Birds and terrestrial Mammals of Rotuma, Fiji islands

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Summary

Rotuma, Fiji, is a small and isolated island in the south-west Pacific, rarely visited by ornithologists. We present here our own observations, estimated numbers and distribution, completed by observations from previous scientists since the 19th century. The status of the four endemic landbirds (one species and three subspecies) is good, especially that of the Rotuman Myzomela, a splendid small honeyeater. However, the recent arrival of the Common Myna is a concern. Additionally, future introductions of predators, like the Mongoose or the Black Rat, are still possible and they could modify very rapidly the island's status. The vigilance of the Biosecurity Authority Fiji in controlling containers and cargo-ships, both at their departure from Suva and on their arrival to Rotuma, is thus very important. Concerning mammals, the Sheath-tailed Bat, abundant 30 years ago, seems now to be extinct.

Male Rotuman Myzomela

Introduction

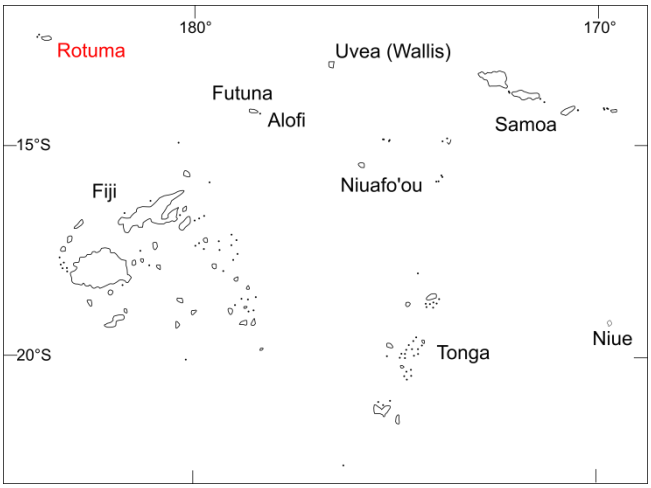

Figure 1. Situation of Rotuma

Presentation of Rotuma

Rotuma is a very isolated island in the Pacific Ocean, located 2°30' S latitude and 177'W longitude, with an area of *ca.* 4,700 ha (including probably islets; data from Wikipedia). It lies 465 km away from the nearest Fijian Island, 545 km from Futuna, 720 km from Uvea (Wallis), and *ca.* 1,000 km from the nearest Vanuatu island (Pentecote I.). Rotuma Island itself is 14 km long and 4 km wide.

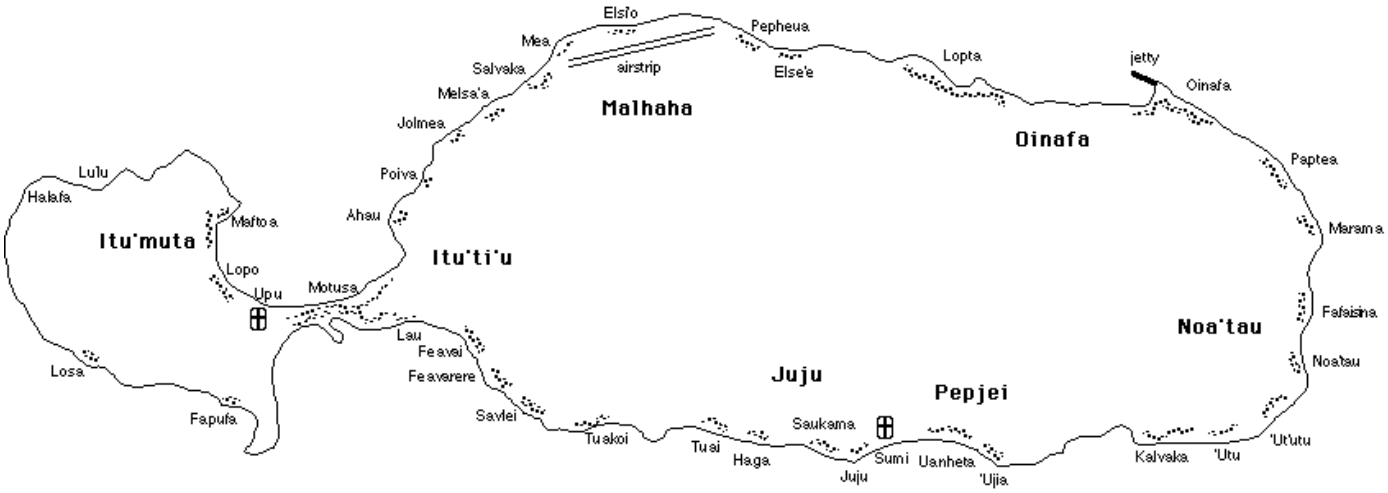

Figure 2. The districts and villages of Rotuma

Ornithological surveys on Rotuma

Bird specimens were obtained by several scientific expeditions that travelled to the Fijian islands during the 19th and 20th centuries. The earliest specimen (a myzomela) arrived in Europe before 1846, but its collector is unknown. The first known expedition to travel to Rotuma was the Challenger Expedition, in 1873-76 (Wiglesworth 1891). The British Museum (UK) received in the 1870s several specimens from G. Brown, an English missionary (Forbes 1878, Wiglesworth 1891, Neumann 1927). The British zoologist J. Stanley Gardiner

collected birds on Rotuma in 1896 (Gadow 1898). The Whitney South Sea Expedition, probably the largest ornithological expedition in the tropical Pacific, stopped on Rotuma for a few days in 1925 (Correia ms, Watling 1985). More than 130 birds were collected, now held at the American Museum of Natural History, New York. They represent the largest collection of specimens from Rotuma.

The most recent contributions on Rotuman birds include

- Fergus Clunie: 30th November-5th December 1985 (Clunie 1985)
- George Zug and coll.: 6th-26th May 1987 (Zug *et al.* 1988)
- Dick Watling in 1992
- Chitishi Mizota and Alivereti Naikatini: 3rd-10th September 2005 (Mizota & Naikatini 2007)

The NGO LäjeRotuma organized two "EcoCamps" in the 2000s with primary schools to raise awareness on the natural island environment. These camps included an introduction to ornithology and general surveys that were conducted on several areas of the island (Anon. B, C).

Summary of the 2018 research project: We stayed on Rotuma from 21th Sept. to 23th Oct. 2018. We surveyed the coastal areas, most of Itu'muta Peninsula, several areas inland (in particular around Noa'tau), and one islet (Afgaha). Birds were observed using binoculars and a telescope. With the permission of the District Councils and of the land owners, we captured birds with mist-nets for future genetic studies (see Annex). Birds were measured and photographed, and sampled for blood or feathers. Samples are stored in the Natural History Museum of Geneva. The birds handling protocol was described in the research protocol and approved by the Ministry of Education, Heritage and Arts. All birds were released a few minutes after their capture. Data for terrestrial mammals were gathered from interviews with the people of Rotuma, the literature and our own observations. No captures of mammals were intended.

The Table 1 summarizes the number and categories of bird species on Rotuma, which are detailed in the systematic list.

Categories	n° of species	Species
Landbirds (endemic)	4	Rotuman Myzomela, Polynesian Triller (ssp. *rotumae*), Lesser Shrikebill *(ssp. wiglesworthi),* Polynesian Starling *(ssp. rotumae)*
Other landbirds (breeding)	6	Pacific Imperial Pigeon, Purple-capped Fruit Dove, Banded Rail, Purple Swamphen, Reef Heron, Pearly Owl
Visitor (waders)	11	Pacific Golden Plover, Lesser Sand Plover, Bristle-thighed Curlew, Whimbrel? Bar-tailed Godwit, Ruddy Turnstone, Red Knot, Sharp-tailed Sandpiper, Sanderling, Pectoral Sandpiper, Wandering Tatler
Visitor (other landbirds)	3	Long-tailed Cuckoo, White-faced Heron, Pacific Harrier?
Seabirds (breeding)	9	White-tailed Tropicbird, Lesser Frigatebird?, Red-footed Booby, Brown Booby, Brown Noddy, Black Noddy, White Tern, Sooty Tern, Black-naped Tern
Seabirds (visitor)	1	Great Frigatebird
Introduced	3	Junglefowl, Domestic Pigeon, Common Myna
Rejected species	2	Fiji Goshawk, White-Throated Pigeon

Table 1. The birds of Rotuma: categories and number of species

Conservation of the endemic birds

Like on all other Pacific islands, the avifauna was probably more diversified before the arrival of Humans on Rotuma (Steadman 2006). However, no landbird became extinct since the mid-19th century, and the avifauna has been naturally enriched during the 21th century by the establishment of the Reef Heron. Three landbirds (Rotuman Myzomela, Polynesian Triller and Polynesian Starling) actually thrive in the open habitats created by the development of food crops. Their respective densities are very high compared to other islands of the region, like Futuna and Uvea (Wallis).

Pernetta & Watling (1978) compiled the dates of vertebrate introductions to the main Fijian islands. Rotuma was for a long time relatively protected by its remoteness and by the absence of a wharf, but recently two alien species managed to reach the island: the Common Myna in 2017 and the Cane Toad (*Rhinella marina*) in 2018. The toad (one individual) was handed over to the Biosecurity officer, but the mynas are now breeding on the island (see details in the systematic list). The project to enlarge the jetty for allowing the docking of cargo-ships will lead to an increase of the number of containers, and in parallel to a higher risk of introductions. The Small Indian Mongoose (*Herpestes auropunctatus*) arrived to Tonga inside such containers (Birdlife 2016). A similar introduction to Rotuma is possible, and the risk of shipping Black Rats (*Rattus rattus*) is even higher. Thus, the vigilance of the Biosecurity Authority in controlling containers and cargo-ships, both at their departure from Suva and at their arrival in Rotuma, will be crucial for the protection of the native biodiversity. The use of a dog trained to detect the presence of alien animals could be a good way to limit the risk of introduction. Such dogs, trained in New Zealand, are now used for Biosecurity control in French Polynesia, on Ua Huka (Marquesas Is.) and Rimatara (Austral Is.).

Systematic list of birds and mammals of Rotuma

For birds, we follow the classification and English names adopted by Dickinson & Remsen (2013) for non-passerines and Dickinson & Christidis (2014) for passerines, with one exception for the endemic Myzomela for which we use the specific name “Rotuman” instead “Rotuma”. We did not find any useful data on the website https://www.cloudbirders.com/, often rich in original observations on Pacific birds. On the other hand, we noted a lot of mistakes on the Wikipedia’s List of Birds of Fiji, with the following species never (or not yet) recorded on Rotuma: Grey-tailed Tattler *Tringa brevipes* (noted as visitor), Wedge-tailed Shearwater *Ardenna pacificus*, Masked Booby *Sula dactylatra*, Greater Crested Tern *Thalasseus bergii*, Blue Noddy *Anous cerulea*, Wattled Honeyeater *Foulehaio carunculatus* (noted as breeder) (https://en.wikipedia.org/wiki/List_of_birds_of_Fiji). Our list excluded the marine mammals. We added also a snake species, which presence is important in the analysis of the bird assemblage.

For Rotuman bird names, we used the following abbreviations for the citations: CMC = Churchward (1940), DW = Watling (2004), FC = Clunie (1985). We followed McClatchey *et al.* (2000) for the Rotuman plant names. Meyer (2017) was the reference for Futunan plant names. Several names provided in Churchward’s Rotuman dictionary could not be assigned to a particular bird species: « TEAVTEVA- *seabird* », « TIVA- *sea-bird that is seen at Rotuma towards the end of the year* », « TOROA- *sea-bird* », « ‘IVA‘O- *bird with very slender body* », « LĀKIVA *sea-bird, similar to the* GOGO*, but with longer legs; also called* GOGO LĀKIVA » (the name GOGO is attributed to Noddies).

Anatidae

No species recorded, but the occasional visits of ducks is suggested by the name « ME‘JIA *wild duck* » (CMC).

TAKU is attributed to the domestic ducks or geese (CMC).

Phasianidae

Junglefowl *Gallus gallus* MOATAVAO (DW), MOA (CMC, FC), ‘UFA (CMC, hen of domestic fowls), ‘UUI (CMC, chick of fowls; name used also for the chicks of KALÄE and VE‘A)

Clunie (1985) suggested that it was “*almost certainly introduced by Rotuma’s earliest settlers*”, but as in other tropical Pacific islands, chickens were probably introduced several times, from different origins. Present all over the island, although more common in villages than in secondary forests, where it is feral. Chickens are frequently captured for consumption, in the past with traditional snares, nowadays with wired cages, in both cases lured with copra.

Setups for catching chickens: reconstitution of a traditional snare (left) and picture of a modern trap (right)

Columbidae

Indeterminate pigeons. Churchward (1940) provided several names that are difficult to assign to a particular species:

"RUPEVAO = *bird*"; RUPE is the name for Imperial Pigeons in several Polynesian languages

"MURAVAO and RUPAGPAGOA- *Other kinds (of pigeons)*" than 'IPA.

Watling (2004) gave the name MURAVAO, with a question mark, for the White-Throated Pigeon. This name was known by several of our informants but they were unable to assign it to a bird species.

On Futuna, the Pacific Imperial Pigeon (LUPE, = 'IPA on Rotuma) has not less than five different names, in relation with the different colorations of the feet or the presence of a prominent knob at the basis of the bill (Thibault *et al.* 2014). It is thus possible that the names listed by Churchward corresponded to different sexes or ages of the Pacific Imperial Pigeon.

Domestic Pigeon *Columba livia* 'IPA (same name than for the Pacific Imperial Pigeon, but well-distinguished by our informants)

Deliberately introduced at an unknown date, but first mentions in 2008-2009 (Anon. D), then qualified as "*fairly common*". In 2018, a single individual seen in Motusa on 30 Sept. and on 12 Oct., and a flock of 5 ind. on 22 Oct. in Ahau. This decline might lead to a local extinction, like in Uvea (Wallis) and Futuna, where two small populations present in 20th century were extinct in 2014 (Thibault *et al.* 2015).

White-Throated Pigeon *Columba vitiensis*

Species with a large range from the Philippines to the Samoa Is. The nominate form (*vitiensis* QUOY & GAIMARD, 1830) inhabits Fiji Is. Its past presence on Rotuma is uncertain. Not recorded by visitors during the 19th century (G. Brown, J.S. Gardiner). In his diary (23th May 1925, p. 234), J.G. Correia wrote: "*The list of birds which Mr. Beck gave me did not include all the species that I found in this island. Besides these I saw six more species as*

follows: Samoa pigeon, black pigeon, gallinule, barn owl, Tahitian cuckoo, Vian rail." His "*Samoa pigeon"* might correspond to the Pacific Imperial Pigeon and his "*black pigeon"* to the White-Throated Pigeon. But "black pigeon" is not a usual name for *C. vitiensis* and it could also relate to a juvenile Pacific Imperial Pigeon, which has a dark plumage. Correia did not mention specifically which birds he collected. In fact, no pigeons from Rotuma, *Columba* or *Ducula*, were listed in the specimen catalog of the American Museum of Natural History or present in the collections (Watling 1985, Paul Sweet pers. com.). The only data concerning the occurrence of the White-Throated Pigeon came from Clunie (1985), who wrote :"*now very scarce and shy, my only seeing one, and otherwise only hearing its mournful call on four occasions".* Because this species was never recorded by any other visitors, we suggest dismissing the hypothesis of a local extinction. We rather think that it was never present on Rotuma, and that Clunie, influenced by Correia's diary, misidentified an Imperial Pigeon.

Pacific Imperial Pigeon *Ducula pacifica* 'IPA (CMC, DW, all our informants), 'IPA NE SORO ("*in poetry*", CMC)

Species with a large range from islands off New Guinea to Cook Is. The nominate form [*pacifica* (J.F. Gmelin, 1789)] is present in most medium-sized and small islands in Melanesia and Polynesia. Genetic analyses of samples from Cook, Tonga, Futuna, and Vanuatu did not reveal geographical structuration for mitochondrial genes (Cibois *et al.* 2017). The species is evaluated by BirdLife International (2018) as Least Concern, but the total population is suspected to be in decline because of habitat destruction and unsustainable levels of exploitation (see for instance Powlesland *et al.* 2008 for Tonga where the decline attributed to cyclone was in fact due to hunting). Thus, the favorable situation encountered on Rotuma, detailed below, is probably exceptional, with a total number estimated at 5,000-10,000 individuals on the island.

Recorded on Rotuma by all observers. Present all over the main island, uniformly distributed. We also observed the species on Afgaha Islet (2 ex. on 11 Oct.), and it probably visits regularly all surrounding islets. Commoner in the villages and farmlands than in the secondary forests where food resources was less abundant, at the time of our visit. We observed single individuals, couples or adults with a juvenile. The absence of larger groups suggests a certain territoriality. Hunting is rare today on Rotuma, and most birds are very tame, even in villages. This situation contrasts with many Pacific islands where hunting or poaching causes the decline of this pigeon. We recorded birds eating or foraging in the following plant species : Breadfruit tree *Artocarpus altilis* 'ULU (fruits also eaten on the ground), fruits of *Calophyllum inophyllum* EFAU, fruits of *Cananga odorata* MOSKOI, fruits of cultivated Santal wood *Santalum* sp. ASI, leaves of Papaya *Carica papaya* ESU (reducing the leaf to a lace-like pattern), fruits of *Elaeocarpus* cf. *tonganus* UMASA, the local tree *Flacourtiam rukam* FIR MOTO, flowers of the palm tree *Pritchardia pacifica* FAKMARU, and small apples of the introduced tree *Spondias dulcis*.

Pacific Imperial Pigeon eating leaves of Papaya

Purple-capped Fruit Dove *Ptilinopus porphyraceus* KUKĀ (DW, Freddy Jione from Itu'muta), KUKŪ (CMC, FC), KU-KU (Gardiner, in Gadow 1898), KUKU (Anon. D, Eliasa Pengueli from Noa'tau)

The taxonomy of this species is complex, with four forms previously treated as subspecies (Dickinson & Remsen 2013), now considered as full species by Del Hoyo & Collar (2014): *ponapensis* FINSCH, 1878 from Chuuk and Pohnpei (Caroline Is.), *hernsheimi* FINSCH, 1880 from Kosrae (Caroline Is.), nominate *porphyraceus* (TEMMINCK, 1821) from Fiji (small islands), Tonga and Niue, and *fasciatus* PEALE, 1848 from Samoa. Cibois *et al.* (2014) showed that *ponapensis* and *porphyraceus* are not sister taxa, suggesting that the species group is not monophyletic. Del Hoyo & Collar (2014) also considered the taxon *graeffei* NEUMANN, 1922 from Wallis and Futuna as a subspecies of *P. porphyraceus*, hybrid between *porphyraceus* and *fasciatus* (an idea first expressed by Ripley & Birckhead 1942). We obtained samples from Rotuma and from Futuna in order to test this hypothesis and to evaluate the genetic difference with Samoa.

Collected on Rotuma by Correia in May 1925. Uncommon in the 1980' according to Clunie (1985), found "*mainly to the more mature bush of the higher hills, and to the less disturbed bushland of the rugged western headland*". Zug *et al.* (1988) observed the species only once.

In 2018, its situation was more favorable, being present all over the island, on the shore and inland, in farmlands, on the outskirts of villages, and in secondary forests. However, its density was considerably lower than that of the imperial pigeon. Also present on islets (one bird singing on Afgaha on 7 Oct). Total number estimated at 500-1,000 individuals. We never observed more than two birds together; and rarely in flight. The observations were mostly isolated birds, singing or answering to a congener. For these reasons we think that this fruit dove is territorial, at least during the season of our visit. Henderson Fruit Dove (*Ptilinopus insularis*) in the Pitcairn Group is also supposed to be territorial (Graves 1992). Elsewhere considered as an "*adaptable species*" found in primary rain forests, secondary forests and cultivations (Gibbs *et al.* 2001). However, on Uvea (Wallis), Futuna, and Alofi, the Purple-capped Fruit Dove has been recorded in small groups up to 10 ind. (Thibault *et al.* 2014). We recorded birds eating fruits or foraging in the following plant species: *Cananga odorata* MOSKOI, *Ficus* sp., Ivory Nut Palm *Metroxylon amicarum* OTA (including flowers).

Adult Purple-capped Fruit Dove

Phaethontidae

The name KURA "*bird, similar to* TÄVÄKE*, but red*" given by Churchward (1940) could refer to the Red-tailed Tropicbird (*Phaethon rubricauda* BODDAERT, 1783), a species never recorded on Rotuma.

White-tailed Tropicbird *Phaethon lepturus* TÄVÄKE (CMC), TAVAKE (name generally given by our informants, sometime pronounced TAVAK), MANJILLO (Joe from Noa'tau)

Largely distributed in the tropical Pacific islands, but "*quite rare and local in Fiji*" (Watling 2004). On Rotuma, according to Clunie (1985), it was "*seen regularly (every other day) gliding high over the central plateau*". In 2018, the bird was also recorded every day, displaying high in flight, but also recorded at low altitude, both on the shore and inland in the farmlands and secondary forests. Seen also on islets (Solkope, Hauati'u, Hauamea'me'a, Afgaha); probably breeds on Uea and other non-visited islets. Number estimated at a few hundred of pairs. Breeds in holes of old, big and tall trees (e. g. TILO *Calophyllum inophyllum* and Mangoes *Mangifera indica*), but also possibly in cliffs (islets, coast of Itu'muta between Maftoa and Fapufa). During our visit, we noted displays as well as birds visiting nest sites, and we observed one chick *ca.* 10 days from fledgling.

Several people mentioned the existence of traditional headdresses made with white feathers, preserved in Juju village in the district of Pepjei. With the help of our guide Fay, we first saw one headdress in which the feathers have been replaced by white wool (the whole object was in a bad state of preservation, with rooster feathers eaten by insects). In a second house, three headdresses were shown in a relatively good state of preservation, and we were able to identify many feathers of White-tailed Tropicbird (belly coverts, wing coverts, and rectrices); these headdresses were associated with wooden clubs and spears, used *ca.* ten years ago for a dance during the visit of the Prime Minister of Fiji. These objects were supposed to be a gift of Futunian people for a "*war dance*", but we ignore at which date they were given and whether they were copies or originals. Churchward (1940) provided the name MIOLMILO for "*Peaked head-dress, decorated with feathers, formerly used in war and still used in war-dances".* However all our informants used the name MIḶ-MIḶ, and Churchward's name might have been misspelled. He also mentioned that according to the tradition, "*a man named* Rafai *learned to make these hats during a visit to the spirit-world*".

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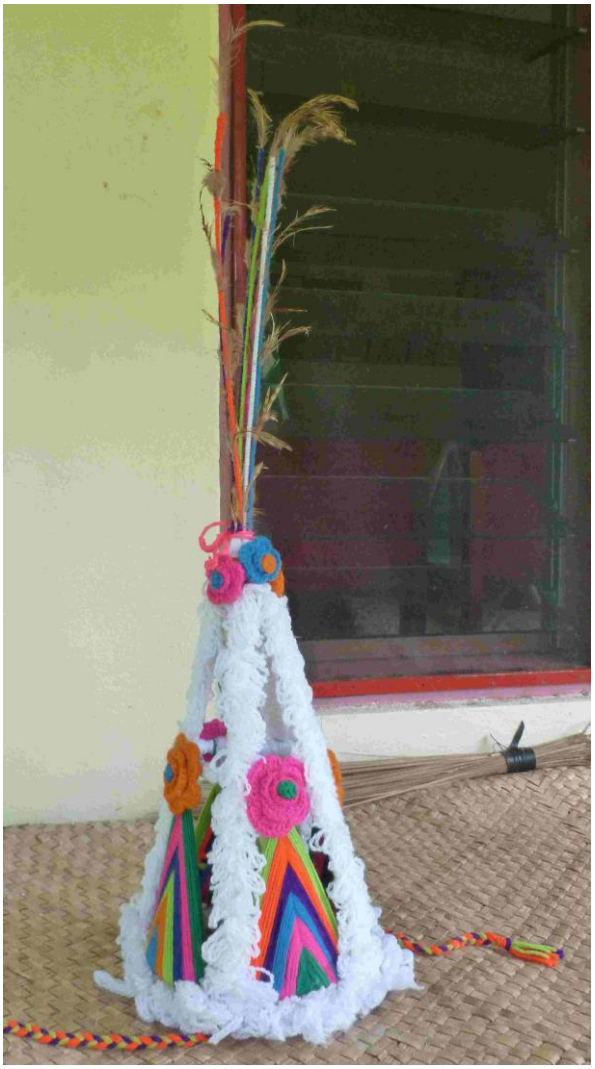

Headdresses decorated with wool (left), and with feathers of White-tailed Tropicbird (right)

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Cuculidae

Long-tailed Cuckoo *Urodynamis taitensis* SIA‘LEVA (CMC, DW), AKIVAO (name known but not attributed to a specific bird by Freddy Jione from Itu‘muta), SIALEVE (Eliasa Pengueli from Noa‘tau)

Breeds in New Zealand, austral winter visitor on islands of Central and Eastern Pacific. Regular in the Fijian archipelago (Watling 2004), but rare on Rotuma where only recorded by Correia in May 1925 (ms, p. 234; no specimen collected, Watling 1985).

Rallidae

Banded Rail *Hypotaenidia philippensis* VE‘A (CMC, DW, all our informants)

A species largely distributed in the Australasia and Oceania, with more than 20 subspecies. In the region, *sethsmithi* (MATHEWS, 1911) is distributed in Vanuatu, Fiji, Tuvalu and *ecaudata* (J.F. MILLER, 1783) in Tonga, perhaps Uvea (Wallis) & Futuna (Dickinson & Remsen 2013). The subspecies status to the Rotuman population is pending genetic analyses.

Collected by Correia in May 1925 (Watling 1985). Common in the 1980s according to Clunie (1985) and Zug *et al.* (1988). In 2018, we recorded it everywhere on the coast and inland, in all kinds of habitat: beaches at low tide, villages, cultivations, secondary forests, grasslands. Perhaps less abundant in secondary forests and locally in Noa'tau village (maybe because of its drier habitat) than in Itu'muta district. *Ca.* one ind./50m seen on main and farmlands roads, but density in secondary forest probably lower. We did not obtain data on its occurrence on islets. Number estimated at several thousand birds.

A terrestrial bird often near chickens in villages or shorebirds on beaches and grasslands. Single birds observed mostly in Sept. In Oct., their behavior started to change, suggesting the beginning of breeding season: more territorials, the birds were chasing intruders (sometimes even flying), emitted grunts when hidden thick vegetation, and we observed three pairs with one young chick. The breeding season probably lasts until Dec. (Gardiner found a nest with four eggs on 3rd Nov., Clunie mentioned a young chick in Dec.).

Adult Band Rail

Purple Swamphen *Porphyrio porphyrio* KALAE (DW, all our informants), KALÄE (CMC)

Two subspecies in the region, *P. p. samoensis* PEALE, 1848 in Samoa and *vitiensis* PEALE, 1848 in Fiji islands (sometimes the two subspecies are merged in *samoensis*). Populations from Rotuma and Futuna have not been studied yet.

Collected by Gardiner in 1896 (Gadow 1898), then by Correia in 1925 (Watling 1985). According to Clunie (1985) "*The kalae is nowadays extremely shy, and very likely nocturnal in much of its behavior. I only saw one in taro gardens … although I heard others. … As in Fiji, human persecution of this notorious crop pest has apparently rendered it shy*". Not recorded by Zug *et al.* (1988). Rarely recorded during the surveys in 2008-2009 (Anon. D). In 2018, we recorded this species in 12 different localities, both on shore and inland. Mainly associated to farmlands and cultivations near the villages; also recorded in the grassland of Paptea School and along the airstrip. Not recorded in the secondary forests, like in Futuna (Thibault *et al.* 2014). Number tentatively estimated at more than one hundred birds. Considered a pest for banana and pineapple cultivations. However, we did not see any traps or snares; the villagers just put rags and scarecrows on their fields.

Procellariidae

No petrel or shearwater has been formally identified on Rotuma, probably because of lack of prospection during the right season and location. However, evidences suggest the regular presence of procellariidae on or near the island. Churchward (1940) mentioned two of them:

FA‘MÄNE for a “*bird seldom seen, but often heard at night-time. It has a habit of uttering its note twice in succession: the Rotumans say* IA TŌ TÀR *i.e. it speaks and immediately answers”*; and TAIKO for a “*bird which utters at night-time a cry like that of a child*”. The generic name TA‘I‘O is attributed to several species of petrels in Tonga and Samoa. Several informants described birds, different from the Pearly Owl, calling in flight above the villages at night; other mentioned birds on islets entering burrows during the night (on Afgaha, Hauati‘u and Hauamea‘me‘a). Correia (ms) described in 1925 “*a black bird which almost all the time in the sea and rests on the tops of the mountains, in the holes under the ground while nesting*”. Rotuman names FA’MAN and TOIOKTA (mentioned by the district councils of both Itu‘muta and Noa‘tau) could be attributed to petrel or shearwater species. Both are carriers of bad presage when calling above villages, a story often told in Polynesia. The bird named TOIOKTA has also the reputation to fart and burp at the same time!

Ardeidae

Reef Heron *Egretta sacra* According to CMC, the name PELŌ, used today (Anon. D, and several informants) comes from the Fijian name BELŌ, a “*crane or stork (seldom seen at Rotuma*)”.

Largely distributed on Pacific islands, with the nominate *sacra* (J.F. GMELIN, 1789) on most of its range. Excepted Niue where it has been recorded only as a vagrant, it breeds throughout the islands of the region (Watling 2004). However, it was not recorded on Rotuma before 2007 (Anon. 2007). It may have (re)colonized successfully the island earlier, perhaps in the 1990s. In 2018, not abundant but regularly seen on all coasts and the grassland of Paptea School. Seen on Afgaha Islet; it probably visits regularly all islets. Not recorded inland in the farmlands, but possibly forages sometimes in cultivations. Fishes on the beaches and on the coral reef of the Maka Bay at low tide. Several villagers told that this heron could eat small chickens, a fact in accordance with its catholic diet. For 46 records, we saw 39 grey morphs and only 7 white morphs. Although no nests were found, there is little doubt that the Reef Heron breeds now on Rotuma.

White-faced Heron *Egretta novaehollandiae* (Latham, 1790) (no local name)

This Australian heron has recently colonized several islands of the Central Pacific: in Tonga in 1988 and Fiji since 1997 (Watling 2004); vagrant on Uvea (Wallis) in 2014 (Thibault *et al.* 2015). On Rotuma, one individual was seen in the grassland of Paptea School on 7 and 8 Oct., and at the airport (the same individual?) on 23 Oct. The bird observed on 8 Oct. was violently chased away by a Reef Heron.

White morph of Reef Heron (in front), and White-faced Heron, both on Uvea (Wallis) in 2014

Fregatidae

Lesser Frigatebird *Fregata ariel* AFAHA, ‘AFAHA (CMC)

A polytypic species with nominate *ariel* (G.R. GRAY, 1845) in the Philippines, northern Australia, and Oceania. The most common Frigatebird seen in the Fijian waters, although very few breeding sites are known (Watling 2004). Recorded on Rotuma by previous observers but no evidence of breeding. In 2018, seen daily in flight, parasitizing Brown Noddies returning at their colony, or drinking at fresh water resurgence in Maka Bay. Trees of Hauati‘u and Hauamea‘me‘a Islets used for roosting by several tens of birds.

Great Frigatebird *Fregata minor* AFAHA, ‘AFAHA (CMC)

A polytypic species, with *palmerstoni* (J.F. GMELIN, 1789) in the triangle formed by New Caledonia, the Pitcairn Group and Hawaii Islands. Seen in flight in small numbers throughout the Fijian islands (Watling 2004). Previously recorded only in 2008-2009 (Anon. D). In 2018, seen at several occasions, but less regularly than the Lesser Frigatebird. No evidence of breeding.

Sulidae

Red-footed Booby *Sula sula* MUTLEI (DW), MUTLE? (CMC, “*seabird somewhat similar to the* KANAPU”)

A polytypic species with *rubripes* GOULD, 1838 distributed in the Indian Ocean and Oceania. Common in the Fijian waters (Watling 2004). On Rotuma, the inventory of breeding sites remains incomplete and the total number of breeders is unknown. Mizota & Naikatini (2007) indicated breeding on Hatana Islet, but they did not indicate a number estimate. In 2018, we observed several tens of birds roosting on Hauati‘u and Hauamea‘me‘a, but the observations were made from Oinafa using a telescope, and we could not confirm the presence of breeders or nests. Not recorded on Solkope and Afgaha.

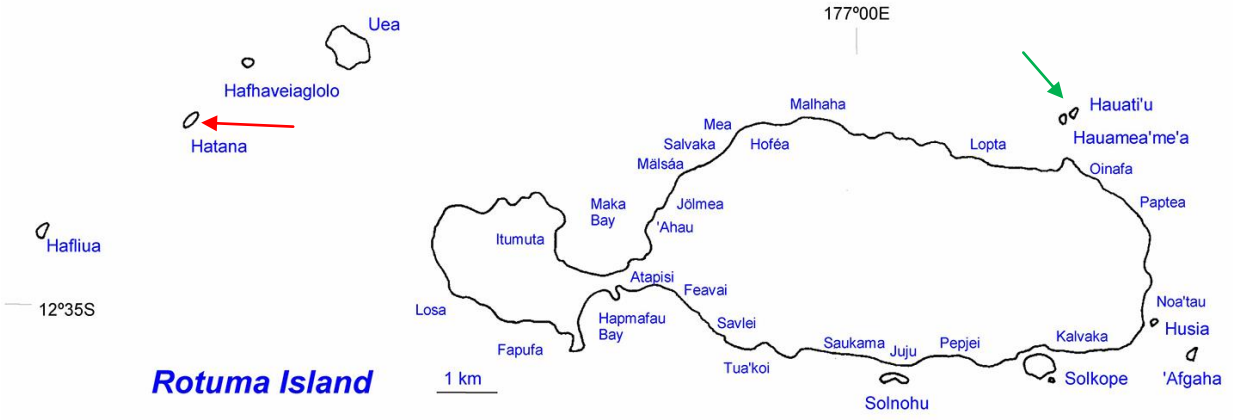

Figure 3. The red arrow indicates the only known breeding colony of Red-footed Boobies (Mizota & Naikatini 2007) and the green arrow a roosting area in 2018

Brown Booby *Sula leucogaster* KANAPU [CMC, "*gannet (sea-bird)*"], KANOPU (DW, Eliasa Pengueli from Noa'tau), also MUTLEI (DW)

A polytypic species with the subspecies *plotus* (J.R. FORSTER, 1844) widespread from the Red Sea and Indian Ocean to the tropical Pacific Ocean. On Rotuma, the inventory of breeding sites remains incomplete and the total number of breeders is unknown. Mizota & Naikatini (2007) recorded breeding on Hatana Islet, but they did not indicate a number estimate. In 2018, we recorded small colonies (less than 10 pairs), with chicks, on Hauati'u and Afgaha, and a roosting place or a small colony on Hauamea'me'a.

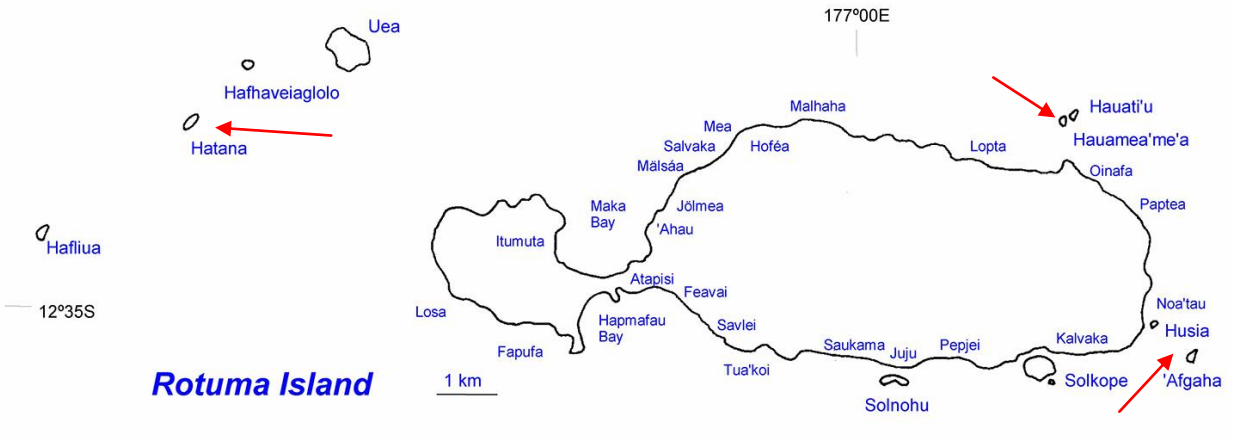

Figure 4. The red arrows indicate the known breeding colonies of Brown Boobies

Charadriidae

The name JULI is attributed to all species of shorebirds by our informants; CMC used also TULI.

Pacific Golden Plover *Pluvialis fulva* (J.F. GMELIN, 1789)

Breeds in the Arctic, and winters from Africa to Polynesia and Australia. Some non-breeders, mostly immature birds, stay all year on their wintering grounds. On Rotuma, recorded by all observers since the end of the 19th century. In Sept.-Oct. 2018, we did not record flocks but mostly isolated birds defending their wintering territory against congeners, generally several thousand of m² of open areas on shore and grassland, also on lawns near houses and farmlands inland. Total number estimated at several hundred birds.

Pacific Golden-Plover moulting from summer to winter plumage

Lesser Sand Plover *Charadrius mongolus* PALLAS, 1776

Breeds in Siberia and Mongolia, and winters on coasts and islands of Indian and West Pacific Oceans; visitor on Fiji Is. A single record on Rotuma: one individual in winter plumage (with some marks on the belly of summer plumage) on 22 Oct. 2018, on a beach at low tide in front of Lopo. Observed for a few minutes, it was then chased by a Pacific Golden Plover and not seen again. It presented a very pale coloration and it might belong to the nominate form *mongolus,* which winters from Taiwan to Australia and New Zealand.

Scolopacidae

The name JULI is attributed to all species of shorebirds by our informants; CMC used also TULI.

Bristle-thighed Curlew *Numenius tahitiensis* (J.F. GMELIN, 1789)

Breeds in Alaska and winters in Oceania from Micronesia and Hawaii in the north, to Polynesia in the south; the largest numbers are found in Hawaii and Eastern Polynesia. On Rotuma, the species was noted only by Clunie (1985): "*a photograph taken on 1st Oct. 1959*" and sightings "*on the football field at Ahau"* and *"near the Motusa istmus*".

Cf. Whimbrel *Numenius phaeopus* (L, 1758)

Large breeding range from America to Eurasia. Regular, but in small number in Western Polynesia (Watling 2004). One curlew seen briefly on 23 Sept. 2018, on rocks bordering the Maka Bay at Lopo and then in flight, could possibly be attributed to this species.

Bar-tailed Godwit *Limosa lapponica* (L, 1758)

Breeds in Alaska and Eurasia and winters in south-east Asia and Western Oceania. A common wader In Fiji Is. (Watling 2004). On Rotuma, probably a seasonal visitor, noted only during the surveys of 2008-2009 (Anon. D), mentioned as "*fairly common*". According to villagers it was more common in the past, always in late December (i.e. around Christmas).

Ruddy Turnstone *Arenaria interpres* (L., 1758)

Large breeding range, from Canada to Northern Europe through Siberia with two distinct subspecies, it is a common shorebird wintering in South-West Pacific.

On Rotuma, recorded by all previous observers. In autumn 2018, it was the commonest shorebird with the Pacific Golden Plover, seen regularly on most of coasts of the mainland and probably of the islets (at least on Afgaha and Hauame'ame'a). Mainly in small flocks, up to 38 individuals, foraging at low tide on beaches, coral reefs, and on grasslands and lawns at high tide. Two spots concentrated the largest flocks: the grassland near the Catholic Church in Motusa and that of the school in Paptea.

We observed during several days a ringed individual: it was an adult (age estimated at least at 3 years), in molt (breeding to winter plumage), seen near the Catholic Church in Motusa and on the beach of Lopo from 30 Sept. to 12 Oct. 2018. Its metal ring was not readable but it had a conspicuous blue flag on the left leg with the number 823, along with a white flag. Thanks to the Australasian Waders Studies Group (e-mail of 20th Nov. 2018), we learnt that it was ringed in Japan - i.e. 6,763 km from Rotuma - on 20th May 2018. Captured during the boreal spring, this bird probably continued his travel from Japan to its breeding grounds in the arctic, and then reached Rotuma in the autumn.

The ringed Turnstone cleaning its plumage on the Motusa Church steps

Red Knot *Calidris canatus* (L., 1758)

Breeds in the Holarctic zone, winters on a more restricted range than the precedent species, although present on coasts and islands of the three oceans. In the Pacific Ocean, recorded on Fiji Is., but not in Eastern Polynesia. On Rotuma, only recorded during the 2008-2009 surveys (Anon. D), considered "*common*".

Sharp-tailed Sandpiper *Calidris acuminata* (HORSFIELD, 1821)

Breeds in Siberia, and winters in a vast range, mainly from New Guinea to Australia and New Zealand, but also regularly on Fijian islands. First record for Rotuma, with one juvenile seen and photographed the 16th Oct. 2018 on the beach of Lopo. See also Pectoral Sandpiper.

Sanderling *Calidris alba* (PALLAS, 1764)

Breeds in the Holarctic zone and winters on most coasts and many islands in temperate and tropical regions of the World, even reaching the very isolated Eastern Island in the Pacific Ocean. Regular in Western Polynesia (Watling 2004). On Rotuma, recorded during the 2008-2009 surveys (Anon. D) and considered "*fairly common*". In 2018, seen only on the beach of Lopo: one in flight on 22th Sept., one foraging on the sand on 26-27 Sept., and another bird, darker, on 1st Oct. Associated with Turnstones when feeding on the beach at low tide.

Pectoral Sandpiper *Calidris melanotos* (VIEILLOT, 1819)

Breeds in Siberia and Northern America, winters in a vast range, both in Western Australasia and South America, but also on Central Pacific islands, like Fiji, where it is regular. First record for Rotuma in 2018. Its identification is difficult because juveniles are very similar to those of the Sharp-tailed Sandpiper. Seen and photographed twice. 1) on 29 Sept. on the road between Lopo and Maftoa, during a heavy rain, 2) on 8 Oct. on the grass of Paptea

School. Differences in coloration (bill, legs, nape, and breast) strongly suggest that two different juvenile birds were observed, often associated with Turnstones.

Sharp-tailed Sandpiper on the beach of Lopo (left), and Pectoral sandpiper on grassland in Paptea (right)

Wandering Tatler *Tringa incana* (GMELIN, 1789)

Breeds in Northeast Siberia, Alaska, and Northwest British Columbia. A very large wintering range in Oceania, from coastal South America to Australia. One of the commonest shorebirds on Pacific islands. However, very similar in winter plumage to the Grey-tailed Tattler *Tringa brevipes* (VIEILLOT, 1816), a wintering visitor in the Western Pacific that reaches also Fiji Is. (Watling 2004). Confusion between the two species are possible. In 2018, we observed the Tattlers in good conditions with a telescope and all were identified as *T. incana* (often with some remains of the breeding plumage on under-tail coverts).

Recorded by most previous visitors. In Sept.-Oct. 2018, it was commonly distributed all over the island and probably on all islets. We found isolated birds every 50-100 m, but no flocks. Tattlers defend actively their wintering territory, generally several thousand of m² in open areas on shore and on large grasslands, chasing away their congeners and also Turnstones. Number estimated at several hundred of birds.

Laridae

Churchward (1940) indicates TALA for "*sea-bird*", a name attributed to Terns in several Polynesian languages (also TARA).

Brown Noddy *Anous stolidus* GOGO (CMC, DW, Anon. D, several informants)

Several subspecies recognized; the taxon *pileatus* (SCOPOLI, 1786) is found in the Indian and Pacific Oceans, occupying tropical and sub-tropical oceanic areas. It breeds in all the island groups of the region (Watling 2004). Our visit on Rotuma corresponded to the beginning of the breeding season (building of nests and incubation). The Figure 4 indicates the breeding colonies found in Sept.-Oct. 2018. They breed in trees (Coconut, Pandanus), in cliffs (Itu'muta district), and on the ground on some islets (Hatana: Mizota & Naikatini 2007). Breeding is also probable on Uea. On the mainland, number per colony did not exceed 10 pairs, but it could reach several hundred of pairs on islets.

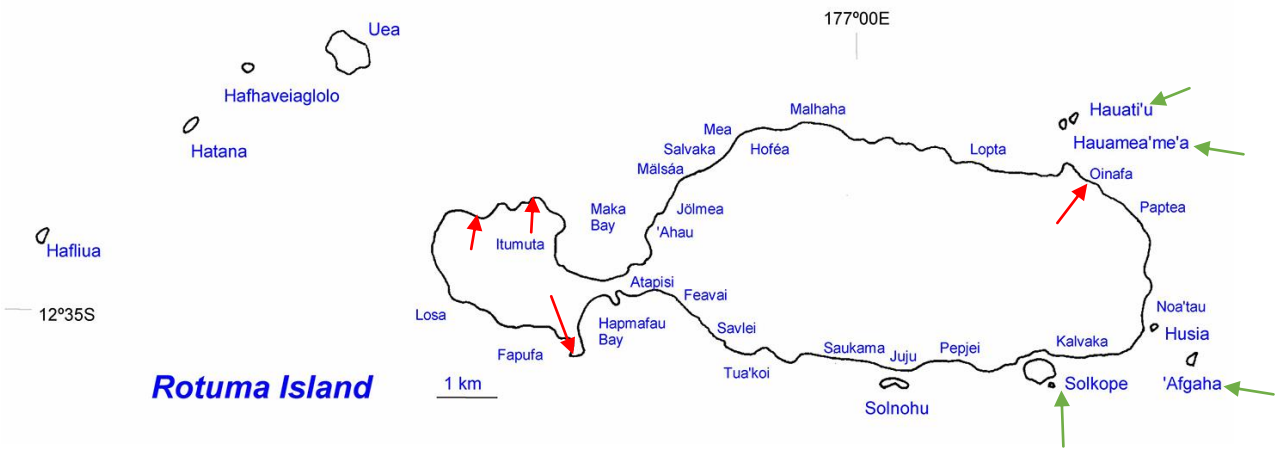

Figure 5. Colonies of Brown Noddies found in Sept. and Oct. 2018 (red arrows = mainland and green arrows = islets)

Black Noddy *Anous minutus* GOGO (CMC, DW), LAGEA (Gardiner cited by Gadow 1898)

A polytypic species represented in Central and South Pacific by the nominate subspecies *minutus* BOIE, 1844. Common throughout the region (Watling 2004), however breeding has been not yet confirmed on Rotuma. Gardiner (in Gadow 1898) collected an immature bird. In Sept.-Oct. 2018, we found a small colony (*ca.* 10 pairs) in an old TILO tree (*Calophyllum inophyllum*) along the shore in Oinafa Village, at the early stage of reproduction with the construction of nests. Birds were also probably breeding on the islets off Oinafa Village.

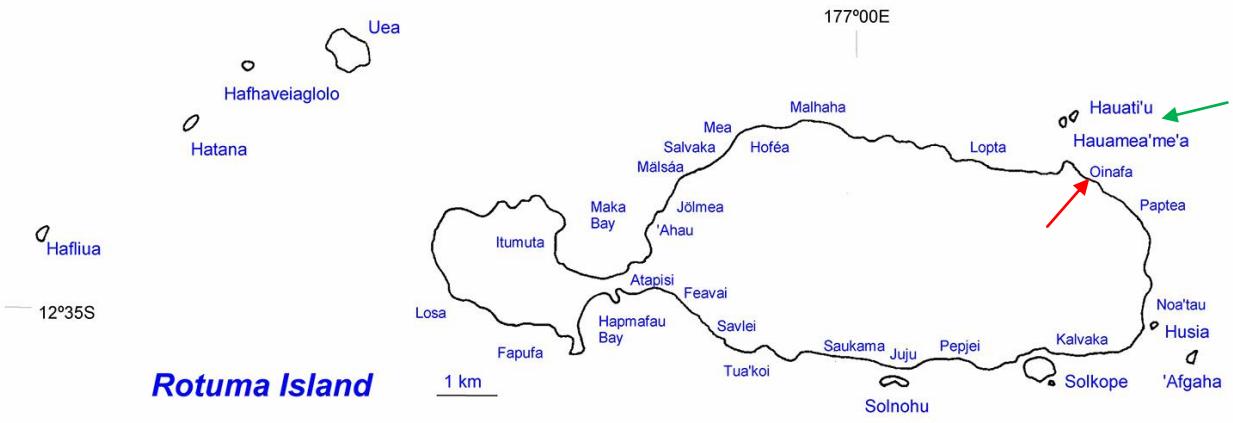

Figure 6. Colonies of Black Noddies found in Sept. and Oct. 2018 (red arrow = mainland and green arrow = islets)

White Tern *Gygis alba* MANSINA (CMC; MANU+SINA "*bird+light*"), MONSINA (DW), MANSIAN (Anon. D)

Widely distributed on the tropical islands of the three Oceans. Nominate *alba* (SPARRMAN, 1786) is common in the region (Watling 2004). Breeding recorded by most previous observers. In Sept-Oct. 2018, it was well-distributed on the mainland, both on the shore and inland; no colonies were found, but we observed isolated pairs feeding a young bird in tall and large TILO trees (*Calophyllum inophyllum*), and small groups, up to ten individuals, were displaying. Number on mainland estimated at a few hundred pairs. Recorded also on Solkope, Afgaha, Hauamea'me'a and Hauati'u, totalizing several hundred pairs. Number on

Hafana and Uea are unknown, but probably relatively high. No doubt that several thousand pairs breed on the Rotuma Group as a whole.

Sooty Tern *Onychoprion fuscatus* (L., 1766)

Widely distributed on the tropical islands of the three Oceans. A colony is known on Hatana Islet (Watling 2004, and villagers), which number was estimated at several thousand pairs (Mizota & Naikatini 2007). In Sept. and Oct. 2018, we did not record it, either on mainland, in flight on the reef, or on the visited islets.

Black-naped Tern *Sterna sumatrana* RAFFLES, 1822

Distributed in Indian and Western Pacific Oceans. Breeding is widespread in the Fijian region (Watling 2004). On Rotuma, one ind. appears on a picture taken on an unknown islet during the 2008-2009 surveys (Anon. D). In Sept.-Oct. 2018, several pairs bred on Haumea'me'a Islet (feeding juveniles on 8 Oct.) and several single birds or pairs were seen in Maka Bay, at the Jetty in Oinafa, near Afgaha Islet, and on coast off Lulu (Itu'muta) and off Paptea.

Pair of Black-naped Terns at the Jetty (Oinafa)

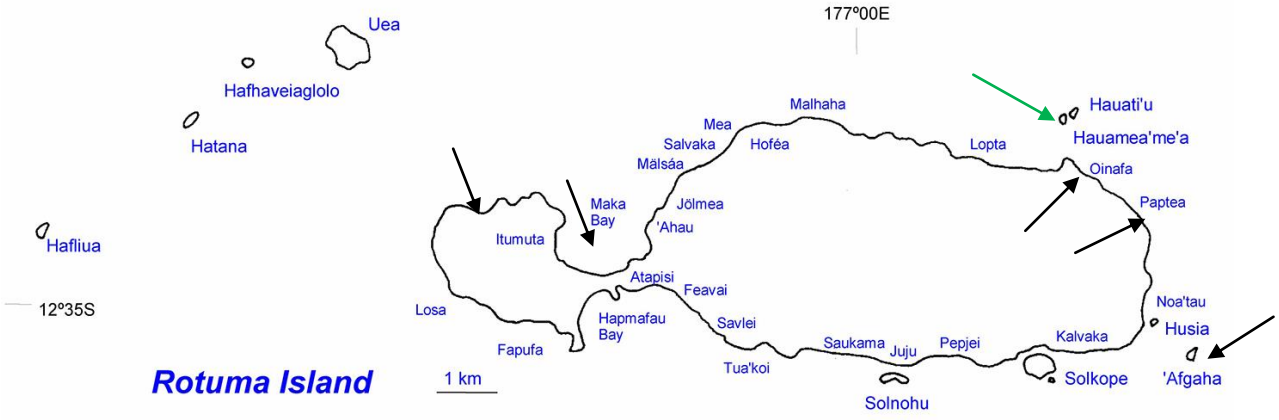

Figure 7. Data for the Black-naped Tern (green arrow = breeding site and black arrows = individual birds or pairs)

Accipitridae

Pacific Harrier *Circus approximans* PEALE, 1848 RUTAI (CMC, DW)

A wide range from south-east Australia through Melanesia and New Zealand to Western Polynesia. Largely distributed in the Fijian archipelago, but only a vagrant on remote and isolated islands, like Uvea (Wallis) and Futuna. No known record on Rotuma, apart from linguistic evidences: the name mentioned in Churchward (1940) for a "*hawk*", and the

mention of Watling (2004) that "*a local name for a hawk in Rotuma indicates periodic visits here*".

Fiji Goshawk *Accipiter rufitorques* (PEALE, 1848)

Endemic to Fiji Is. No known record on Rotuma, apart from Gardiner's mention in Gadow (1898), where the name "***Jerleva"*** is attributed to a Goshawk, "*repeatedly seen in Rotumah*" but not collected. Correia (ms) tried unsuccessfully to obtain a specimen: "*what this man called swallow hawk is a Tahitian cuckoo. Another man brought me one swallow hawk but when I took it it proved to be a barn owl*". Clunie (1985) dismissed Gardiner's mention, and we also suggest removing this bird from the list of birds of Rotuma.

Tytonidae

Pearly Owl *Tyto delicatula* (GOULD, 1837) RURU (CMC, DW, all our informants)

Widespread in the Fijian Archipelago and surrounding islands, including Uvea (Wallis) and Futuna. Recorded on Rotuma by all observers since the 19th century, but in small number. In Sept.-Oct. 2018 we noted it only four times in Itu'muta and inland, always in cultivation areas. According to Watling (2004), the Pearly Owl "*feeds almost exclusively on rats, but locally small birds, bats and insects are taken*". In 2018, when taken into account the rarity of rats and the probable extinction of bats (see below), we can speculate that passerine birds represent its main diet, perhaps with geckos and large insects.

Meliphagidae

Rotuman Myzomela *Myzomela chermesina* G.R. GRAY, 1846 ARMEA [CMC, DW; present name used by our informants, but also ARUMEA (Gardiner in Gadow 1898) and ARAMEA (Forbes 1878 and Wiglesworth 1891 from Rev. G. Brown)]. ARMEA is also the name of a tree, the paper Mulberry or Tapa cloth Tree *Broussonetia papyrifera*.

In 1846, G.R. Gray, from the British Museum, first provided the name *chermesina* to a new species of bird belonging to the family of Meliphagidae, but from an unknown origin. As it was frequent at that time, he did not describe the bird but D.W. Mitchell illustrated an individual (a male, see plate beside). The description of the species was done subsequently in 1878 by another zoologist, W.A. Forbes, who compared the plate to the specimens sent by a missionary from Rotuma. Considered for a long time as a subspecies of the Cardinal Myzomela *Myzomela cardinalis* (J.F. GMELIN, 1788) (Mayr 1932), it is now treated as a full species (Del Hoyo & Collar 2016); see Figure 8 for biogeographic hypotheses.

Mitchell's 1846 plate.

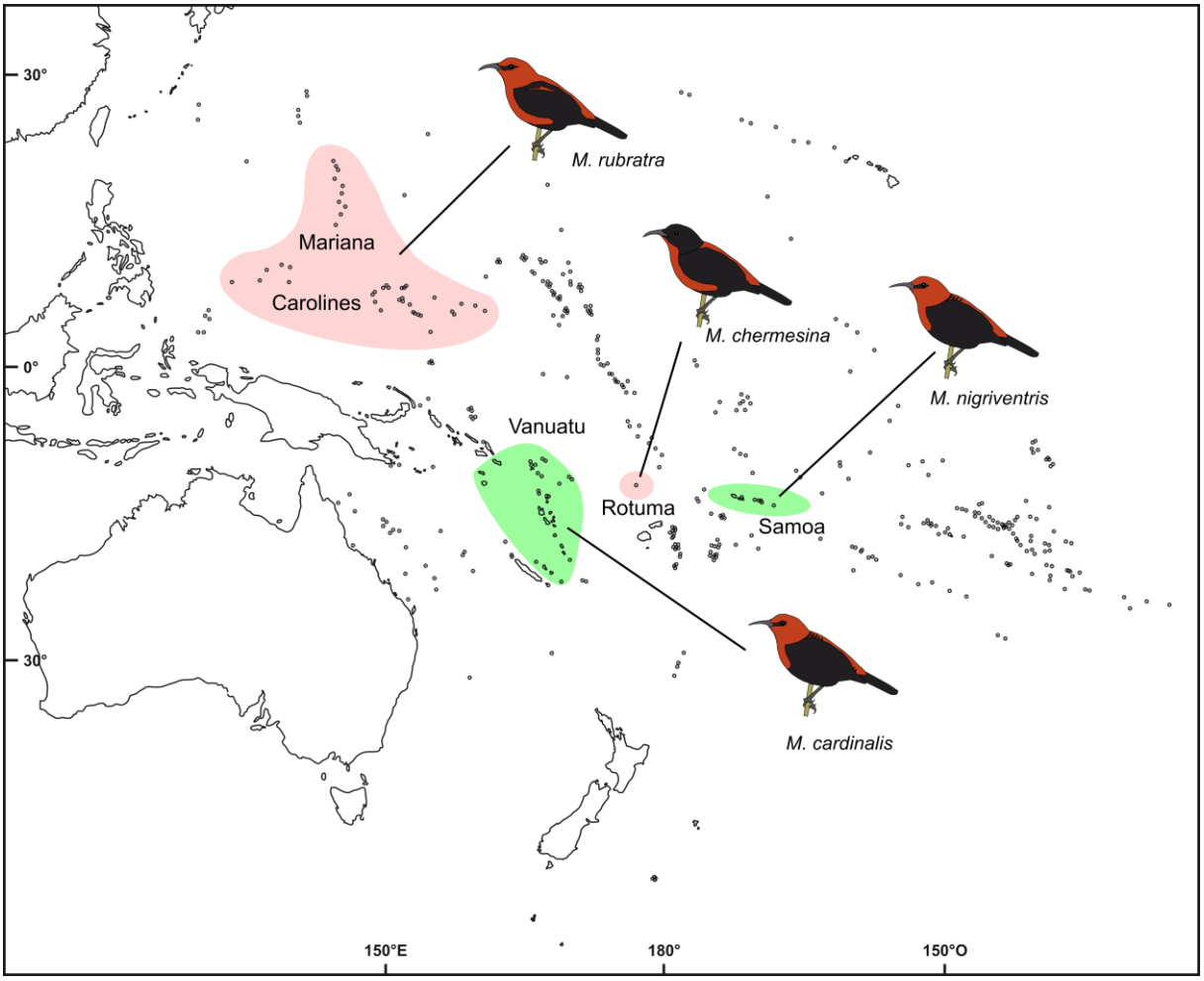

Figure 8. Biogeographic hypotheses. According to the phylogenetic tree of the genus *Myzomela* proposed in Marki *et al.* (2017), the Rotuman Myzomela ***M. chermesina*** is closely related to the Micronesian Myzomela ***M. rubratra*** (LESSON, 1827) [an hypothesis also proposed by Koopman (1957)]. But their relationships with other Myzomelas are unclear, in particular with the Samoan Myzomela ***M. nigriventris*** PEALE, 1848, never sequenced. Koopman (1957) suggested that the taxon from Samoa derived from the same ancestor as the Vanuatu Cardinal Myzomela ***M. cardinalis*** (Gmelin, JF, 1788)

Endemic to Rotuma. Recorded by all visitors, often considered as the commonest Rotuman bird. In 2018, very common all over the mainland, more frequent in open areas (villages, coastland, and farmlands) than in the dense secondary forests. Present also on islets: known from Uea (BirdLife International 2018), we recorded the species on Afgaha, and it probably visits or stays on all islets. However, the mainland is the main reservoir and most efforts of conservation should be concentrated there (the total area of the islets represents only a few km² vs. 47 km² for the mainland). Using the data by F. Clunie in the 1980s and D. Watling in the 1990s, BirdLife International (2018) estimated the population number at 10,000-19,999 individuals. Our estimate based on observations and captures with mist-nets is within the same range, with a mean of five birds/ha in villages and farmland, and ca. one bird/ha in dense secondary forest. Thus, population number remained stable, at least for the last 30 years. We agree with BirdLife International's position to treat the species as *"Vulnerable because it has a tiny range and is therefore at risk from stochastic events and human impacts, such as the establishment of introduced predators*". The case of the Sheath-tailed Bat (see below) showed that isolated population on island, even very numerous, can disappear rapidly. In this context, the destruction of the recently introduced mynahs (see § Common Myna) should be a priority, as suggested by Fiji Nature (Anon. A).

Cluny (1985) noticed the aggressive behavior of the Rotuman Myzomela: *"More than any other Rotuman bird, it exhibits a remarkable versality in behaviour, almost certainly through lack of competition from other honeyeaters and insectivorous birds. It approaches even the notorious Wattled Honyeater* Foulehaio carunculata*, in pugnacity, dashing recklessly at Polynesians Trillers, Polynesian Starlings, and, of all things, White Terns, driving them from trees"*. We can add that some birds do not hesitate to fly above the sea, as observed regularly in Maka Bay. It forages in all vegetation levels, from grasslands to high trees. All observers admired its acrobatic feeding technics, gleaning or hanging in the vegetation and, according to Clunie (1985), fly-catching. It forages mainly solely, but also in groups up to 20 or thirty birds – seen for instance eating, flying, chasing congeners in a great confusion on OTA inflorescences (Ivory Nut Palm *Metroxylon amicarum*). Recorded feeding also in the following plants: Coconut *Cocos nucifera* NIU (and gleans invertebrates in dead dry leaves), *Morinda citrifolia* 'URA, palm tree *Pritchardia pacifica* FAKMARU, *Spathodea campanulata*, the very common introduced flower *Stachytarpheta* (cf. *cayennensis*, ex. *urticaefolia*) SERE or FINAK NE PUAK, and in cultivated *Hibiscus* sp. (piercing the basis of the flower from behind).

Breeding data are scarce, summarized in Table 2. Gardiner (in Gadow 1898) collected a chick in Oct. or Nov. and gave an accurate description of the nest placed "*in any fork formed by the twigs of the hifo tree* (Callophyllum inophyllum*). The nest is made of grass and rather deep. The eggs, numbering from three to five, are white, with a few red spots, very large for the size of the bird*." These data suggest that nest, clutch-size and coloration of eggs are more similar to those of the Cardinal Myzomela than to the Orange-breasted Myzomela *Myzomela jugularis* PEALE, 1848 (cf. Clunie 1984).

	Jan.-April	May	June-Aug.	Sep.	Oct.	Nov.	Dec.
Displays	-	-	-	X	X	X	-
Occupied nests	-	-	-	-	X	X	end of breeding ?
Feeding of fledglings	-	X	-	X	X	X	-

Table 2. Data on the breeding of the Rotuman Myzomela from Gardiner in Gadow (1898), Clunie (1985), Zug *et al.* (1988), and this work. "X" corresponds to a mention in the literature or to personal observations, and the sign" – " to an absence of data

Campephagidae

Polynesian Triller *Lalage maculosa rotumae* Neumann, 1927 JEA (CMC, DW, all our informants)

The Polynesian Triller *L. maculosa* (PEALE, 1848) includes 16 subspecies distributed in Temotu (South Solomon), Vanuatu, Fiji and surrounding islands (Rotuma and Futuna), Tonga, Samoa and Niue. In the phylogenetic tree of the ten sequenced *Lalage* species, it occupies a basal position in a clade formed by species found in Australia, New Guinea, and Sulawesi to Melanesia and Samoa (Jønsson *et al.* 2010). The subspecies *rotumae* is considered as very distinct, characterized by the darker colour of the male and by its larger size (Mayr & Ripley 1941).

On Rotuma, it has been recorded by all previous observers. Correia in 1925 collected at least 21 specimens. The Polynesian Triller occupies both the coastland and the inland, in all types of habitats (coconut groves, cultivations, villages, secondary forests, open coastal forests), even along the airstrip when the grass has been freshly cut. It is less common in secondary forests when the cover is too dense, whereas it is abundant at the edge of forests and in open habitats (generally cultivations). We recorded it commonly on Afgaha Islet, and it probably occupies other islets, such as Uea. Density is high with several individuals/ha. Population number is similar to that of the Myzomela, i.e. 10,000-19,999 individuals. The different populations of the Polynesian Triller in the south-west Pacific have various habitats preferences. Rare in the dense forests in Temotu (South Solomon), it is dependent of such montane forests on Santo (Vanuatu) (Dutson 2011). On several Polynesian islands, it occupies open habitats in afforestation with exotic woods (Watling 2004). Uncommon on Futuna, at least since the beginning of the 20th century (in 1925 Correia collected only 2 sp.), it inhabits mainly grasslands with ferns and afforestation of Caribbean Pines (*Pinus caribaea*). Uncommon as well on Alofi, it is restricted to dense humid forests. On these two islands, the population number is limited to a few hundred pairs, as opposed to the large number on Rotuma, for a similar land surface.

Male Polynesian Triller

Relatively tame in villages, some birds do not hesitate to visit baskets with vegetables and fruits in the market at Ahau, in the middle of people. Its social system seems complex with birds always seen in small groups. Insectivorous, mainly caterpillars (Clunie 1985, Watling 2004), they feed also on fruits of *Ficus benjamina* (Clunie 1985). They forage on the ground and at all stages and height in the vegetation. Breeding period spreads at least from Sept. to Dec. (Table 3), but is probably longer, starting in August or earlier.

	Jan. to Aug.	Sep.	Oct.	Nov.	Dec.
Displays	-	X	X	X	X
Brood patches	-	X	X	-	-
Occupied nests	-		X	X	X
Feeding of fledglings	-	X	X	X	X

Table 3. Data on the breeding of the Polynesian Triller (from Gardiner, Clunie 1985, and this work; brood patches were examined on several birds caught with mist-nest). "X" corresponds to a mention in the literature or to personal observations, and the sign" – " to an absence of data

Monarchidae

Lesser Shrikebill *Clytorhynchus vitiensis wiglesworthi* MAYR, 1933 FÄ'ERE (CMC), FA'ERE (DW, FC), HELAVAO (CMC, Freddy Jione from Itu'muta), FA-AIRE (Gardiner in Gadow), HELEVAO (Anon. D)

The genus *Clytorhynchus* belongs to a specific clade (the "core-monarchs") largely distributed in the Tropical Pacific islands (Andersen *et al.* 2015). It includes two species from the Central Polynesia [Black-faced Shrikebill (*C. nigrogularis*) and Lesser Shrikebill]. The first occupies only the large Fijian islands, whereas the second is found in most of the Fijian archipelago and surroundings islands (Futuna, Rotuma), in Tonga, and Samoa. Not less than 12 subspecies are recognized (Mayr 1933, Dickinson & Christidis 2014). The subspecies *wiglesworthi,* endemic to Rotuma, was described more on the basis of its restricted range than because of its morphological characters that differ weakly from other populations (Mayr 1933). A first genetic analysis of six subspecies from the Fiji Is. did not show a clear structure among them (Andersen *et al.* 2015), suggesting a possible recent colonization on some of islands or regular gene flow. We will test in future analyses whether the isolated populations from Futuna and Rotuma are more distinct genetically from the others.

The Lesser Shrikebill is not globally threatened ("*Least Concern*" according to BirdLife International 2018), although it disappeared from several islands of its range: Mamanuca and Yasawa groups in Fiji (Masibalavu & Dutson 2006, Gregory 2018), and Tau in American Samoa (Gregory 2018). In Tonga its range has contracted significantly due to deforestation, understorey clearance by pigs and goats, and predation by cats and rats (Gregory 2018). On Rotuma, we estimated the population number at a few thousand individuals. However, the destruction of several hectares of forest along the airstrip, in addition to the cutting of the tall and big TILO trees at Elsio and Pepheua, has necessarily provoked the disappearance of several territories. However, the situation of the Lesser Shrikebill is considerably better on Rotuma than on Futuna and Alofi where the forest destruction in the 2000s was drastic.

Lesser Shrikebill

Recorded by all previous observers, who described the bird as a forest dweller (Clunie 1985, Zug *et al.* 1988). In Sep. and Oct. 2018, we found it all over the mainland, although markedly less common than the three other endemic Rotuman passerines. We heard a singer on Afgaha Islet, and it probably occupies the other forested islets (at least Uea). Relatively more abundant in dense secondary forests inland, where it was often the commonest passerine. However, it occupies all woody groves, even of very small range (e.g. Malvaceae trees), in farmlands, villages, and on the coast (in TILO trees). Mainly insectivorous, gleans

actively in the vegetation, also fly-catching. Watling (1982) indicated also "*probably a little fruit*" in its diet.

Breeding habits remain poorly known, its nest and eggs were never described. During our visit, we captured several females with broad patches, and we found a dead chick (less than a week old) fallen from a nest on 1st Oct., suggesting that the breeding season has begun. Most birds collected in May 1925 by Correia were "*in badly worn plumage or molting*" (Mayr 1933), thus past the breeding season.

Sturnidae

Polynesian Starling *Aplonis tabuensis rotumae* MAYR, 1942 HUSILA, (Forbes 1878, CMC, FC, DW, all our informants), HUSELA (Gardiner)

The genus *Aplonis* GOULD, 1836 includes 21 extant species (Dickinson & Christidis 2014), and several others extinct species in Micronesia, Vanuatu, Cook, and Society (Steadman 2006, Dickinson & Christidis 2014, Thibault & Cibois 2017). The Polynesian Starling is represented by 12 subspecies, distributed on Temotu (South Solomon), Fiji Is. and surroundings islands ([Futuna, Uea (Wallis), and Rotuma], Tonga, Samoa, and Niue. According to Mayr (1942), the subspecies are distinguished by the coloration of their plumage (darker on some Tongan and Samoan islands than in Fiji), and also by the coloration of the iris. Regarding this character, however, we found more variation on birds captured in the field than the data indicated on the specimen labels (see Table 4).

Locality	subspecies	Mayr (1942)	Watling (2004)	this work (only adults)
Manua Islands, Samoa Is.	*manuae,*	yellow	yellow	
Tutuila Island, American Samoa.	*tutuilae*	yellow	yellow	
Upolu and Savaii, Samoa Is.	*brevirostris*	yellow	yellow	
Niue	*brunnescens*	unknown		
Tonga and 2 Fijian islands	*tabuensis*	iris brown or yellowish		
Southern Tonga	*tabuensis*		brown	
Niuafou Island, Northern Tonga	*nesiotes*	yellow	yellow	
Northern Tonga	*tenebrosus*	yellow		
Futuna, Alofi	*fortunae*	yellow	yellow	orange-yellow (9 ind.), brownish-red (4 ind.)
Uea (Wallis)	*fortunae*	yellow	yellow	Yellow (4 ind.), olive (1 ind.)
Rotuma	*rotumae*	yellow	yellow	olive (31 ind.) or yellow (10 ind.)
Fiji Is.	*vitiensis*	prevalence of yellow		
Fiji, Northern Lau	*vitiensis*		yellow or brown	
Temotu, Solomon (excepted Tikopia)	*pachyrhamphus*	brown		
Ticopia (Temotu, Solomon)	*tucopiae*	yellowish or brown		

Table 4. Coloration of the iris of Polynesian Starlings according to subspecies and locality. Data published by Mayr (1942) came from the labels of the specimens collected during the Whitney South Sea Expedition in the 1920s. Data from Futuna, Uvea (Wallis) and Rotuma obtained from birds caught in mist-nets and photographed (A. Cibois & J.-C. Thibault unpublished data)

Polynesian Starlings, left from Rotuma (olive iris), and right from Uvea (Wallis) (yellow iris)

Recorded on Rotuma by all previous observers. Present all over the island, and probably on all islets (seen on Kalvaka, Afgaha, and in flight toward the islets off Oinafa). Probably the commonest Rotuman bird, although abundance varies greatly among habitats. Very common in cultivations and around villages where food is plentiful (up to ten birds/ha), but less abundant in coconut groves and in very low density in dense secondary forests. Population number similar to the Rotuman Myzomela and Polynesian Triller, i.e. 10,000-19,999 individuals.

Mainly frugivorous, but also insectivorous (Watling 2004). On Rotuma, it forages solely or in small groups composed of excited and noisy birds. Recorded feeding on the following plants or fruits: Papaya *Carica papaya* ESU, *Flacourtia rukam* FIRO MOTO, ripe mangoes *Mangifera indica* MAGKO on the ground, the local tree *Micromelum minutum*, bananas (*Musa*) PARI, Guava *Psidium guajava* KOAO or KUAVA; and according to Zug *et al.* (1988) also chili peppers *Piper sp*. But no observations were obtained in secondary forests where they probably eat berries and fruits of native trees. We also observed a Starling attempting to open a Hermit-crab with its bill, on rocks of the shore, and we found broken shells of small terrestrial mollusks in the forests, possibly predated by Starlings.

In Sep. and Oct. we caught birds with brood-patches as well as fledglings, and we found one dead chick, fallen from its nest, suggesting that the breeding season has begun. Clunie's (1985) observations of birds carrying food or nest materials indicated that it extended at least to December.

Common Myna *Acridotheres tristis* (L., 1766)

An Asian bird, introduced in many Pacific islands, including the largest Fijian islands. It arrived on Rotuma, ship-assisted, seven to twelve months ago (i.e. end of 2017 or early 2018), possibly on the cargo-ship « Lomaiviti Princess » and settled first around the Jetty in Oinafa. In Sept.-Oct. 2018, we found five isolated pairs in the following coastal localities: Oinafa (near the Jetty), Paptea, Marana, Noa'tau, and 'Utu. The Myna did not disperse west of Oinafa in the North, suggesting that the large stand of dense secondary forests between

the jetty and Lopta constituted a barrier. It might however continue its spread west of ‘Utu in the South, where such forests are not present. Not recorded inland. Two pairs were probably visiting nesting sites, and two others were feeding chicks at nest. They were seen foraging for invertebrates in grasslands.

The Myna’s future expansion on the island could likely be possibly to the detriment of the endemic passerines, in particular of the Rotuman Myzomela, which occupies the same habitat. Immediate actions should be undertaken to prevent a larger colonization of the island. On Uvea (Wallis), the Common Myna is common ten years after its arrival but it does not compete seriously with the local Polynesian Starling. On Futuna the consequences of the introduction of the Jungle Myna [*A. fuscus* (WAGLER, 1827)] are unknown, in particular regarding the Wattled Honeyeater [*Foulehaio carunculatus* (JF GMELIN, 1788)] (Thibault *et al.* 2014).

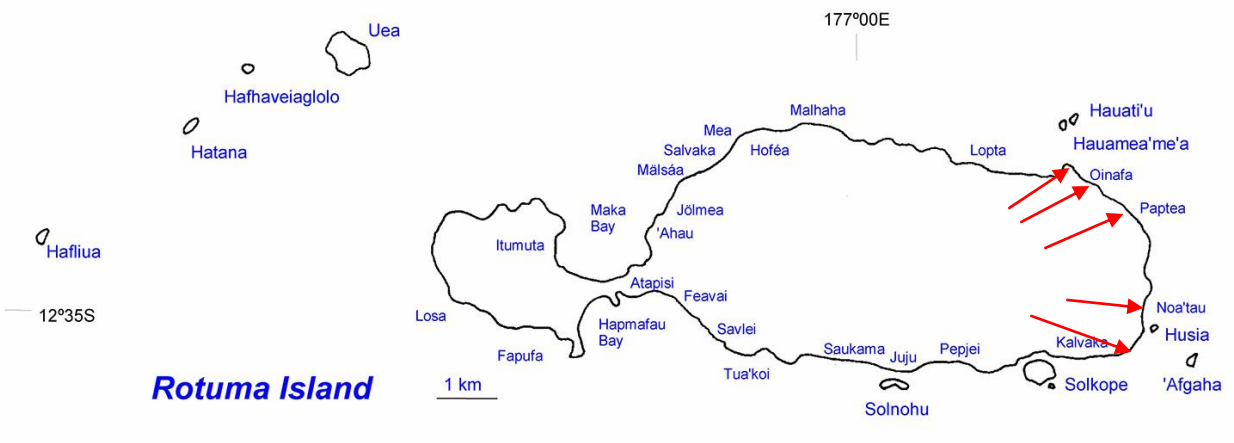

Figure 9. Localization of the Common Mynas in Sept. and Oct. 2018

Mammalia

Emballonuridae

Sheath-tailed Bat *Emballonura semicaudata* (PEALE, 1848) HUFHUFU [CMC; “*bat (flying animal*”), all our informants]

This small bat has a large range in the tropical Pacific, but in a limited number of localities in Western Samoa, American Samoa, Tonga, Fiji, Palau, the Truk and Caroline Islands, and Guam and the Marianas (Helgen & Flannery 2002). Despite its large range, the species is in decline in all archipelagos since the beginning of the 20th century. Still included in the category “*endangered*” by the IUCN (Bonaccorso & Allison 2008), but probably best considered “*critically endangered*”. Based on data from Micronesia, Samoa and Fiji, the causes of its decline or extinction include cyclones, human perturbations, the use of pesticides, the consequences of the World War II (in Micronesia), introduced animals, and diseases (Lemke 1986, Helgen & Flannery 2002, Tarburton 2002, Palmeirim *et al.* 2007, Wiles *et al.* 2011, Anon. B). Palmeirim *et al.* (2007) proposed the most pertinent analysis: “*The peculiar range of this species may explain why it is so vulnerable. In spite of a capacity to disperse over water it apparently failed to establish populations on any of the biologically rich islands located along the western edge of its range. This failure to thrive in species-rich communities suggests that it cannot cope well with competition or with predation, interactions that presumably increased with the multiple species introduced by humans across its range.*

Susceptibility to pathogens could be a major cause of the species' decline but we do not know of any confirmed mass mortality of Microchiroptera caused by pathogenic agents".

On Rotuma, first recorded by Correia in 1925, by thousands. Then, in 1985 Clunie described a still very favorable situation: "*Sheather-tailed Bats roost in multiple thousands in caves on the rocky western headland of Rotuma, my identifying them in the hand on a visit to the Fapufa cave. An hour or more before sunset they emerge and disperse throughout the island, flying between and over the coconut trees*" …"*Late each afternoon a stream of thousands of these little bats passed over the Government station at ahau*" … "*Wherever I wandered of an evening I encountered them in far larger numbers than is usual in Fiji*" (Clunie 1985). Two years later, in 1987: "*the bat was observed infrequently and only singly in or adjacent to the forest*" (Zug *et al.* 1988). In Sep.-Oct. 2018, we did not observe any bats, nor did we obtain any information suggesting its presence. The visits of four caves at Itu'muta (1 in Lulu, 2 in Losa, 1 in Fapufa) were unsuccessful. We questioned numerous villagers (in Itu'muta, Noa'tau, Oinafa, Lopta, Ahau): people under 30 years old did not know the bats' existence, and older people only remember seeing the bats when they were young, but not any since at least a decade. We concluded that the bats are probably extinct on Rotuma, but the causes of their extinction remain mysterious. Predation by cats or other introduced animals can be excluded. Primary forests have been transformed to cultivations and secondary forests long since the colonization by Polynesian People, with no major changes since Clunie's visit. Excepted the cave at Losa that is used by people to bath in a little fresh water basin, the caves are seldom visited, except during WW II when some were used as refuge by the population. Pesticides on the other hand cannot be excluded: they were apparently used in great quantity still in the early 2000s (McKay 2007), and then banished only recently by all islanders. The introduction of a new pathogen agent could also be a possible explanation.

Muridae

KUMĀ (= baby rat, CMC), PIJA (= rat, CMC), both names attributed to the Polynesian Rat (Eliasa Pengueli from Noa'tau, Freddy Jione from Itu'muta)

Ship (Black) Rat *Rattus rattus* (L., 1758)

Largely introduced on islands in the three Oceans. Not recorded on Rotuma by previous naturalists and, during our visit, not seen or recorded by the villagers. Moreover, all the coconuts were intact, whereas attacks on green coconuts on the trees are usually a sign of the presence of this rat on islands.

Brown (Norway) Rat *Rattus norvegicus* (BERKENHOUT, 1769)

Large distribution on Pacific islands where it has been introduced since the 19th century. Never yet recorded on Rotuma, but on 23th Oct. 2018, we observed on the beach of Lopo a rat larger than a Polynesian Rat, with a short tail, suggesting a possible recent introduction. Such arrival is however not surprising regarding the increased number of containers.

Polynesian Rat *Rattus exulans* (PEALE, 1848)

Large distribution on Pacific islands where it has been introduced by the first inhabitants. Uncommon during our visit in Sep. And Oct. 2018. Two carcasses of rat were attributed to this species; one seen on main farmland road in Itu'muta and the other in Ahau.

House Mouse *Mus musculus L., 1758*

Large distribution on Pacific islands where it has introduced since the 19th century. Not yet recorded on Rotuma, but one small rodent seen on the main farmland road (district of Itu'ti'u) in Oct. 2018 could belong to this species.

Reptilia

Boidae

Pacific Treeboa *Candoia bibroni* (DUMÉRIL & BIBRON, 1844) 'ALETE (CMC)

One specimen collected by Gardiner on Rotuma was cited by Boulenger (1897) (under the synonym name *Enygrus australis*). Zug *et al.* (1988) did not record it, but they indicated that it « *persists according to the Rotuman* ». Not recorded in 2018, but several informants said they find it occasionally when cutting trees in the forest. Also present on Futuna (Gill 1993) and Alofi (pers. obs., 2014). Zug (2013) mentioned that « *adults prey mainly on birds and mammals* », but its density is low and its impact on the small passerines (*e.g.* the Rotuman Myzomela) probably insignificant.

Pacific Treeboa resting in a tree on Alofi, twin island of Futuna

Annex: List of birds captured on Rotuma

Species	Number of individuals mist-netted	Number of samples (feather or blood)
Aplonis tabuensis	51	20
Arenaria interpres		1
Clytorhynchus vitiensis	14	14
Ducula pacifica	2	2
Hypotaenidia philippensis	1	1
Lalage maculosa	20	20
Myzomela chermesina	30	22
Phaethon lepturus		1
Pluvialis fulva	1	1
Ptilinopus porphyraceus	2	2
Sula leucogaster		2
11 species	121	86

Table 5. List of birds sampled in September and October 2018. All mist-netted birds were released a few minutes after their capture

Species	Number of specimens in museum collections
Aplonis tabuensis	29
Clytorhynchus vitiensis	18
Hypotaenidia philippensis	1
Lalage maculosa	25
Myzomela chermesina	45
Porphyrio porphyrio	1
Ptilinopus porphyraceus	14
Tyto alba	1

Table 6. List of bird species collected in May 1925 on Rotuma and held at the American Museum of Natural History, New York and National Museum of Natural History, Smithsonian Institution (collectors: Correia, Hicks and Callourt) (source: Bird collection of the WSSE, collections of the American Museum of Natural History, accessed on VertNet (http://www.vertnet.org) on 07 December 2018)

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Anon. A https://naturefiji.org/rotuman-myzomela-myzomela-chermesina/

Anon. B.https://naturefiji.org/emballonura-semicaudata-pacific-sheath-tail-bat/

Anon. C *Rotuma schools eco-camp report 2007*. 1-19. Available from www.rotuma.net/os/lajereports/EcoCamp_07%20_Report.pdf

Anon. D *Rotuma birdlife 2008-2009*. LäjeRotuma Initiative.

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