

## Birds of Uvea (Wallis), Futuna and Alofi islands (South-West Pacific): an update

JEAN-CLAUDE THIBAULT\*

Muséum National d'Histoire Naturelle, département Systématique et Evolution, 55 rue Buffon, 75005 Paris, France

ALICE CIBOIS

Department of Mammalogy and Ornithology, Natural History Museum of Geneva, CP 6434, 1211 Geneva 6, Switzerland

JEAN-YVES MEYER

Délégation à la Recherche, Gouvernement de la Polynésie française, B.P. 20981 Tahiti, Polynésie Française

**Abstract** Alofi, Futuna and Uvea (also called Wallis), 3 islands situated north of Fiji and Tonga archipelagos, are rarely visited by ornithologists. We present new data on the avifauna obtained during surveys in 2014 and we compare them with previous surveys made in the 1920s, 1980s and 1990s. We recorded the extirpation of 1 species (friendly ground-dove, *Alopecoenas stairi*) probably related to predation, and the decline of another (lesser shrikebill, *Clytorhynchus vitiensis*) linked to deforestation. Although the recent arrival of the black rat (*Rattus rattus*) in Futuna is a potential threat for the blue-crowned lorikeet (*Vini australis*), no decline is apparent at the present time. In general, most landbirds seemed common despite loss of native habitats and hunting pressure; similarly, the seabird populations and number of species appeared stable, a situation probably linked with the general decrease of harvesting. Finally, 2 breeding species (spotless crane, *Zapornia tabuensis*, and tropical shearwater, *Puffinus bailloni*) and 3 vagrants (white-faced heron, *Egretta novaehollandiae*, masked lapwing, *Vanellus miles*, and pectoral sandpiper, *Calidris melanotos*) are added to the list.

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### INTRODUCTION

In Western Polynesia, 4 oceanic islands are peripheral to the 3 main archipelagos of Fiji, Tonga and Samoa, namely, from west to east, Rotuma (a Fijian dependency), Futuna, Alofi, and Uvea (also called Wallis Island) (Fig. 1). The last 3 islands belong to the French Overseas Collectivity of Wallis

and Futuna. Compared to the nearby archipelagos, these isolated islands have few seabird colonies and a low number of landbirds, but share a similar assemblage of species (Watling 2004). They have been rarely surveyed for birds, despite the occurrence of several endemic sub-species. We present here an update of the list of birds of Alofi, Futuna and Uvea (Wallis) conducted during a survey made in 2014, and we compare these data with previous bird surveys conducted in April-May 1925 (J.G. Correia

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\*Correspondence: jnclthibault@aol.com

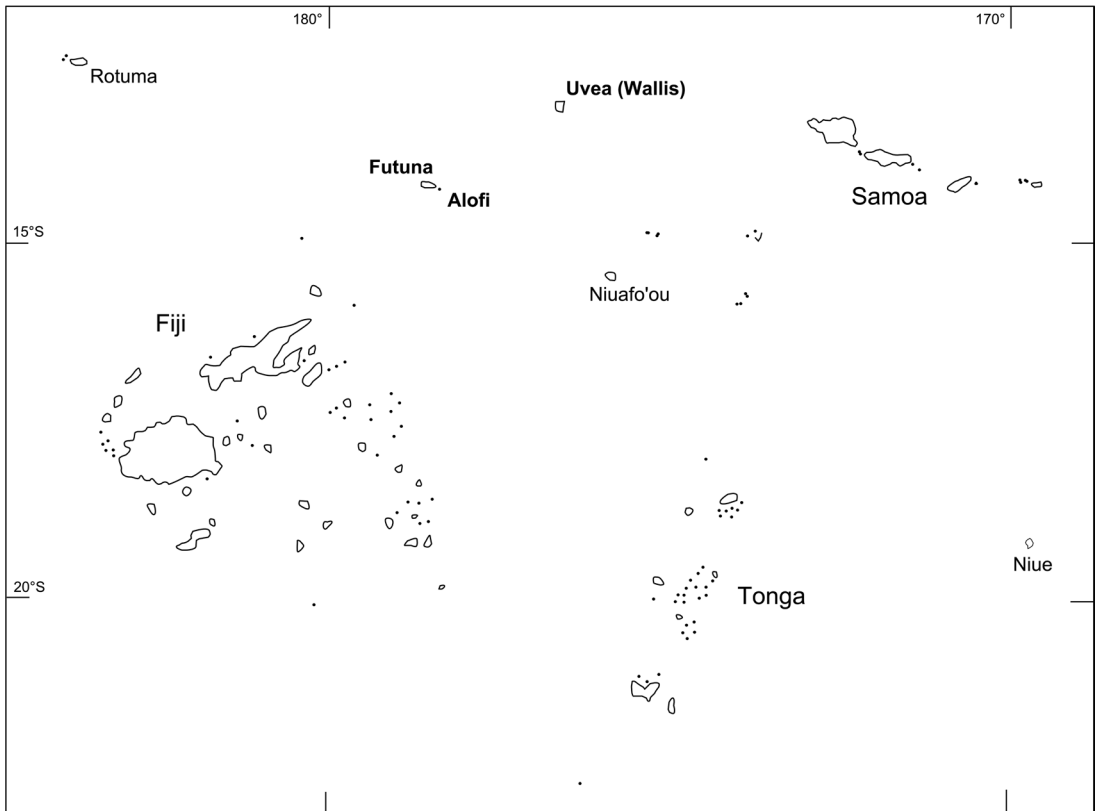


Fig. 1. Map of the location of Wallis & Futuna in the south-west Pacific.

MS), December 1985 and January 1986 (Guyot & Thibault 1987 for landbirds; Thibault & Guyot 1987 for breeding seabirds), and September-October 1993 (Gill 1995).

## METHODS

### Island characteristics

Data on land area, altitude and number of inhabitants are presented in the Table 1. Futuna is separated from Alofi by 1.7 km, and Uvea (Wallis) by 230 km from Futuna. Seven main vegetation types can be distinguished [described in Meyer (2007), after Morat & Veillon (1985) and Hoff & Brisse (1990), following the classification of Whistler (2002) for the Samoa islands]: (1) wetlands including seashore mangroves (on Uvea only), swamp forests including *Hibiscus tiliaceus*, coastal and lake marshes, inland crater lake forests (on Uvea only), montane marshes (on Futuna only); (2) shore or coastal strand vegetation on calcareous (sandy) or basaltic (rocky) substrates including coastal shrubland and *Pandanus tectorius* scrubs; (3) shore or coastal forests including *Pisonia grandis* forest on sandy islets (only on Uvea offshore sandy

islets); (4) para or supra-littoral forest on calcareous (Alofi) or rocky (Uvea, Futuna) sea-cliffs; (5) lowland wet or rainforests in valleys, inland craters (on Uvea only), ridges and slopes; (6) montane wet or rainforests or cloud forest (on Futuna only, at Mt Puke above 500 m elevation); and (7) anthropogenic vegetation including secondary forests, fernland (*Dicranopteris linearis*) and savannas called "toafa", cultivated or managed lands [irrigated wet taro fields (*Colocasia esculenta*), Caribbean pine (*Pinus caribaea*) forestry plantations, cultivations (*Cocos nucifera*, *Piper methysticum* and *Broussonetia papyfera*; mainly on Futuna and Alofi), house gardens, fallow land, etc.].

### Collection of data

We stayed on Uvea from 25 to 27 August, then from 20 to 27 September 2014, visiting all habitats on the mainland and 3 islets of the lagoon (known for their seabird colonies). Futuna was surveyed from 27 August to 20 September visiting all main habitats. Lastly, we spent and camped for 5 days on Alofi between the 1-5 September, then 1 day on 18 September, visiting the northern (from east to west) part of the island up to the summit (Mount

**Table 1.** Characteristics of the 3 islands of Wallis & Futuna archipelago.

Island	Land area (km <sup>2</sup> )	Max. altitude (m)	Number of inhabitants (2013)
Uvea (Wallis)	77.9	151	8,584
Futuna	46.3	524	3,613
Alofi	32	417	not permanently inhabited

Kolofau). Previously, one of us (JYM) has visited the southern and central side of Alofi from 20-23 November 2008 and 6-9 May 2011. The identity and presence of birds was confirmed observed visually, but for future molecular studies we also collected blood samples from 71 individuals mist-netted (permit granted by the Over-sea Collectivity). The status of each species was then compared to previous surveys (see introduction).

#### ANNOTATED CHECKLIST

We follow the nomenclature of Dickinson & Rensen (2013) for non-passerines and Dickinson & Christidis (2014) for passerines. Scientific name of the 4 endemic taxa is followed by \*.

##### **Pacific black duck** (*Anas superciliosa*)

**Uvea.** Breeder. Recorded on lakes, mainly Kikila Lake. Stable number estimated at less than 20 pairs, both 1985-86 and 2014. **Futuna.** Breeder. Not recorded in 1985-86. In 2014, number estimated at c. 50 individuals, visiting wet taro fields and coastal areas.

##### **Junglefowl** (*Gallus gallus*)

**Uvea.** Introduced. The sub-fossil bones obtained from archaeological excavations suggest an introduction that predates European exploration of the island (Balouet & Olson 1987). In 2014, numerous around inhabited areas, but no evidence of a feral population. **Futuna.** Introduced. In 2014, numerous on shore, mainly near houses, but also seen in a dense forest at Vele Point. **Alofi.** Introduced. Sub-fossil bones obtained from archaeological excavations suggest an old introduction (J.-C. Balouet, *in litt.*). In 2014, numerous at Alofitai (on the eastern side with a housing site) near the shore, but not recorded in the inland forest. Distribution and abundance on the 3 islands appears similar compared to the 20<sup>th</sup> century surveys.

##### **Rock dove** (*Columba livia*)

**Uvea.** Introduced. Small group near the Catholic Mission in 1985-86. **Futuna.** Introduced. Small group at Leava in 1993. Not recorded later and probably extinct.

##### **Friendly ground dove** (*Alopecoenas stairi*)

**Alofi.** Extirpated. Recorded in 1925, but in very

small numbers. In 1985-86, it was seen or heard 11 times during 5 days of bird surveys, both on shore and inland, in cultivated areas and dense rainforests. In 2008, 2011 and 2014, we did not detect the bird during a total of 13 days of field-investigation that covered most parts of the island. We consider this population as extirpated.

##### **Pacific imperial pigeon** (*Ducula pacifica*)

**Uvea.** Breeder. Present all-over the island, commoner in villages in 2014 than in 1985-86 due to the decrease of hunting. **Futuna.** Breeder. Rare in 1925 and localised to bottom of valleys in 1985-86; in 2014, it was still hunted, but noted all-over the island, including villages, suggesting a lower hunting pressure than previously. **Alofi.** Breeder. "Common" in 1925 according to Correia (MS) ; uncommon, but regularly seen in 1985-86. In 2014, it was not recorded on the shore and villages, but only in the dense forest and in small number.

##### **Uvea imperial pigeon** (*Ducula david*)

**Uvea.** Extinct. Date of extinction unknown, sub-fossil bones found in archaeological excavations (Balouet & Olson 1987). The presence of bones of both imperial pigeon species suggests that they co-existed on the island.

##### **Crimson-crowned fruit dove** (*Ptilonopus porphyraceus*)

**Uvea.** Breeder. In 1985-86, it occupied villages, native and secondary forests, cultivated areas, and several islets in the lagoon. In 2014, this species was still common despite the extensive loss of the dense forest, perhaps because it can survive in the gardens and cultivation that surround the increasing area of houses and which provide an abundance of fruits from *Cananga odorata* and *Ficus* spp. **Futuna.** Breeder. In 1985-86 and 2014, it was common but never numerous in all forested areas on shore and inland. **Alofi.** Breeder. In 1985-86 and 2014, common all over the island.

##### **Red-tailed tropicbird** (*Phaethon rubricauda*)

**Uvea.** Breeder. Isolated birds or displaying pairs seen several times on rocky islets in 1985 and 2014; breeding might be regular but it likely involves only a few pairs.

**White-tailed tropicbird** (*Phaethon lepturus*)

**Uvea.** Breeder. Breeds in holes in cliffs of crater lakes inland and perhaps in trees on several islets. Number seems stable between 1986-87 and 2014 with several tens of pairs. **Futuna.** Breeder. Breeds in small cliffs at the bottom of most inland valleys, and probably in forests at Vele Point. Number seems stable between 1986-87 and 2014 with 100-200 pairs. **Alofi.** Breeder. Breeds in the dense forest, with a stable number estimated at 10-99 pairs.

**White-rumped swiftlet** (*Aerodramus spodiopygius*)

**Futuna.** Breeder. Abundant, conducts continuous aerial feeding in all types of habitats, including beaches and shore at low tide; populations seem stable between 1985-86 and 2014. We surveyed several breeding sites (deep caves located on sea-cliffs), the most important with 500-700 occupied nests (number estimated from pictures). **Alofi.** Breeder. Common in both periods (1985-2014), but mostly inland where they hunt in clearances within cultivation and on the shore.

**Long-tailed cuckoo** (*Urodynamis taitensis*)

**Uvea.** Visitor. Recorded in April 1925 (Bogert 1937) and January 1986 (Guyot & Thibault 1987). **Futuna.** Visitor. Recorded in May and July 1925 (Bogert 1937); isolated birds on 28 August, 8, 9 and 16 September 2014 (this study); December 1985 (Guyot & Thibault 1987).

**Banded rail** (*Hypotaenidia philippensis*)

**Uvea.** Breeder. Very common, both in 1985-86 and 2014, all-over the mainland and on several islets, including near houses where it is very tame, despite the presence of dogs and brown rats (*Rattus norvegicus*). **Futuna.** Breeder. Quite common both in 1985-86 and 2014; found in wet taro fields, sometimes in high density, but scarce elsewhere on the coast; unrecorded inland. **Alofi.** Breeder. Several observations in 1985-86 on the coast, but unrecorded in 2014.

**Spotless crane** (*Zapornia tabuensis*)

**Futuna.** Breeder. First record for the island on 19 September 2014 in "toafa", below Mount Matatao (388 m), with 3 different individuals heard.

**Purple swamphen** (*Porphyrio porphyrio*)

**Uvea.** Breeder. Recorded all-over the island in cultivations including wet taro fields, secondary forests, gardens near houses, with the highest density being at Kikila Lake. **Futuna.** Breeder. Uncommon, probably because hunted and considered as a pest by farming communities. Not recorded in 1985-86, and only twice in 2014 (in a cultivation of tuber on the coast and in a dense humid forest inland). **Alofi.** Breeder. Present inland in cultivation and secondary forest in 1985-86, but only heard once on

the coast in 2014, suggesting a possible decline due to over-hunting in relation with the recent extension of cultivation.

**Tropical shearwater** (*Puffinus bailloni*)

**Futuna.** Breeder. First record for the island. Several individuals calling in flight at the summit of Mount Puke (524 m) at night, early in the morning on 30 August 2014.

**White-faced heron** (*Egretta novaehollandiae*)

**Uvea.** Visitor. First record for the island. One adult seen on 24 and 26 September 2014 at Alofivai Lake.

**Pacific reef egret** (*Egretta sacra*)

**Uvea.** Breeder. Recorded on shore, islets and lakes, both in 1985-86 and 2014. Occurrence of the 2 morphs, white and grey, in all periods; however, their ratio is inverted between 1985-86 (grey = 82%,  $n = 60$  sightings) and 2014 (grey = 41%,  $n = 27$  sightings). **Futuna.** Breeder. Recorded on shore, mouth of rivers, and probably breed in small cliffs inland. Only grey morphs recorded so far, but 1 white adult, with nuptial feathers, was observed on 17 September 2014; because this bird presented large grey spots on plumage, we think it was probably a "mottled" morph coming from elsewhere (Fiji or Tonga; Watling 2004). **Alofi.** Breeder. Recorded in small number at every visit; only grey morphs.

**Lesser frigatebird** (*Fregata ariel*)**Great frigatebird** (*Fregata minor*)

Visitor, possible breeder. Both species observed flying over the 3 islands or resting in red-footed booby colonies on Alofi and islets in the lagoon of Uvea. No breeding recorded.

**Red-footed booby** (*Sula sula*)

**Uvea.** Breeder. Breeding on at least 2 islets of the lagoon in 1985-86, 1993, and 2014; probably stable number estimated at less than 1,000 pairs. **Futuna.** Visitor. Seen permanently flying over the island and ashore, but probably not breeder. **Alofi.** Breeder. Breeding noted at west side, at Mafaa Point in 1985-86 and 2014 with a number estimated at 100-200 nests.

**Brown booby** (*Sula leucogaster*)

**Uvea.** Breeder. Breeding in small number (less than 100 pairs) on at least 2 islets of the lagoon. **Futuna.** Visitor. Non-breeding, a small resting place noted at Vele Point in September 2014. **Alofi.** Visitor and possible breeder in rocks at Mafaa Point in 1985-86, and 2014.

**Pacific golden plover** (*Pluvialis fulva*)

**Uvea.** Visitor. The commonest shorebird, recorded at each visit year-round, on shore, along some ponds (Kikila Lake), on piers, stadium, airstrip; number

estimated at *ca.* 1,000 individuals during autumn 2014. **Futuna.** Visitor. Recorded at each visit but in a smaller number, on shore, airstrip, wet taro fields, and “toafa” with low ferns up to 400 m asl. **Alofi.** Visitor. Few suitable areas, present in small number on shore, occasionally inland in open areas covered with low ferns.

**Masked lapwing** (*Vanellus miles*)

**Uvea.** Visitor. First record for the island. One bird (sub-species *novaeollandiae*) from 15 to 26 September 2014, visiting the airstrip and Alofivai Lake.

**Bristle-thighed curlew** (*Numenius tahitiensis*)

**Uvea.** Visitor. Recorded in December 1985 (1 individual) and September 1993 (2 individuals).

**Whimbrel** (*Numenius phaeopus*)

**Uvea.** Visitor. One record in December 1985 and one also in September 2014. **Futuna.** Visitor. One record in September 2014.

**Bar-tailed godwit** (*Limosa lapponica*)

**Uvea.** Visitor. Recorded in December 1985 (1-4 individuals). **Futuna.** Visitor. Single record in December 1985 and also in January 1986.

**Ruddy turnstone** (*Arenaria interpres*)

**Uvea.** Visitor. Recorded at each survey, by tens in autumn on shore at low tide and at Kikila Lake (maximum of 39 together). **Futuna.** Visitor. Less abundant, recorded at each survey (maximum 10 together).

**Pectoral sandpiper** (*Calidris melanotos*)

**Uvea.** Visitor. First record for the island. One bird (>1 year old) on the shore of Kikila Lake on 20 September 2014.

**Wandering tattler** (*Tringa incana*)

**Uvea.** Visitor. Regular visitor recorded year-round, mainly on the coast and on Kikila and Alofivai Lakes. Number could reach several hundred during autumn migration. **Futuna.** Visitor. Present, probably year-round, in lower number than on Uvea, on the shore, wet taro fields and mouth of rivers. **Alofi.** Visitor. Recorded on shore in small number.

**Brown noddy** (*Anous stolidus*)

**Uvea.** Breeder. Breeds on at least 5 islets of the lagoon and in smaller number in the cliffs of inland lakes. Number estimated at 1,000-2,000 pairs, seeming stable between 1985-86 and 2014. **Futuna.** Breeder. Breeds in a few valleys and in coconut groves (on the northern, more forested side of the island). Number estimated at less than 500 pairs. **Alofi.** Possible breeder. Recorded in small number in coastal forest, both in 1985-86 and in 2014.

**Black noddy** (*Anous minutus*)

**Uvea.** Breeder. Breeds on at least 2 islets of the lagoon with a number estimated at least at 1,000 pairs in 1985-86 and 2014.

**White tern** (*Gygis alba*)

**Uvea.** Breeder. Breeds on at least 3 islets of the lagoon and locally on the main island. Number estimated at several hundred pairs in 1985-86 and 2014. **Futuna.** Breeder. Breeds on coast, but mainly inland. Number estimated at several thousands in 1985-86, but only at several hundred in 2014. **Alofi.** Breeder. Very low number on coastal and inland forest (several tens pairs).

**Bridled tern** (*Onychoprion anaethetus*)

**Uvea.** Breeder. Very small population (less than 10 pairs) breeding on 2 islets of the lagoon, recorded both in 1985-86 and 2014.

**Black-naped tern** (*Sterna sumatrana*)

**Uvea.** Breeder. Very small population (less than 30 pairs) breeding on 3 islets of the lagoon, recorded both in 1985-86 and 2014. **Alofi-Futuna.** Visitor. A few non-breeders recorded in 1985-86 in the channel and along the coast of Alofi.

**Greater crested tern** (*Thalasseus bergii*)

**Uvea.** Visitor. A single record of one vagrant bird on 28 January 1986.

**Pacific harrier** (*Circus approximans*)

**Uvea.** Visitor. Collected during the 19<sup>th</sup> century (Wiglesworth 1891). One immature seen over Kikila Lake on 21 September 2014. **Futuna.** Visitor. One immature seen several times in December 1985 and January 1986.

**Pearly owl** (*Tyto delicatula*)

**Uvea.** Breeder. Regularly seen all-over the mainland, both in 1985-86 and 2014. **Futuna.** Breeder. regularly seen on coastal areas, both in 1985-86 and 2014. **Alofi.** Breeder. Although seen only in January 1986, it is a probable resident according to inhabitants.

**Collared kingfisher** (*Todiramphus chloris regina*\*)

**Futuna.** Breeder. Frequently recorded during each survey, mainly on coastal areas, but also inland near the summit. **Alofi.** Breeder. Common on coastal areas. The regression of coastal forest does not seem to affect its number, and secondary forests and gardens are now its main habitat.

**Blue-crowned lorikeet** (*Vini australis*)

**Uvea.** Extirpated. Last record during 1905-1909 period (Vialat 1919). **Futuna.** Breeder. Commonly distributed in coastal vegetation, mainly in villages and cultivations where food resources are more abundant. Number difficult to estimate, but at least



of several hundreds, with no decline noted between 1985-86 and 2014. **Alofi.** Breeder. Commoner in 1985-86 than in 2014, but it is a possible consequence of the period of food availability.

**Wattled honeyeater** (*Foulehaio carunculatus*)

**Futuna.** Breeder. Abundant at each survey, in all forested areas from coastal to upland dense forest near the summit. **Alofi.** Breeder. Abundant in all forested areas at all altitudes.

**Polynesian triller** (*Lalage maculosa futunae\**)

**Futuna.** Breeder. Never abundant since the first survey in 1925. No change noted between 1985-86 and 2014 with a number estimated at more than 100 pairs. Today, it occupies mainly "toafa" with stand of introduced Caribbean pines and edges of dense forest from sea-level (although mainly up to 50 m) to the highest summit. Absent from pure dense forest and cultivations. **Alofi.** Breeder. Rarely recorded at each survey since 1925; only one record in January 1986 in "toafa" below the Mt. Kolofau and one in September 2014 at the edge of a dense rainforest at 230 m asl.

**Lesser shrikebill** (*Clytorhynchus vitiensis fortunae\**)

**Futuna.** Breeder. Recorded during each survey. Occupy mainly dense humid forests inland up to the summit, only very locally secondary forests near villages. No estimate number available due to its discretion, but we observed a decline in 2014 after the destruction of a large part of the forest at Vele Point, for cultivation and extension of the airstrip. **Alofi.** Breeder. Commonly recorded in 1985-86 and 2014 in dense inland rainforest up to the summit, but absent from cultivations; number has decreased after clearance of at least 20% of the forested areas during the past 30 years (Morat *et al.* 1983).

**Chestnut-breasted mannikin** (*Lonchura castaneo-thorax*)

**Uvea.** Introduced. Probably introduced from New Caledonia. First recorded in 2007-08 with a small number and limited range (Theuerkauf *et al.* 2010). In 2014, number and range have significantly increased, spread to most habitats island, with the largest group of several hundreds of individuals seen near the airstrip.

**Common mynah** (*Acridotheres tristis*)

**Uvea.** Introduced. First recorded in 1999 [Rod Hay cited by Atkinson & Atkinson (2000)]. Theuerkauf *et al.* (2010) mentioned a group with 20 individuals in 2007-2008. In 2014, it was very shy, with only a single or a pair recorded in the main village of Mata Utu, and near 2 areas with cattle or pigs; number estimated to a few tens of birds.

**Jungle myna** (*Acridotheres fuscus*)

**Futuna.** Introduced. It is unknown if birds were introduced, ship-assisted, or if they colonised by themselves from nearby archipelagos (Watling 2004). First recorded in 2007 with number estimated at less than 100 individuals (Theuerkauf *et al.* 2010). In 2014, noted on coastal areas, but also flying over the summit of Mt Puke. Groups generally composed of less than 10 birds, although a group of more than 100 regularly was observed roosting near Leava; total number probably more than 1000. Visits cultivation, and pig stalls.

**Polynesian starling** (*Aplonis tabuensis fortunae\**)

**Uvea.** Breeder. Common on the mainland and on several islets, in all types of habitats. Feed largely in fruit trees near houses, and the current increase of urbanisation (houses and gardens) could increase its range and number. **Futuna.** Breeder. Common from shore to the summit inland on all vegetation types, although commoner near villages. **Alofi.** Breeder. Present all-over the island, more common in villages and cultivations than in the dense forest.

## DISCUSSION

Because of the small size of the islands and the relatively easy accessibility of most habitats, the inventory of the breeding landbirds is quite straightforward, but the discovery of the tropical shearwater on Futuna shows that these islands, like many others in the tropical Pacific, remain under-investigated for the nocturnal Procellariiformes. Further investigations should take place in the mountains of Futuna for the Tahiti petrel (*Pseudobulweria rostrata*) and on islets of Uvea for the wedge-tailed shearwater (*Ardenna pacifica*). Similarly, the list of vagrant birds could probably be increased with more regular surveys, which are limited now by the low number of local or visiting birdwatchers.

From a conservation point of view, the islands share 3 important ecological problems. First, forest clearance for cultivation is substantial despite the recent and slow decrease in the human population ([http://www.insee.fr/fr/themes/document.asp?ref\\_id=ip1251](http://www.insee.fr/fr/themes/document.asp?ref_id=ip1251)): this may be due in part to the absence of a forestry policy. Although some species, like the kingfisher, seem to adapt to this habitat change, the decrease of the dense native forest affects the population of shrikebills, whose range in Western Polynesia is contracting through a number of local extinctions (Watling 2004). A similar decline is evident in seabird colonies, especially on Alofi.

Second, several introduced birds and mammals, rats especially, pose potential threats to the native avifauna. The extinction of the friendly ground-dove from Alofi, restricting even more its

small range in Western Polynesia (Watling 2004), is part of a long process that started in the early 20<sup>th</sup> century, provoked mainly by the abundance of stray dogs, and the introduction of the brown rat in 2007-08 (Theuerkauf *et al.* 2010). The introduction of the black rat (*Rattus rattus*) on Futuna might be detrimental to several native birds, like shrikebills and lorikeets. It has been shown that Polynesian monarchs (*Pomarea* spp.) are very sensitive to nest predation by black rats, leading to the extinction of several taxa (Robertson *et al.* 1994; Thibault *et al.* 2002). The extinction of the blue-crowned lorikeet from Uvea is clearly related to the introduction of the black rat at the end of 19<sup>th</sup> or early 20<sup>th</sup> century. Thus the arrival of the black rat on Futuna, possibly in the 1990s (Theuerkauf *et al.* 2010), compromises the future of the lorikeet on the island. Although no sign of a decline was noted in 2014, the lorikeet is a long-lived species and rats predate mainly eggs or chicks, so a decline may not be apparent immediately (Rinke 1986). In the cases of the blue-crowned lorikeet on Niue (Wodzicki 1971; Powlesland *et al.* 2000) and the Marquesas lorikeet (*V. ultramarina*) on Ua Pou and Fatu Iva (Marquesas) (Seitre & Seitre 1992; *pers. obs.*), the resilience of population due to adults' survival delayed the population's extinction to one or several decades. On Futuna, we observed in 2014 only one juvenile being fed by an adult (for several tens of observations), and the 9 individuals caught with mist net were all in adult plumage. The impact of introduced predators on seabirds might be less important, although the low number of white terns on Uvea and its decline on Futuna could be attributed to the predation by the black rat. However, we cannot exclude the egg and chick predation by the native Pacific boa (*Candoia bibroni*) on Futuna and Alofi, or a natural fluctuation linked to the breeding period.

Finally, hunting is still an issue on the 3 islands, especially in the absence of a protected species list, although subsistence hunting has decreased over the last decades. The species the most affected by hunting today is the imperial pigeon, especially on Alofi, where designated hunters collected birds for Futunians' ceremonial occasions. On the basis of our survey and of the trends observed when comparing previous visits, we provided to the Collectivity a basic list of recommendations for the conservation of birds on Uvea, Futuna and Alofi (Thibault *et al.* 2014). Despite the fact that Alofi has been included on the list of Pacific islands needing protection for their natural richness for quite a long time (Dahl 1986), and a legal framework for nature protection adopted in 2006 ("Code de l'Environnement"), no bird species is protected by law and no nature reserve or other protected areas have been created.

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