea regia*

A flock of 34–42 birds was observed on Lake Oendui. Informants told Verheijen (1976) that they had shot the 'spoon-bird' on the north and south coasts of Roti (Verheijen 1976). There are few Lesser Sundas records, but this species occurs regularly in the Timor region (Trainor 2005).

AUSTRALIAN PELICAN *Pelecanus conspicillatus*

Groups of 10–50 birds were recorded throughout the Tapuafu peninsula wetlands, with 68–101 birds recorded at Lake Oendui and one bird at Lake Oeina Lay. Local people stated that this species is present year-round on the peninsula. In April–November 1981, 150–200 birds were noted at Lake Oendui (FAO 1982); five were seen at Pulau Ndana in August 1990 (Johnstone and Jepson 1996). This species is one of the most regularly recorded waterbird visitors to Timor-Leste (Trainor 2005). Its presence is apparently not related to seasonal migrations or influxes (*contra* Mayr 1944, Johnstone and Jepson 1996, Coates and Bishop 1997).

ELEGANT PITTA *Pitta elegans*

This inconspicuous forest bird was considered unconfirmed for Roti (White and Bruce 1986), based on a local name given for the species by an informant to Verheijen (1976). I found Elegant Pitta to be widespread in forest, woodland and *Lantana camara* shrubland, and remarkably abundant, frequently with 6–10 birds calling simultaneously at dusk and dawn. The status of this bird in the Timor region is of interest: it is uncommon in West Timor (Mayr 1944, Noske and Saleh 1996) and has not yet been recorded in Timor-Leste, to my knowledge.

PLAIN GERYGONE *Gerygone inornata*

Restricted-range. This small passerine was widespread but uncommon and rarely heard. One bird at Lake Oendui had a cream chest and belly with a light grey tint, and might have been a fledgling; Timor birds have clean white underparts (Coates and Bishop 1997).

LARGE-BILLED CROW *Corvus macrorhynchos*

An immature bird taken by local people from a nest (10 m high in a 30 m tall fig tree) on 18 December 2004 at Daurendale had a slate-blue iris and light orange gape. Large-billed Crow was recorded daily, but Johnstone and Jepson (1996) had just a single record.

OLIVE-BROWN ORIOLE *Oriolus melanotis*

Restricted-range. This species was common in woodland, villages and tropical dry forest, with up to ten birds attending fruiting fig trees. Johnstone and Jepson (1996) considered it to be scarce on Roti. This species is endemic to Roti, Semau, Timor, Atauro (Trainor and Soares 2004) and Wetar.

TIMOR FIGBIRD *Sphecothebes viridis*

Restricted-range. This species was widespread and frequent in large fruiting trees in villages, woodland and forest. It occurs on Roti, Semau and Timor (Coates and Bishop 1997).

NORTHERN FANTAIL *Rhipidura rufiventris*

The distinctive race *tenkatei* (Büttikofer 1892) is endemic to Roti and is characterised by a slate-grey throat and breast with white streaks, compared to the nominate race which has a white chin and throat. Northern Fantail was unrecorded by Verheijen, but considered uncommon in tropical dry forest and mangrove by Johnstone and Jepson (1996). I found

this species to be frequent in all wooded habitats including villages. Birds have a less upright perching posture than Northern Fantail from northern Australia or Timor, and more frequently occur in the understory at 1–5 m. On Timor, the species forages below the canopy in habitats where it co-occurs with Rufous Fantail *R. rufifrons* (Noske 1997), but this was not the case on Roti. The contact call is similar to that reported from Buru (Coates and Bishop 1997) and northern Australia (Schodde and Tidemann 1988): a single or double *yip*, reminiscent of yapping by Black-winged Stilt *Himantopus himantopus*. The ‘sucking’ call of *rufiventris* on Timor was not heard.

ORANGE-SIDED THRUSH *Zosterornis peronii*

Restricted-range; Near Threatened. The song of Orange-sided Thrush provided an almost constant background noise during the day in wooded habitats (including dense shrubland with scattered trees) throughout the Tapuafu peninsula. In contrast, Johnstone and Jepson (1996) had three records. This species is considered Near Threatened because of heavy trapping in West Timor (BirdLife International 2004); there appears to be no trapping in northern Roti. The racial identity of the Roti population is unknown.

TIMOR BLUE FLYCATCHER *Cyornis hyacinthinus*

Restricted-range. This distinctive flycatcher was uncommon, with two observations of males at Daurendale and Olokama, plus a few aural records. There did not appear to be any morphological differences from birds on mainland Timor. The call structure was also similar, but calls seemed to be less energetic. Timor Blue Flycatcher was first recorded from Roti in 1993 (Johnstone and Jepson 1996) and is otherwise known from Timor, Wetar and Semau.

WHITE-BELLIED BUSHCHAT *Saxicola gutturalis*

Restricted-range; Near Threatened. This species is endemic to Timor, Semau (endemic race *lactuosa*) and Roti (previously known by a female collected by Ten Kate in 1894: Mees 1975). It was common in woodland, gaps in tropical dry forest, and mangrove edge. Begging by fledglings (with an insect-like high pitched buzzing) was frequently noted at Lake Oendui (18 December 2004) and Olokama (21 December 2004). The call has a similar basic structure to that given by Timor birds, with a series of rapidly whistled notes, but the end of the call differs substantially (comprising long squeaky whistles): further analysis of calls and morphology may show that these birds represent an endemic race. Urquhart and Bowley (2002) stated that White-bellied Bushchat prefers different habitat to Pied Bushchat *S. caprata*, but the two species often co-occurred on Roti. This species is abundant in dry forest and secondary forest in Timor-Leste (personal observations).

TIMOR STUBTAIL *Urosphena subulata*

Restricted-range. The tiny Timor Stubtail was observed only once, but calls were heard widely in tropical dry forest, woodland and shrubland: a single high pitched *pseeeeeee* then *blip...blip...blip* and a rapid high pitched trill. This are the first Roti records. The

**Table 2.** Counts of waterbirds at inland lakes on the Tapuafu peninsula, Roti. Maximum counts are given for Lake Oendui.

Species	Muke	Oendui	Dead Sea	Olokama	Lendooen	Oeina Lay	Oeina	Total
WANDERING WHISTLING-DUCK <i>Dendrocygna arcuata</i>		c.1,000						c.1,000
GREEN PYGMY-GOOSE <i>Nettapus pulchellus</i>		10						10
PACIFIC BLACK DUCK <i>Anas superciliosa</i>		44	20			1		65
SUNDA TEAL <i>Anas gibberifrons</i>	65		23					88
HARDHEAD <i>Aythya australis</i>						22		22
WHITE-BREASTED WATERHEN <i>Amaurornis phoenicurus</i>		6			2+			8
WHITE-BROWED CRAKE <i>Porzana cinerea</i>					1+			1
DUSKY MOORHEN <i>Gallinula tenebrosa</i>					1+			1
COMMON COOT <i>Fulica atra</i>		2						2
BLACK-TAILED GODWIT <i>Limosa limosa</i>		7						7
WHIMBREL <i>Numenius phaeopus</i>			11	2		1		14
MARSH SANDPIPER <i>Tringa stagnatilis</i>	67	8	4	8			1	88
COMMON GREENSHANK <i>Tringa nebularia</i>		12	16	6		1	1	36
WOOD SANDPIPER <i>Tringa glareola</i>		7	1	6		1	1	16
COMMON SANDPIPER <i>Actitis hypoleucos</i>	2	5	12	5			2	26
GREY-TAILED TATTLER <i>Heteroscelus brevipes</i>			1	1				2
RED-NECKED STINT <i>Calidris ruficollis</i>	251			3			254	
LONG-TOED STINT <i>Calidris subminuta</i>		8	6	8				22
SHARP-TAILED SANDPIPER <i>Calidris acuminata</i>	131	1	1	13				146
CURLEW SANDPIPER <i>Calidris ferruginea</i>			1					1
COMB-CRESTED JACANA <i>Irediparra gallinacea</i>		2						2
BLACK-WINGED STILT <i>Himantopus himantopus</i>	15	17	9	1				43
PACIFIC GOLDEN PLOVER <i>Pluvialis fulva</i>				1				1
GREY PLOVER <i>Pluvialis squatarola</i>			1	9				10
LITTLE RINGED PLOVER <i>Charadrius dubius</i>				2				2
RED-CAPPED PLOVER <i>Charadrius ruficapillus</i>	36	8	13+	16				73
ORIENTAL PRATINCOLE <i>Glareola maldivarum</i>		54						54
WHISKERED TERN <i>Chlidonias hybridus</i>		2						2
LITTLE GREBE <i>Tachybaptus ruficollis</i>		50	124+		2+			176
AUSTRALASIAN GREBE <i>Tachybaptus novaehollandiae</i>		4						4
DARTER <i>Anhinga melanogaster</i>		7			1+	4		12
LITTLE PIED CORMORANT <i>Phalacrocorax melanoleucos</i>		20	50	85	11			265
LITTLE BLACK CORMORANT <i>Phalacrocorax sulcirostris</i>		c.300	8	70	11		10	c.399
LITTLE EGRET <i>Egretta garzetta</i>		30						30
PACIFIC REEF EGRET <i>Egretta sacra</i>		1	5	1				7
GREAT EGRET <i>Casmerodius albus</i>		3	1	2	2		6	14
LITTLE HERON <i>Butorides striatus</i>			2					2
RUFIOUS NIGHT HERON <i>Nycticorax caledonicus</i>		c.20	c.20					c.40
ROYAL SPOONBILL <i>Platalea regia</i>		42						42
AUSTRALIAN PELICAN <i>Pelecanus conspicillatus</i>		101				1		102

species is otherwise known from Timor, Wetar and Babar (Coates and Bishop 1997) and was recently added to the avifauna of Atauro island (Trainor and Soares 2004).

**TIMOR LEAF WARBLER** *Phylloscopus presbytes*  
Restricted-range. This species was frequent in woodland and tropical dry forest throughout the Tapuafu peninsula. The breezy, rising and falling whistle given by Roti birds sounded similar to that of birds on Timor. The species is also found on Timor, Flores and Atauro (Trainor and Soares 2004).

**RED-CHESTED FLOWERPECKER** *Dicaeum mauei*  
Restricted-range. This species was widespread and frequent in wooded habitats.

**FLAME-BREASTED SUNBIRD** *Nectarinia solaris*  
Restricted-range. This sunbird was widespread and common through all wooded habitats including villages, but it was considered 'scarce' by Johnstone and Jepson (1996).

## DISCUSSION

The observations presented here greatly improve our knowledge of Roti's avifauna. The new species included the globally threatened Yellow-crested Cockatoo, four restricted-range species, seven migrant waders and eight other waterbirds. The addition of many new island records, including resident forest birds, was unexpected following surveys by Mees (1975), Verheijen (1976) and Johnstone and Jepson (1996). However, there were many differences between the earlier surveys and the present one in terms of field effort (location, time of year etc.), and there may be more natural forest and wetlands on the northern Tapuafu peninsula than in the other areas of Roti which were the focus of earlier surveys. Verheijen (1976) accurately stated that 'further collecting in special habitats...in the wooded area of Landu..., might have resulted in a doubling of the number of species collected [or recorded]'. The potential importance of the Tapuafu area had been highlighted by FAO/UNDP in 1982, and it was unfortunate that the area had not been surveyed until now.

The avifauna of Roti island forms a subset of that of neighbouring Timor, with all but two of the species known from Roti occurring on Timor: Johnstone and Jepson (1996) recorded Black-naped Oriole *Oriolus chinensis* and Red-headed Honeyeater *Myzomela erythrocephala*. The closest populations of both species are on Sumba. Neither was recorded during the present survey, but after viewing paintings, local people suggested that they were present and uncommon in the Daurendale area. Three additional species have recently been added to Timor's avifauna: Green Pygmy-goose, Hardhead *Aythya australis* and Pale-headed Munia *Lonchura pallida* (Trainor 2005, Trainor *et al.* in press.). Few other passerines known from the island went unrecorded. Black-faced Cuckoo-shrike *Coracina novaehollandiae* is an austral winter migrant from Australia and would not be expected in December. Short-tailed Starling *Aplonis minor* is known from a single specimen (Johnstone and Jepson 1996) and might be an occasional visitor, moving nomadically in search of fruit. Only two of seven finches were recorded, undoubtedly because of the limited extent of open savanna, grassland and ricefields in the Tapuafu peninsula.

The records of 17 bird species in Verheijen (1976) were based on anecdotal information from informants (12 species) or his own observations where identification was uncertain. Seven of these species have not been confirmed by subsequent observations or collection, but are likely to be present. These are: Blue-breasted Quail *Coturnix chinensis*, Island Collared Dove *Streptopelia bitorquata*, snipe sp. (perhaps Swinhoe's Snipe *Gallinago megala*), Osprey *Pandion haliaetus*, Australian Hobby *Falco longipennis*, Black Bittern *Dupetor flavicollis* and Timor Sparrow *Lonchura fuscata* (these species are listed in the appendix as unconfirmed).

Both of the globally threatened species recorded on Roti are unsurprisingly also under threat on the island, with their populations probably greatly limited by capture for trade (Yellow-crested Cockatoo) or hunting (Timor Green Pigeon). Verheijen (1976) stated that

Yellow-crested Cockatoo 'certainly occur[s] on Roti', but he did not record any directly. BirdLife International (2001) suggested that Roti should be targeted for surveys of the species. Cockatoos are known by local communities throughout the peninsula, and are hunted after orders are placed by dealers. There are no specialist bird-trappers on the island, but fishermen and farmers may opportunistically catch cockatoos when there is demand. Local people said that flocks of up to 20 birds could be seen in the 'corn season' around agricultural crops. Yellow-crested Cockatoo is now very rare in West Timor, where there have been few records in the past decade (Lesmana *et al.* 2000), but there are many isolated flocks in Timor-Leste (Trainor and Mauro in prep).

Timor Green Pigeon and Black Cuckoo Dove (along with Pink-headed Imperial Pigeon and Emerald Dove *Chalcophaps indica*) are the main target of hunters on the peninsula. On Roti, the green pigeon has been recorded twice, and is probably rare. There are similarly few records from West Timor (BirdLife International 2001). The species calls irregularly, but appears naïve and often perches for long periods in the canopy (presumably congregating around fruiting fig trees, which are well known by hunters), rendering it easy to shoot. The cuckoo dove was recorded at a relatively high rate comparable with that on Timor-Leste (Trainor and Mauro in prep). More fieldwork is needed on Roti to better understand the status of both of these species.

There are many taxonomic challenges among the poorly known bird faunas of Wallacean islands (White and Bruce 1986, Coates and Bishop 1997). Given the narrow distance between Roti and Timor, little differentiation would be expected between populations of the same species on Roti and Timor. However, the calls, and in some instances appearance, of several species on Roti differ somewhat from those on Timor, and may be worth further study. The Roti race of Southern Boobook is also noteworthy, being highly distinctive based on DNA sequencing (R. Johnstone *in litt.* 2005).

Waterbird populations on the Tapuafu peninsula and the saline and freshwater lakes that support them are of high regional significance. As mentioned by Johnstone and Jepson (1996), Roti lies on the East Asia–Australasian flyway for migratory waders. Total waterbird counts are generally low, but several species obviously overwinter on Roti (see Table 2 and Appendix); for other 'transient' species, these wetlands are important for resting and feeding. The area is the typical south-eastern limit for three migrant shorebirds (Common Redshank *Tringa totanus*, Long-toed Stint *Calidris subminuta* and Little Ringed Plover *Charadrius dubius*) that are relatively rarely reported in Australia (Barrett *et al.* 2003). Counts of Sharp-tailed Sandpipers *Calidris acuminata* were among the highest for the Timor region (Trainor 2005). The region supports relatively high numbers of visitors (e.g. Australian Pelican), and of resident species such as grebes, cormorants, egrets, night herons and ducks. The Kupang Bay and Mina River wetlands (Andrew 1986) lie about 60–80 km north of Roti and undoubtedly form a regionally important and diverse interconnected wetland system. In addition, Ashmore

Reef (a Ramsar-listed wetland) lies only 145 km south of Roti. The conservation recommendations of FAO/UNDP (1982) have not been acted upon, but my observations indicate that the area retains high natural values.

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## APPENDIX

A list of the birds of Roti and satellite islands with brief notes on species of interest not covered in Results.

Name	Status	K	V	J	T	Notes
BROWN QUAIL <i>Coturnix ypsilophora</i>	R		X	X	X	Reported from Roti, Ndao and Doö by Verheijen
[BLUE-BREASTED QUAIL <i>C. chinensis</i> ]	R		X			Verheijen had a voice record on Roti
RED JUNGLEFOWL <i>Gallus gallus</i>	R		X	X	X	'Well known on Roti' (Verheijen 1976)
WANDERING WHISTLING-DUCK <i>Dendrocygna arcuata</i>	R		X	X	X	Large groups congregate on lakes at end of dry season
GREEN PYGMY-GOOSE <i>Nettapus pulchellus</i>	V				X*	Ten birds on Lake Oendui on 16 December 2004; locally common on Timor (Trainor 2005)
PACIFIC BLACK DUCK <i>Anas superciliosa</i>	R		X	X	X	An anecdotal report from Verheijen
SUNDA TEAL <i>A. gibberifrons</i>	R		X	X	X	
HARDHEAD <i>Aythya australis</i>	V				X*	Twenty-two on Lake Oeina; generally rare in Wallacea, but regular on Timor (Trainor 2005)
RED-BACKED BUTTONQUAIL <i>Turnix maculosa</i>	R		X		X	One in tropical dry forest adjacent to Lake Oendui floodplain
COMMON KINGFISHER <i>Alcedo atthis</i>	R			X	X	Common at lakes
COLLARED KINGFISHER <i>Todiramphus chloris</i>	R		X	X	X	
SACRED KINGFISHER <i>T. sanctus</i>	M			X		
RAINBOW BEE-EATER <i>Merops ornatus</i>	R		X	X	X	
ORIENTAL CUCKOO <i>Cuculus saturatus</i>	M				X*	Single birds observed north of Sipu and Olokama
BRUSH CUCKOO <i>Cacomantis variolosus</i>	R				X*	Single birds at Daurendale, Sipu and Olokama. Verheijen also indicated that this species may be present based on a local name for a cuckoo
AUSTRALIAN KOEL <i>Eudynamis cyanocephala</i>	R,F				X*	Widespread and common in forest. Verheijen suggested the presence of this species on Roti
LESSER COUCAL <i>Centropus bengalensis</i>	R		X		X	
SHINING BRONZE CUCKOO <i>Chrysococcyx lucidus</i>	M		X			Collected by Verheijen on Dao island
RAINBOW LORIKEET <i>Trichoglossus haematodus</i>	RF				X*	Verheijen's informants indicated that lorikeets were present, and he thought he saw Olive-headed Lorikeets <i>T. euteles</i>
YELLOW-CRESTED COCKATOO <i>Cacatua sulphurea</i>	CR,R,F				X*	
GREAT-BILLED PARROT <i>Tanygnathus megalorhynchus</i>	R		X	X		Observed by Verheijen, and Johnstone and Jepson (1996)
OLIVE-SHOULDERED PARROT <i>Aprosmictus jonquillaceus</i>	RR,NT,R,F		X		X	
GLOSSY SWIFTLET <i>Collocalia esculenta</i>	R		X	X	X	Both swiftlets nest in numerous limestone caves. Local people indicated that a larger species, probably Little Swift <i>Apus affinis</i> is also present
EDIBLE-NEST SWIFTLET <i>C. fuciphaga</i>	R			X	X	
BARN OWL <i>Tyto alba</i>	R		X	X		Verheijen collected locals names for Barn Owl and probably Southern Boobook
SOUTHERN BOOBOOK <i>Ninox novaeseelandiae</i>	R,F			X		
SAVANNA NIGHTJAR <i>Caprimulgus affinis</i>	R			X	X	Heard by Verheijen on Roti and Dao
SPOTTED DOVE <i>Streptopelia chinensis</i>	R		X	X	X	
[ISLAND COLLARED DOVE <i>S. bitorquata</i> ]	R		X			'Could be heard everywhere near the coasts of Roti' according to Verheijen (1976), but there have been no subsequent records
BLACK CUCKOO DOVE <i>Turacoena modesta</i>	RR,NTU,R,F				X*	
EMERALD DOVE <i>Chalcophaps indica</i>	R,F		X	X	X	Common and widespread
PEACEFUL DOVE <i>Geopelia striata</i>	R		X	X	X	
TIMOR GREEN PIGEON <i>Treron psittacea</i>	RR,EN,R,F		X		X	
ROSE-CROWNED FRUIT DOVE <i>Ptilinopus regina</i>	R,F		X	X	X	Common in forest and woodland
PINK-HEADED IMPERIAL PIGEON <i>Ducula rosacea</i>	RR,NTt,R,F		?X		X*	Verheijen saw an imperial pigeon ('aenea') on Nusa island, but did not record any on Roti
BUFF-BANDED RAIL <i>Gallirallus philippensis</i>	R		X			
WHITE-BREASTED WATERHEN <i>Amaurornis phoenicurus</i>	R		X	X	X	
WHITE-BROWED CRAKE <i>Porzana cinerea</i>	R		X	X	X	Verheijen saw an additional <i>Porzana</i> sp. but could not confirm its identity
PURPLE SWAMPHEN <i>Porphyrio porphyrio</i>	R	X				
DUSKY MOORHEN <i>Gallinula tenebrosa</i>	R			X	X	
COMMON COOT <i>Fulica atra</i>	V				X*	Two at Lake Oendui on 22 December 2004, rare in Wallacea



Name	Status	K	V	J	T	Notes
[SNIPE SP. <i>Gallinago</i> sp. (? <i>megala</i> )]	M		X			A snipe was seen by Verheijen's assistant but was not collected
BLACK-TAILED GODWIT <i>Limosa limosa</i>	M				X*	Seven at Lake Oendui on 20 December 2004 (first record for this month in Wallacea: Coates and Bishop 1997)
WHIMBREL <i>Numenius phaeopus</i>	M		X	X	X	Verheijen also recorded a second <i>Numenius</i> sp., probably Eastern Curlew <i>N. madagascariensis</i>
COMMON REDSHANK <i>Tringa totanus</i>	M			X		
MARSH SANDPIPER <i>T. stagnatilis</i>	M			X	X	Small numbers overwinter
COMMON GREENSHANK <i>T. nebularia</i>	M			X	X	Small numbers overwinter
WOOD SANDPIPER <i>T. glareola</i>	M		X	X	X	Small numbers overwinter
COMMON SANDPIPER <i>Actitis hypoleucos</i>	M		X	X	X	Small numbers overwinter
GREY-TAILED TATTLER <i>Heteroscelus brevipes</i>	M			X	X	
RUDDY TURNSTONE <i>Arenaria interpres</i>	M			X		
RED-NECKED STINT <i>Calidris ruficollis</i>	M				X*	One large flock on Lake Muke (see Table 2)
LONG-TOED STINT <i>C. subminuta</i>	M			X	X	Small numbers overwinter
SHARP-TAILED SANDPIPER <i>C. acuminata</i>	M			X	X	Probably overwinters; relatively large numbers at Muke
CURLEW SANDPIPER <i>C. ferruginea</i>	M				X*	
RED-NECKED PHALAROPE <i>Phalaropus lobatus</i>	M				X*	About 30 birds, 10 km north-east of Pantai Baru on 23 December 2004
COMB-CRESTED JACANA <i>Irediparra gallinacea</i>	R	X			X	The first Roti records since Ten Kate in 1891
BEACH THICK-KNEE <i>Esacus neglectus</i>	NT,R			X		Reported from Ndana island by Johnstone and Jepson (1996)
BLACK-WINGED STILT <i>Himantopus himantopus</i>	R	X		X	X	One immature was noted at Lake Muke and four immatures were present at Lake Oendui
PACIFIC GOLDEN PLOVER <i>Pluvialis fulva</i>	M		X	X	X	
GREY PLOVER <i>P. squatarola</i>	M				X*	
LITTLE RINGED PLOVER <i>Charadrius dubius</i>	M				X*	Two at Olokama on 21 December 2004; regionally rare
RED-CAPPED PLOVER <i>C. ruficapillus</i>	R				X*	
MALAYSIAN PLOVER <i>C. peronii</i>	NT,R		X			Known only from Doö island (Mees 1975)
LESSER SAND PLOVER <i>C. mongolus</i>	M			X		
ORIENTAL PRATINCOLE <i>Glareola maldivarum</i>	M				X*	Single flock of transients en-route to Australia on 17 December 2004
AUSTRALIAN PRATINCOLE <i>Stiltia isabella</i>	M	X		X		
GREAT CRESTED TERN <i>Sterna bergii</i>	R		X	X	X	Verheijen had records from on Roti and Doö
BLACK-NAPED TERN <i>S. sumatrana</i>	R			X		
LITTLE TERN <i>S. albifrons</i>	V		X			Verheijen saw 'many Little Terns ...near the coast of Roti'
BRIDLED TERN <i>S. anaethetus</i>	V		X	X		
SOOTY TERN <i>S. fuscata</i>	V		X	X		
WHISKERED TERN <i>Chlidonias hybridus</i>	M			X	X	
BROWN NODDY <i>Anous stolidus</i>	V		X	X	X	
[OSPREY <i>Pandion haliaetus</i> ]	R		X			Local people indicated to Verheijen the presence of a 'diving eagle'
ORIENTAL HONEY-BUZZARD <i>Pernis ptilorhynchus</i>	M			X	X	One bird over woodland near Sipu on 20 December 2004
BRAHMINY KITE <i>Haliastur indus</i>	R		X		X	Uncommon, one bird in immature plumage at Olokama
WHITE-BELLIED SEA EAGLE <i>Haliaeetus leucogaster</i>	R		?		X*	Frequent; four sightings of adults and immatures; Verheijen had no direct records
SHORT-TOED SNAKE EAGLE <i>Circaetus gallicus</i>	R		X			
BROWN GOSHAWK <i>Accipiter fasciatus</i>	R,F	X				
SPOTTED KESTREL <i>Falco moluccensis</i>	R	X		X		
[AUSTRALIAN HOBBY <i>F. longipennis</i> ]	R		X			'Three times I saw a small falcon rushing past in Roti (perhaps it is more likely to have been <i>Falco longipennis</i> )' (Verheijen 1976)
PEREGRINE FALCON <i>F. peregrinus</i>	R				X*	A single over Daurendale
LITTLE GREBE <i>Tachybaptus ruficollis</i>	R		?		X	Verheijen saw a small unidentified grebe at Lake Bais
AUSTRALASIAN GREBE <i>T. novaehollandiae</i>	?R				X*	

Name	Status	K	V	J	T	Notes
MASKED BOOBY <i>Sula dactylatra</i>	V					Reported by Bourne in White and Bruce (1986)
RED-FOOTED BOOBY <i>S. sula</i>	V				X*	One in Roti Strait on 16 December 2004
BROWN BOOBY <i>S. leucogaster</i>	V		X			Verheijen had observations around the coasts of Roti, Ndao and Doö
DARTER <i>Anhinga melanogaster</i>	NT,R				X*	
LITTLE PIED CORMORANT <i>Phalacrocorax melanoleucos</i>	R			X	X	Common on lakes
LITTLE BLACK CORMORANT <i>P. sulcirostris</i>	R		?		X*	Frequent on all wetlands; > 500 birds estimated on peninsula
WHITE-FACED HERON <i>Egretta novaehollandiae</i>	R		X	X		
LITTLE EGRET <i>E. garzetta</i>	?R			X	X	
PACIFIC REEF EGRET <i>E. sacra</i>	R		?	X	X	
PIED HERON <i>E. picata</i>	V			X		
GREAT-BILLED HERON <i>Ardea sumatrana</i>	NT,R		X			Observed regularly by Verheijen around Roti and Doö
PURPLE HERON <i>A. purpurea</i>	?R	X	X			Verheijen saw this species near Namodale
GREAT EGRET <i>Casmerodius albus</i>	R				X*	
INTERMEDIATE EGRET <i>Mesophoyx intermedia</i>	?R		X			Collected on Dao (Verheijen 1976) or Doö (according to Mees 1975)
CATTLE EGRET <i>Bubulcus ibis</i>			X	X	X	
LITTLE HERON <i>Butorides striatus</i>	R		X	X	X	
RUFOUS NIGHT HERON <i>Nycticorax caledonicus</i>	R		X	X	X	Several roosts of up to 20 birds were seen. Verheijen recorded from Doö
[BLACK BITTERN <i>Dupetor flavicollis</i> ]	R		?			Verheijen (1976) stated 'I believe to have seen' this bird; confirmation of its occurrence is needed
ROYAL SPOONBILL <i>Platalea regia</i>	V		?		X*	
AUSTRALIAN PELICAN <i>Pelecanus conspicillatus</i>	V				X	
GREAT FRIGATEBIRD <i>Fregata minor</i>			X			Observed by Verheijen along the coasts of Roti, Ndao and Doö
BULWER'S PETREL <i>Bulweria bulwerii</i>				X		
WEDGE-TAILED SHEARWATER <i>Puffinus pacificus</i>				X		
ELEGANT PITTA <i>Pitta elegans</i>	R,F		X		X*	Informants indicated presence of <i>Pitta</i> sp. to Verheijen
RED-HEADED MYZOMELA <i>Myzomela erythrocephala</i>	R			X		
BROWN HONEYEATER <i>Lichmera indistincta</i>	R		X	X	X	
HELMETED FRIARBIRD <i>Philemon buceroides</i>	R,F		X	X	X	Uncommon in forest and woodland
PLAIN GERYGONE <i>Gerygone inornata</i>	RR,R		X	X	X	
GOLDEN WHISTLER <i>Pachycephala pectoralis</i>	R			X	X	
LARGE-BILLED CROW <i>Corvus macrorhynchos</i>	R		X	X	X	
WHITE-BREADED WOODSWALLOW <i>Artamus leucorhynchus</i>	R		X	X	X	Verheijen had records from Roti and Dao
OLIVE-BROWN ORIOLE <i>Oriolus melanotis</i>	RR,R,F	X	X	X	X	
BLACK-NAPED ORIOLE <i>O. chinensis</i>	R			X		
TIMOR FIGBIRD <i>Sphecotheres viridis</i>	RR,R,F	X		X	X	
WALLACEAN CUCKOOSHRIKE <i>Coracina personata</i>	R,F		X	X	X	Recorded daily in forest
BLACK-FACED CUCKOOSHRIKE <i>C. novaehollandiae</i>	R		X	X		Verheijen had records from Roti and Dao
WHITE-SHOULDERED TRILLER <i>Lalage sueurii</i>	R		X	X	X	Common and widespread
NORTHERN FANTAIL <i>Rhipidura rufiventris</i>	R	X		X	X	
RUFOUS FANTAIL <i>R. rufifrons</i>	R		X	X	X	
SPANGLED DRONGO <i>Dicurus hottentottus</i>	R,F		X	X	X	Uncommon in forest
ISLAND MONARCH <i>Monarcha cinerascens</i>	R,F				X*	Frequent and widespread in forest and villages
SPECTACLED MONARCH <i>M. trivirgatus</i>	R,F				X*	Frequent and widespread in forest
BROAD-BILLED MONARCH <i>Myiagra ruficollis</i>	R		X	X	X	Common
ORANGE-SIDED THRUSH <i>Zosterops peronii</i>	RR,NT,R,F			X	X	
TIMOR BLUE FLYCATCHER <i>Cyornis hyacinthinus</i>	RR,R,F			X	X	
PIED BUSHCHAT <i>Saxicola caprata</i>	R	X	X	X	X	Ten Kate's specimen was lost
WHITE-BELLIED BUSHCHAT <i>S. gutturalis</i>	RR,NT,R,F	X			X	
SHORT-TAILED STARLING <i>Aplomis minor</i>	R,F			X		
PACIFIC SWALLOW <i>Hirundo tahitica</i>	R		X		X	Verheijen had records from Roti and Dao
ZITTING CISTICOLA <i>Cisticola jumidis</i>	R		X	X	X	
BRIGHT-HEADED CISTICOLA <i>C. exilis</i>	R		X			Verheijen saw males in breeding plumage singing near the coast
ASHY-BELLIED WHITE-EYE <i>Zosterops citrinellus</i>	R	X	X	X	X	

Name	Status	K	V	J	T	Notes
TIMOR STUBTAIL <i>Urosphena subulata</i>	RR,R,F				X*	
TIMOR LEAF WARBLER <i>Phylloscopus presbytes</i>	RR,R,F				X*	
AUSTRALASIAN BUSHLARK <i>Mirafra javanica</i>	R				X*	A single bird on the road 15 km east of Pantai Baru
RED-CHESTED FLOWERPECKER <i>Dicaeum maugei</i>	RR,R	X	X	X	X	
FLAME-BREASTED SUNBIRD <i>Nectarinia solaris</i>	RR,R		X	X	X	Verheijen had records from Roti and Dao
PADDYFIELD PIPIT <i>Anthus rufulus</i>	R		X	X	X	
RED AVADAVAT <i>Amandava amandava</i>	R		X	X		
ZEBRA FINCH <i>Taeniopygia guttata</i>	R		X	X	X	
BLACK-FACED MUNIA <i>Lonchura molucca</i>	R		?	X		
SCALY-BREASTED MUNIA <i>L. punctulata</i>	R			X		
FIVE-COLORED MUNIA <i>L. quinticolor</i>	R		X	X	X	Uncommon; two birds at Lake Oendui
PALE-HEADED MUNIA <i>L. pallida</i>	R		X			Dao island only. This species has recently been recorded on Timor (Trainor <i>et al.</i> in press)
[TIMOR SPARROW <i>L. fuscata</i> ]	RR,VU		?X			Verheijen (1976) stated 'I believe to have observed the Timor Sparrow'; confirmation is needed

### Key

#### Status

RR=Restricted-range (<50,000 km<sup>2</sup>: Stattersfield *et al.* 1998).

R=Resident

M=Migrant

F=Forest-dependent

V=Vagrant

CR=Critically Endangered

EN=Endangered

VU=Vulnerable

NT=Near Threatened

#### Records:

K=Ten Kate (1891–1893)

V=Verheijen (1976)

J=Johnstone and Jepson (1996)

T=present survey. New island records are denoted with an asterisk.

Unconfirmed records are included in square brackets