

# FOREST BIRD COMMUNITIES IN WESTERN SAMOA

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## ABSTRACT

The birds of Upolu and Savai'i, Western Samoa, were surveyed in August 1984. Birds were counted along a 2 km transect in O le Pupu-Pu'e National Park and 5-minute bird index counts were used in upland and lowland Savai'i.

There was a significant difference in the composition and density of bird communities between partly logged and unmodified tava (*Pometia pinnata*) forest. The composition of bird communities differed at varying altitudes both in the national park and in Savai'i. There were more species at higher altitudes on Savai'i, and rare species were recorded at only the higher altitudes on Upolu and Savai'i. The relative abundance and occurrence of threatened bird species were noted, and possible sightings of Puna'e, the Samoan Woodrail, in upland Savai'i were recorded.

## INTRODUCTION

Savai'i and Upolu, the largest of the Samoan island group (Fig. 1), have the most diverse bird fauna of this group, with 32 species of native birds (Watling 1982). All 11 endemic Samoan birds are on Savai'i, including one Western Samoan endemic, the Samoan White-eye.

The morphology, taxonomy and distribution of Western Samoan bird species have been reviewed in Mayr (1945), Ashmole (1963), du Pont (1972), Muse & Muse (1982), and Watling (1982). These authors also have commented on the breeding, foraging and status of rare bird species. Recent observations on the distribution of birds and the status of rare birds have been made by Yaldwyn (1952), Dhondt (1976), Child (1979), Reed (1980), and Lovegrove (1984). The only published work on the distribution of bird communities in Samoa is Amerson *et al.* (1982). However, this work was confined to American Samoa, which has fewer land bird species than Western Samoa.

We studied forest bird communities during a visit to Western Samoa on 14-31 August 1984. Birds were surveyed in different forest types and at a range of altitudes.

The forests in Western Samoa are under threat from forestry and agriculture. On Savai'i native forest logging has severely depleted the forest habitat of most of the endemic birds, particularly in the lowlands. This has continued on both Upolu and Savai'i, despite the development of exotic plantation forestry. Slash and burn gardening on both islands threatens large areas of upland forests, as farmers use forestry roads to gain access to formerly inaccessible land.



FIGURE 1 — Western Samoa. Locations referred to in the text are shown.

## Bird habitat

### *O le Pupu-pu'e National Park*

The distribution of the vegetation, landforms and vertebrates of the national park were broadly surveyed by Ollier *et al.* (1979). The national park ranges from sea level to 1100 metres, on Mt Fito. The park has four major landforms: uplands, wide valley systems, the O le Pupu lava field, and the coastal cliffs. Forest communities on these landforms, respectively, are maotea mea montane forest, mamalava and mafoa foothill forest, tava lowland forest, and littoral vegetation.

Maotea mea forest has a variable canopy height, from 6 m on the upper crater rims to 18 m on the upland plateaux. The dominant tree is maotea mea (*Dysoxylum huntii*). There are a dense ground cover and shrub layer and abundant epiphytes. This forest has a taller canopy at its lower altitudinal limit.

Mamalava forest dominates the foothills in the park. The canopy varies from 20 to 30 m. This is the most diverse forest type in Samoa. Although it has many tree species it is dominated by mamalava (*Planchonella torricelliensis*). There are a moderate ground cover and sparse shrub and subcanopy layers.

Unmodified tava lowland forest has an irregular canopy, up to 30 m high on the O le Pupu lava plain. The dominant tree is tava (*Pometia pinnata*). Mamalava'asi (*Syzygium inophylloides*), ma'ali (*Canarium samoense*) and tavai (*Rhus taitensis*) are also common. The ground cover is dense, especially in clearings, and the shrub and subcanopy layers are moderate to dense. Some of the tava forest within the national park has been selectively logged for canopy species. This partly logged forest has a lower canopy, a denser understorey and more clearings than unmodified tava lowland forest.

The littoral vegetation along the coastal cliffs has a number of plant communities that become taller and more diverse away from the coast. Whistler (Ollier *et al.* 1979) described four littoral vegetation communities at O le Pupu-Pu'e National Park: *Lepturus* strand vegetation, *Scaevola* littoral scrub, *Pandanus* littoral forest and *Calophyllum* littoral forest.

#### *Upland Savai'i*

Upland Savai'i is covered in continuous cloud forest and receives over 6000 mm of annual rainfall. Despite this high rainfall, the ground seems to be relatively free-draining and the soil and ground layers retain little moisture. The forest canopy is generally less than 18 m tall and has abundant epiphytes (Whistler 1979). In this *Spiraanthemum* – *Dysoxylum* forest, the largest trees are *Reynoldsia pleiosperma* and *Homalanthus accuminatus*.

Wild cattle and pigs have browsed the understorey and groundcover along the main range. Vegetation is unmodified on the flanks of the many craters along the main range.

#### *Tafua*

The Tafua peninsula area is a broad, flat lava flow with many collapsed lava tubes. There is almost no soil cover and little moisture is retained.

This lowland area (less than 60 m a.s.l.) is the largest area of lowland tava forest on Savai'i. Although there are small clearings through this forest in various stages of regeneration, most of the forest is unmodified.

As one approaches the coast, the forest type changes from tava forest through to *Pandanus* forest, and *Hibiscus tilliaceus* becomes more common, together with occasional *Callophyllum* trees. Landward from the *Pandanus* screen along the coast is a mixed forest of *Barringtonia*, *Hernandia*, *Pisonia* and many large *Asplenium nidus* ferns and Polynesian arrowroot (*Tacca leontopetalloides*).

## METHODS

*Transect in the national park:* We spent the first 5 days becoming familiar with the identification of forest birds in the national park. We were assisted by national park staff, particularly with the bird calls.

Ten transects (two per day) were run along a 2 km track, from the O le Pupu-Pu'e National Park headquarters towards the Pe'ape'a Caves. The first kilometre of the transect was in partly logged tava forest and the second kilometre in unmodified tava forest.

The transects were started between 0700 and 0830, the second observer starting out an hour after the first to minimise dependent data and bird disturbance. The transect lines were walked slowly, covering 0.8-1.0 km per hour. All birds seen and heard within 10 m on either side of the track were recorded.

A multivariate analysis of variance (manova) was used to compare differences in the composition and density of species between partly logged and unmodified forest. The eight commonest species were used in the analysis i.e. Wattled Honeyeater, Samoan Whistler, Samoan Broadbill, Samoan Starling, Cardinal Honeyeater, Samoan Fantail, White-throated Pigeon,

Scarlet Robin. White-rumped Swiftlets were not used in the analysis because their numbers varied widely between counts.

*Bird distribution in the national park:* Bird distribution and relative abundance were recorded throughout the national park at different altitudes. A day was spent in each of these forest types: coastal fringe, mamalava foothill forest, tall montane forest, low montane forest and exotic plantation. We recorded all birds seen and heard, taking care not to record them more than once. At the end of the day, we added the numbers of each species to get a crude estimate of abundance of bird species in each forest type. Bird abundances in tava lowland forest were derived from the transects described above.

*Five-minute bird index counts on Savai'i:* These were used to get an indication of the species present and relative bird numbers within and between upland and lowland forest. All birds seen and heard for a 5-minute period were recorded. We took care not to count birds more than once. We attempted to standardise our index counts by counting at similar times of the day and in similar weather conditions. We used bird index counts when our time was limited and we were unable to set up transects.

## RESULTS

### **Transect in the national park**

We recorded 21 bird species, 18 in partly logged and 20 in unmodified tava forest. The total number of birds in each forest type was similar, the mean number of birds per transect ( $\pm$  standard error) was  $35.4 \pm 2.31$  in partly logged forest and  $33.6 \pm 1.38$  in unmodified forest.

The manova showed significant difference in the bird composition and density between partly logged and unmodified forest. The Hotelling-Lawley trace statistic for the manova was  $f(8,2) = 103.08$ ,  $p < 0.0096$ .

Partly logged forest differed from unmodified forest in having higher numbers of Samoan Starling, Cardinal Honeyeater, White-rumped Swiftlet and Polynesian Triller. Samoan Fantail, White-throated Pigeon, Red-headed Parrotfinch and Crimson-crowned Fruit Dove had higher numbers in unmodified forest. There were only slightly higher numbers of Pacific Pigeon and Polynesian Starling in partly logged forest, and of Wattled Honeyeater and Scarlet Robin in unmodified forest. Mao were found only in unmodified forest. Samoan Whistler, Samoan Broadbill and Flat-billed Kingfisher had very similar numbers in both forest types. The most common bird in both forest types was the Wattled Honeyeater, which was twice as common as any other bird. Some of the 21 species recorded were rarely encountered on the transects.

### **Bird distribution in the national park**

We found 21 bird species within the national park. Six of these species were in the coastal fringe, 16 in the tava lowland forest, 13 in the mamalava/mafoa foothill forest, 10 in the tall maotea mea montane forest, and 14 in the low maotea mea montane forest (including craters). Six species were recorded in the exotic forest plantation adjacent to the national park. The number of species in the tava lowland forest may be higher because we spent longer there.

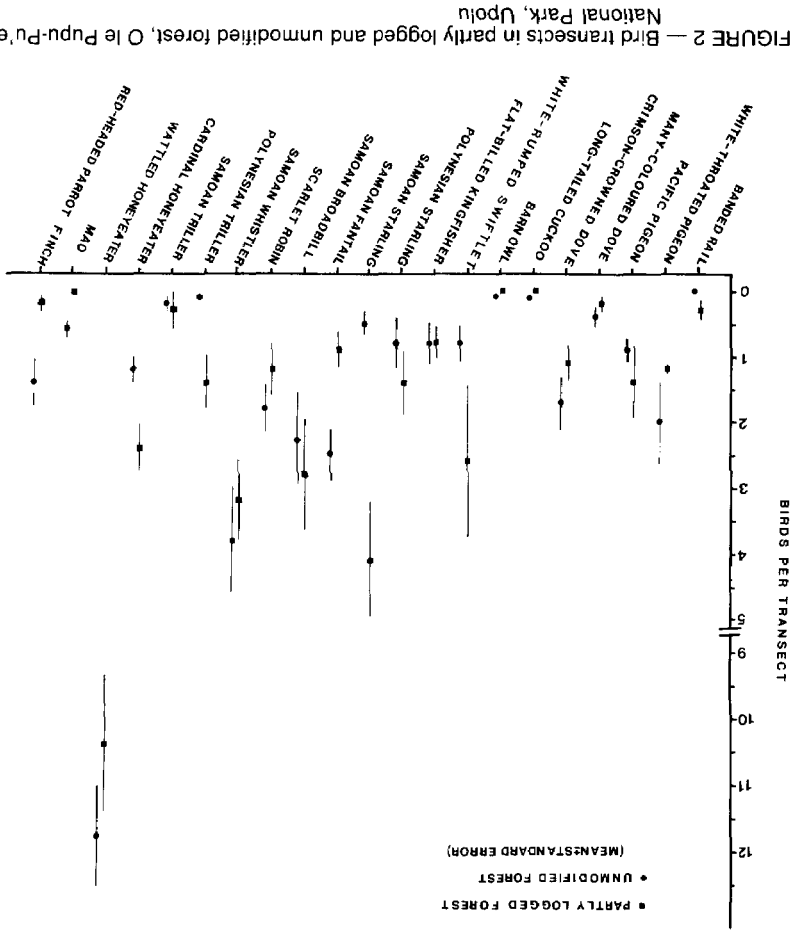
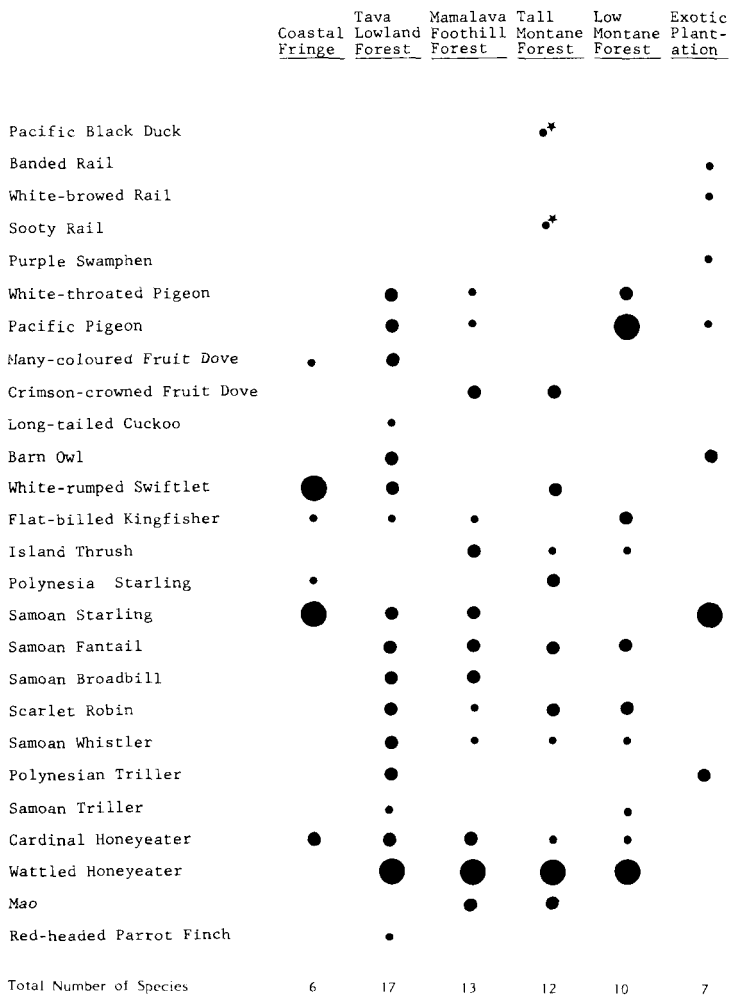


FIGURE 2 — Bird transects in partly logged and unmodified forest, O le Pupu-Pu'e National Park, Upolu

Neither pigeon species was found in the coastal fringe, Pacific Pigeon whereas White-throated Pigeon reached only the tall montane forest. The two dove species also showed quite different distributions. The Many-colored Fruit Dove was seen in the coastal fringe and tava lowland forest, whereas the Crimson-crowned Fruit Dove was at higher altitudes. The three honeyeaters had different distribution patterns. The Cardinal Honeyeater was at all altitudes, decreasing in abundance in the montane forest, the Wattled Honeyeater was abundant at all altitudes, and the Mao Honeyeater was only in foothill and montane forest, being particularly common in the craters at high altitude.



Key: ● Abundant  
 ● Common/Frequent  
 • Occasional/Rare  
 \* Crater lake in montane forest

FIGURE 3 — Relative abundance of bird species distributed across the altitudinal vegetation sequence in O le Pupu-Pu'e National Park

The Polynesian Starling was common only at the highest altitude, whereas the Samoan Starling was abundant in the coastal fringe and forest clearings, decreasing markedly at higher altitudes. The Polynesian Triller had a similar distribution pattern to the Samoan Starling. The Samoan Triller was in tava lowland and tall montane forest, but was nowhere common. It lives in the shrub forest layer and is inconspicuous.

The Samoan Whistler, Samoan Fantail, Samoan Broadbill and Scarlet Robin were found at all altitudes except the coastal fringe. Samoan Whistler and Samoan Broadbill were commonest in the tava lowland forest, whereas the Samoan Fantail and Scarlet Robin were commonest at higher altitudes.

The Island Thrush was uncommon in foothill and montane forest. The Red-headed Parrot Finch was rare and very limited in distribution, being seen only in tava lowland forest. The White-rumped Swiftlet and Flat-billed Kingfisher ranged from the coastal fringe to tall montane forest, but the kingfisher was common only in tall montane forest. The Sooty Rail, White-browed Rail and Pacific Black Duck were found in the crater wetlands at the highest altitudes.

In exotic forest plantations adjacent to the national park, the Samoan Starling and Polynesian Triller were common. Also seen there were Barn Owl, Banded Rail, White-browed Rail and Purple Swamphen.

#### **Upland and lowland Savai'i**

In the 5-minute bird counts, we recorded 18 species in upland Savai'i and 14 species in lowland Savai'i. There was a minor difference in overall bird numbers; the upland forest had  $21.33 \pm 1.38$  birds per 5 minutes and the lowland forest had  $17.92 \pm 1.7$  birds per 5 minutes.

We observed similar numbers of Wattled Honeyeater, Pacific and White-throated Pigeons, and Crimson-crowned Fruit Dove in both areas. Several birds had higher numbers in the lowland forest – Flat-billed Kingfisher, Samoan Whistler, White-rumped Swiftlet and Polynesian Starling, and in particular Samoan Broadbill, which was six times more common than in upland forest. However, Samoan Fantail, Scarlet Robin and Cardinal Honeyeater were found in higher numbers in upland forest, and Mao, Tooth-billed Pigeon, Samoan White-eye and possibly the Samoan Woodrail were encountered only in upland forest.

The most common bird in both lowland and upland forest was the Wattled Honeyeater. The next most common were Samoan Broadbill, Crimson-crowned Fruit Dove and Samoan Whistler in lowland and Crimson-crowned Fruit Dove and Cardinal Honeyeater in upland forest.

#### **Rare birds**

*Samoan Woodrail*: We had two possible sightings of this bird in the upland forests of Savai'i, 1 km west of Mount Elietoga, while on a traverse from the end of the Asau forestry road towards Mt Silisili. On 22 August, National Parks Officer Kolati Poai briefly saw a bird like a small Purple Swamphen. It had a yellow forehead and was dark grey on the back and wings, with red legs.

On 23 August, MB flushed a small ground bird from a crater floor. It scrambled and fluttered across the thick vegetation away from him into dense

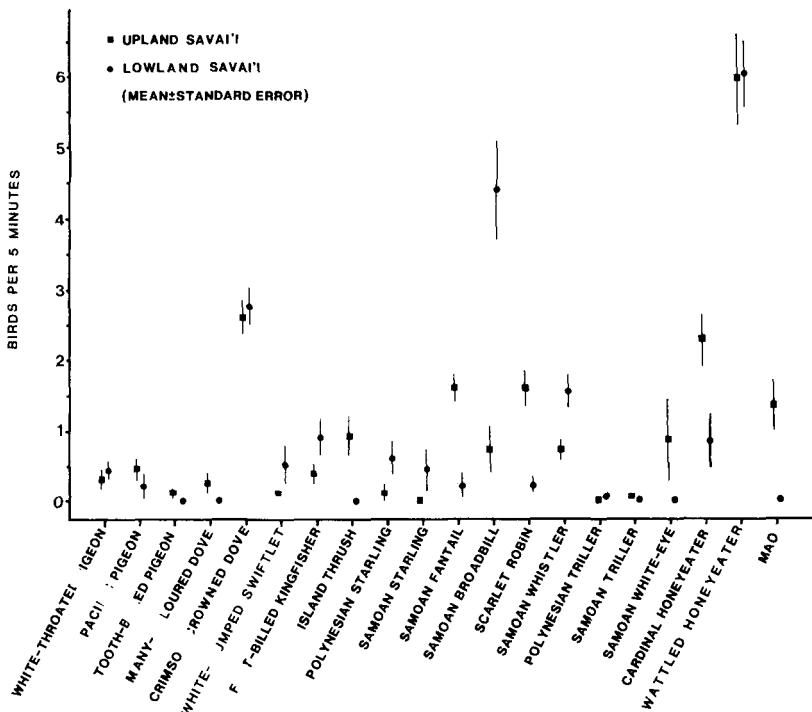


FIGURE 4 — Bird transects in upland and lowland forest on Savai'i.

undergrowth and disappeared. It had long red legs, was slightly larger than a Banded Rail, and had a dark grey back and wings with a lighter grey rump.

Unfortunately neither sighting was verified by other members of the party.

*Friendly Quail Dove:* We did not see this bird on Upolu or Savai'i. It apparently has not been seen for at least 35 years. Although du Pont (1972) stated that this bird was found in dense forest above 1100 m, the last recorded sighting in Western Samoa is in Yaldwyn (1952), who stated that it "appears to be rare; occasionally seen on the ground at Vaitoto (D. V. Cobercroft)".

*Tooth-billed Pigeon:* We heard this pigeon occasionally in upland Savai'i but saw it only rarely, in the lower forest tiers. It has been seen recently in upland Upolu (Kolati Poai, pers. comm.) and at Tiavi Falls, Upolu, by Dhondt (1976).

*Samoan White-eye:* Noisy flocks of 15-20 birds were not uncommon, feeding in the canopy of the upland forests of Savai'i.

*Mao:* We saw and heard the Mao in the upland and foothill forests of Upolu and Savai'i. It seemed to have a good population in the area we traversed in upland Savai'i. It dominated the early dawn and dusk choruses, being



particularly vocal in the craters surrounding Mt Fito, in O Le Pupu-pu'e National Park, and on upland Savai'i. Mao has also been recorded at Tiavi Falls (Orenstein 1976 and Dhondt 1976) and at Pe'ape'a Cave in the national park (Lovegrove 1984).

*Pacific Black Duck*: We saw this duck in the marsh in Vaivai Crater, on the main range in the national park. It is rare in Western Samoa, and in American Samoa (Amerson *et al.* 1982), where freshwater and coastal wetlands are few and small.

*Sooty Rail*: Sooty Rail were heard in Vaivai crater. It is rare in Samoa, not even having a local name.

### Notes on other birds

*Blue-crowned Lory*: Lories were commonly seen feeding on coconut flowers in the agricultural plantation adjacent to the national park. They were also seen on the southern foothills of Savai'i feeding in flocks on *Elaeocarpus ulianus* flowers growing between newly established agricultural plantations.

*White-rumped Swiftlet*: Swiftlets were often seen emerging from lava caves, especially in Tafua forest, where collapsed lava caves are common. Swiftlets were seen nesting in Pe'ape'a Cave in the national park, more than 300 m from the nearest cave opening.

*Exotic birds*: Jungle Fowl was the only exotic bird we saw in forests on Upolu and Savai'i. Jungle Myna and Red-vented Bulbul were in open areas and plantations but not in natural forests. Jungle Myna was seen only on Upolu.

## DISCUSSION

Partial logging of lowland tava forest has changed the species composition and the density of individual bird species, although the total bird numbers were similar in partly logged and in unmodified forest, except for Banded Rail. The Mao was found only in unmodified forest and the Red-headed Parrot Finch was restricted mainly to that type. More than half the species had higher numbers in unmodified forest. White-throated Pigeon, Crimson-crowned Fruit Dove, and Samoan Fantail were much more numerous in unmodified forest. Samoan Starling, Polynesian Triller, Cardinal Honeyeater and White-rumped Swiftlet were more common in partly logged forest, where they were often found in canopy gaps. Blue-crowned Lory, Samoan Starling, Polynesian Triller, and Banded and White-browed Rails also were commonly found in forestry and agricultural plantations.

Amerson *et al.* (1982) noted that lowland rain forest on Tutuila, American Samoa, contained large numbers of birds, particularly nesting Crimson-crowned Fruit Dove, Wattled Honeyeater, Polynesian Starling and White-tailed Tropicbird. They also found that Cardinal Honeyeater, White-rumped Swiftlet, Pacific Pigeon and Blue-crowned Lory had higher densities in secondary forest than in rain and ridge forests.

In upland and lowland Savai'i, the forest bird communities had similar total bird numbers and number of species, but the species composition differed. Samoan Broadbill and Flat-billed Kingfisher were found predominantly in lowland forest and Samoan Fantail mainly in upland forest.

Mao, Tooth-billed Pigeon, Samoan White-eye and Island Thrush were found only in upland forest on Savai'i at the time of our survey.

Our survey was undertaken only in one part of the year and does not take into account any seasonal bird movements between unmodified forest and modified habitats and between different altitudes. Blue-crowned Lory were found mainly in coconut plantations. They probably use forest areas at other times of the year, when trees are in bloom (Amerson *et al.* 1982).

Our results concurred with previous observations on the commoner forest bird species by Yaldwyn (1952), Dhondt (1976), Child (1979), Reed (1980), and Muse & Muse (1982). However, it is difficult to assess the status of the rarer birds in Western Samoa from the sparse information available on population size, distribution and habitat requirements. However, past records are anecdotal and often conflicting. The Tooth-billed Pigeon is a good example; Yaldwyn (1952) noted it was "not as common as it was", while Dhondt (1976) said it was rare and also "not so rare in the forest". Reed (1980) considered it rare and endangered. Of these authors, Reed (and her party) were the only observers to have spent time in the upland forests of Savai'i, the major area of Tooth-billed Pigeon habitat.

From our observations in a wide range of forest types in Western Samoa, the habitat of Tooth-billed Pigeon, Mao and Samoan White-eye is now restricted to prime upland forests. The Scarlet Robin, Samoan Triller and Island Thrush, being found mainly at higher altitudes and in low numbers in modified forests, may also be threatened.

The Friendly Quail Dove appears to be an enigma: it is common in Fiji and some of the northern Tongan islands (Watling 1982), and present on Ofu and possibly Olosega Islands in American Samoa (Amerson *et al.* 1982). It may have always been in low numbers in Western Samoa, where its population could be subject to periodic extinction and reinvasion from Tonga.

Lovegrove and his party saw Tooth-billed Pigeon, Mao and Samoan White-eye at their camp near Mt Elietonga (Lovegrove 1984). When we visited this site two years later, it had been cleared for a forestry plantation. None of these three birds were found in forestry plantations on Savai'i by Lovegrove (*pers. comm.*).

It is imperative that a range of representative habitats be preserved in Western Samoa. This is urgently needed in Savai'i, where there are no reserves to represent unique habitats and endemic flora and fauna. The upland forests support populations of the rare Tooth-billed Pigeon, the Mao, the endemic Samoan White-eye and possibly the Samoan Woodrail. The Tafua forest area had large numbers of birds in unmodified lowland and coastal forest, with adjoining mangrove habitats.

There has been little research into the population size, distribution and ecology of any Samoan birds. Research priorities in Western Samoa must include Samoan White-eye, Tooth-billed Pigeon and Mao. Further searching for the Samoan Woodrail and Friendly Quail Dove on Savai'i may yet be fruitful. This research is necessary for the preservation of the rare bird species and for the design of reserves in Western Samoa.

## APPENDIX

SAMOAN NAME (K.Poai)	ENGLISH NAME	SCIENTIFIC NAME
Toloa	Pacific Black Duck	<i>Anas superciliosa petewensis</i>
Moa'aivao	Jungle Fowl	<i>Gallus gallus</i>
Ve'a	Banded Rail	<i>Gallirallus philippensis</i>
Vai	White-browed Rail	<i>Poliolimnas cinereus tannensis</i>
-	Sooty Rail	<i>Porzana tabuensis tabuensis</i>
Manuali'i	Purple Swamphen	<i>Porphyrio porphyrio</i>
Puna'e	Samoa Woodrail	<i>Pareudiastes pacificus</i>
Fiaui	White-throated Pigeon	<i>Columba vitiensis</i>
Tu'aimeo	Friendly Ground Dove	<i>Gallicolumba stairii</i>
Lupe	Pacific Pigeon	<i>Dacula pacifica pacifica</i>
Manume'a	Tooth-billed Pigeon	<i>Didunculus strigirostris</i>
Manuma	Many-coloured Fruit dove	<i>Ptilinopus peroussi</i>
Manutagi	Crimson-crowned Fruit dove	<i>Ptilinopus porphyraceus</i>
Segavao	Blue-crowned Lory	<i>Vini australis</i>
'Aleva	Long-tailed Cuckoo	<i>Eudynamis taitensis</i>
Lulu	Barn Owl	<i>Tyto alba lulu</i>
Pe'ape'a	White-rumped Swiftlet	<i>Collocalia spodiopygia</i>
Ti'otala	Flat-billed Kingfisher	<i>Halcyon recurvirostris</i>
Manu palagi	Red-vented Bulbul	<i>Pycnontus cafer bengalensis</i>
Tutulili	Island Thrush	<i>Turdus poliocephalus samoensis</i>
Miti tai	Polynesian Starling	<i>Aplonis tabuensis brevirostris</i>
Fuia	Samoa Starling	<i>Aplonis atrifusca</i>
Se'u	Samoa Fantail	<i>Rhipidura nebulosa</i>
Tolai fatu	Samoa Broadbill	<i>Myiagra albigentris</i>
Tolai ula	Scarlet Robin	<i>Petroica multicolor</i>
Vasavasa	Samoa Whistler	<i>Pachycephala flavifrons</i>
Miti vao	Polynesian Triller	<i>Lalage maculosa</i>
Miti tai	Samoa Triller	<i>Lalage sharpei</i>
-	Samoa White-eye	<i>Zosterops samoensis</i>
Segasegamau'u	Cardinal Honeyeater	<i>Myzomela cardinalis</i>
Iao	Wattled Honeyeater	<i>Foulehaio carunculata</i>
Ma'otma'o	Mao	<i>Gymnomyza samoensis</i>
Manu ai pa'u la'au	Red-headed Parrot Finch	<i>Erythrura cyaneovirens</i>

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## LITERATURE CITED

- AMERSON, A. B. Jr.; WHISTLER, W. A.; SCHWANER, T. D. 1982. Wildlife and wildlife habitat of American Samoa. Ed. R. C. Banks. 2 vol. Washington: U.S. Fish and Wildlife Service.
- ASHMOLE, M. J. 1963. Guide to the Birds of Samoa. Pacific Science Information Center. Bernice P. Bishop Museum, Honolulu, Hawaii. 21 pp.
- CHILD, P. 1979. Some bird observations from Western Samoa. *Notornis* 26: 171-179.
- DHONDT, A. 1976. Bird observations in Western Samoa. *Notornis* 23: 29-43.
- du PONT, J. E. 1976. South Pacific Birds. Delaware Mus. Nat. His., Monograph No. 3. 218 pp.
- LOVEGROVE, T. 1984. The South West Pacific Expedition. *Forest and Bird* 15 (1): 21-28.
- MAYR, E. 1945. Birds of the South West Pacific. New York: MacMillan. 316 pp.
- MUSE, C.; MUSE, S. 1982. Birds and Bird Lore of Samoa. O Manu Ma Tala'aga o Manu o Samoa. Pioneer. Walla Walla, Washington. 156 pp.
- OLLIER, C. D.; WHISTLER, W. A.; AMERSON, A. B. Jr. 1979. O Le Pupu-Pu'e National Park, Samoa. Vol. I and II. UNDAT (United Nations Development Advisory Team). Suva.
- ORENSTEIN, R. I. 1979. Notes on the Ma'o (*Gymnomyza samoensis*), a rare Samoan Honeyeater. *Notornis* 26: 181-184.
- REED, S. 1980. The birds of Savai'i, Western Samoa. *Notornis* 27: 151-159.
- WATLING, R. 1982. Birds of Fiji, Tonga and Samoa. Wellington: Millwood. 176 pp.
- WHISTLER, W. A. 1978. Vegetation of the montane region of Savai'i, Western Samoa. *Pacific Science* 32 (1): 79-94.
- YALDWYN, J. C. 1952. Notes on the present status of Samoan birds. *Notornis* 5: 28-30.

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