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Birds of Aitutaki, Cook Islands

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Abstract: The distributions of birds on the islands of Aitutaki were surveyed 3–13 Oct 2024. We document 22 resident and migratory species across the 17 islands of the almost-atoll Aitutaki, with regionally important colonies of red-tailed tropicbirds (*Phaethon rubricauda*), red-footed boobies (*Sula sula*), and wedge-tailed shearwaters (*Ardenna pacifica*), as well as a population of the IUCN-vulnerable blue lorikeet (*Vini peruviana*) on Aitutaki's main island. While Pacific rats (*Rattus exulans*) and cats (*Felis catus*) are present on some islands, others potentially remain rat-free. Over the last 25 years, the reef island of Motukitū has undergone a substantial habitat transformation from introduced coconut forest to native atoll broadleaf forest, enabling the recovery of seabirds. Prevalent threats to the birds of Aitutaki include the introduction of additional rat species, spread of Pacific rat to currently rat-free islands within the almost-atoll, unsupervised tourism, and habitat modification on the small islands.

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INTRODUCTION

Islands are hotspots for bird evolution and endemism (Thibault & Cibois 2017) and also for their extinction (Duncan *et al.* 2013). Island type contributes differently to both these processes (Steibl, Bunbury *et al.* 2024). The Cook Islands contain a diversity of island types, including volcanic, makatea, sand cay, low-lying atoll and the almost-atoll of Aitutaki. The mix of volcanic, reef, and sand cay islands on the almost-atoll of Aitutaki potentially played an important role in promoting bird species diversity and thus make Aitutaki a focus for bird conservation (Steibl, Steiger *et al.* 2024). Some scientific work has taken place

on Aitutaki almost-atoll. Although Aitutaki almost-atoll (hereafter 'Aitutaki') has had a long human history, the majority of the scientific documentation of the environment of Aitutaki has only been conducted from the middle of the 20th century. Stoddart & Gibbs (1975) documented a scientific expedition from 27 Aug to 26 Sep 1969 focusing on geomorphology and vegetation on the main volcanic island and the reef and lagoon islands.

Published records of the avifauna of Aitutaki have largely been provided through reports from occasional visits by foreign birdwatchers. The first full list of birds from Aitutaki was produced by David Holyoak who visited Aitutaki Island 4–5 Aug 1973 (Holyoak 1976, 1980). Subsequently, from 30 Aug to 3 Sep 1980, Peter & Margaret Child visited Aitutaki Island and five other islands (Maina,

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Akaiami, Rapota, Moturakau, and Motukituu) (Child 1981). From 26 Nov to 2 Dec 1983, John & Leila Taylor visited Aitutaki Island and at least some smaller islands (Taylor 1984). From 2 Nov to 3 Dec 1987, David Steadman visited Aitutaki Island and three other islands (Maina, Rapota, and Moturakau) (Steadman 1991). From 4–10 Oct 1995 Brian Gill visited Aitutaki Island and (on 7 Oct 1995) Maina and Tapuaetai (Gill 1996). During November 1999, Harry & Deborah Carter visited Aitutaki Island and (on 24 Nov 1999) Maina and Tapuaetai (Carter & Carter 1999). More recently, eBird checklists (Sullivan *et al.* 2009) provide additional records from visits to Aitutaki by birdwatchers. Steadman's archaeological work on Aitutaki Island and Moturakau has further added to understanding the historical avifauna (Steadman 1991), documenting the extinction of an undescribed whistling duck (*Dendrocygna*, undescribed sp.), spotless crane (*Zapornia tabuensis*), Tahiti petrel (*Pseudobulweria rostrata*) and kura or Kuhl's lorikeet (*Vini kuhlii*).

Rodent trapping campaigns in 1993 and 1994 caught kiore (*Rattus exulans*) and house mice (*Mus musculus*), but no ship rats (*Rattus rattus*), on Aitutaki Island (Gill 1996; McCormack 1997). In 2002, Ian Karika and Ron Henry undertook a rat control operation on Motukituu, spreading 7 kg of 0.05g/kg brodifacoum Talon wax baits along 6 east-west transects, dropping bait every 20 metres.

During October 2024, we visited Aitutaki and undertook basic surveys of each island to assess bird species presence and order of magnitude abundance, the presence of rats and cats, and notes on vegetation and human usage. These surveys document change in the status of birds on Aitutaki over 30 years, and the first comprehensive survey of all islands since half a century ago. Our records of birds and invasive mammals provide an updated summary of their distribution, which hopefully motivates appropriate rat eradication projects as an island restoration and species conservation tool (Kappes & Jones 2014).

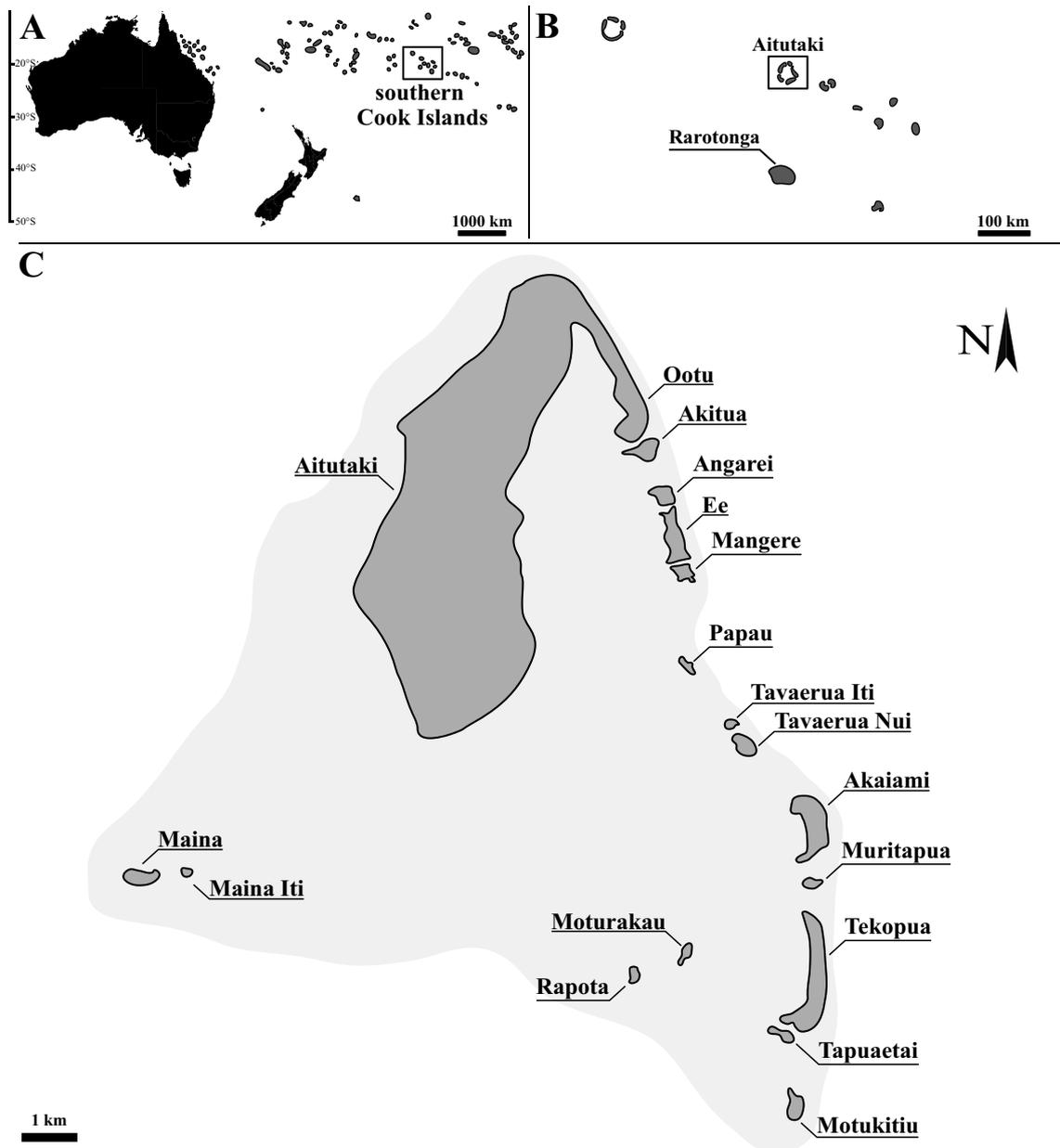


Figure 1. Aitutaki almost-atoll (C) and its location in the southern Cook Islands group (B) and the southern Pacific Ocean (A). The sizes of Pacific Islands are exaggerated.

MATERIALS AND METHODS

Aitutaki (18° 51' 30" S, 159° 47' 30" W, Fig. 1) consists of a single large volcanic main island (123 m maximum altitude) of the same name dominating the north-west of the coral reef rim. This main island is naturally connected to a low-lying island of reef-borne deposits ('Ootu') where the airport runway is located. These two islands are now fused, with the main island tapering from the northernmost point south-eastwards towards the eastern rim chain of reef islands. The eastern rim has 12 reef islands separated by channels of various widths. Ootu peninsula has been connected to Aitutaki Island since prior to the 20th century, and Angarei, Ee, and Mangere were mapped as one island ('Mangere') in both 1908 and 1945 (Marshall 1908; Spoehr & Bonham 2012). Slightly west of these reef islands, inside the lagoon are two small volcanic islands: Moturakau and Rapota. On the south-west of the atoll are two sand cays: Maina and Maina-iti, the latter of which recently became vegetated (c. 1969), and this process was accelerated by intentional planting of coconut palms (*Cocos nucifera*) since the end of the 20th century (Nick Henry, pers. comm.). The entire almost-atoll therefore consists today of the large main island, and 16 smaller islands (Table 1).

With the support of the Manuae Enea Conservation Trust (MECT) and Birds New Zealand, we visited Aitutaki from 3 to 13 Oct 2024 and on most days surveyed its islands. Time spent on each island varied but was minimally sufficient to document current vegetation and birdlife and determine rat and cat (*Felis catus*) status. House mice are relatively uncommon on Aitutaki Island (Gill 1996), and we did not check for their presence on the smaller islands where the best place to search for sign would have been inside buildings that we did not have permission to access.

RESULTS

Bird species nomenclature follows the *Checklist of the birds of New Zealand* (OSNZ Checklist Committee 2024). Plant species nomenclature follows *Flora of the Cook Islands* (Sykes 2016). Aitutaki Māori names where available are from the Cook Islands Biodiversity and Ethnobiology Database (McCormack 2025).

Grey duck *Anas superciliosa* Mokorā rau-vai

Two were observed in flight on the southwestern coast of Aitutaki Island.

Red junglefowl *Gallus gallus* Moa

Feral and abundant across modified Aitutaki Island, Ootu and Akitua and, generally of a wild type (Holyoak 1980). Individuals of both sexes were also observed around human modified areas on Akaiami, Tekopua, Tapuaetai, Moturakau, and Rapota.

Long-tailed cuckoo *Eudynamis taitensis* Karavia

A few were heard or seen each day on surveyed islands. These would have been resident birds yet to leave for New Zealand, or southward migrating birds passing through from more distant islands.

Pacific golden plover *Pluvialis fulva* Tōrea

Seen along coasts on all islands of Aitutaki, as well as being commonly found in open areas on Aitutaki Island (including Ootu). A few were observed on each visit to all other islands. Opportunistic counts as we drove along the airstrip on Ootu were similar to those made 40 years earlier (Taylor 1984) suggesting numbers have not markedly changed.

Bristle-thighed curlew *Numenius tahitiensis* Teuea

Observed in low numbers on the coast of Aitutaki Island and Motukititi, consistent with Child (1981). We estimate that fewer than 10 birds were present on Aitutaki at the time of our surveys.

Ruddy turnstone *Arenaria interpres*

One seen on the exposed reef platform on the north end of Motukititi. This species was not recorded from Aitutaki by Holyoak (1980); however, a single bird was recorded in 1980 by Child (1981) and four birds on one day were seen in 1981 (D. Lawrie, 1981, ebird.org/checklist/S26664637). More recent records of small numbers were made in 2010 and 2011 (B. Wedderburn, 2010, ebird.org/checklist/S12941534; G. Schön, 2011, ebird.org/checklist/S78053991). It is a regular visitor to the Cook Islands in small numbers.

Table 1. Islands of Aitutaki (clockwise from north). Island classification follows Stoddart & Gibbs (1975). Place names follow Land Information New Zealand (2014). *excluding Ootu peninsula starting at the airport runway.

Island	Type	Area (ha)	Structures	Notes
Aitutaki	Volcanic	*1490.03	Inhabited	Connected prior to 20 th century
Ootu	Reef	73.97	Airstrip	
Akitua	Reef	10.65	Resort	A resort island
Angarei	Reef	10.99	None	
Ee	Reef	25.29	None	
Mangere	Reef	7.14	None	
Papau	Reef	3.91	Hut	
Tavaerua Iti	Reef	2.92	None	
Tavaerua Nui	Reef	10.31	Hut	
Akaiami	Reef	36.91	Lodge	
Muritapua	Reef	3.48	None	
Tekopua	Reef	61.02	Hut	
Tapuaetai	Reef	4.99	Lodge	Translated "One Foot" (Island)
Motukititi	Reef	9.42	None	
Moturakau	Volcanic	1.91	Hut	
Rapota	Volcanic	3.15	Hut	
Maina Iti	Sand cay	0.81	Hut	Colloquially "Honeymoon Island"
Maina	Sand cay	12.22	Hut	

Wandering tattler *Tringa incana* Kuriri

Seen along coasts on all islands of Aitutaki and as well as being common around Aitutaki Island (including Ootu). One or two were observed on each visit to all other islands. These numbers are similar to Child (1981); however, our methods are not comparable.

Brown noddy *Anous stolidus* Ngōio

Small numbers of brown noddies were observed flying overhead or collecting nesting material from the beaches on the reef islands along the eastern rim. During our surveys but on separate occasions about 100 were counted roosting on the southern spit of Tekopua (J. Kok., pers. comm.) and northern spit of Motukitū. In March 2024, 70 were counted on Akaiami (E. Bell & P. Garner-Richards, 2024, ebird.org/checklist/S163480896).

Black noddy *Anous minutus* Ngōio

Small numbers of black noddies were observed collecting nesting material from the beaches and commencing nesting in the broadleaf forests (*Pisonia grandis* trees) on Tekopua and Motukitū, indicating the start of the breeding season. Numbers and breeding are consistent with historical observations 40 years earlier (Child 1981; Taylor 1984).

White tern *Gygis alba* Piraki

Observed flying overhead in small groups on all islands of Aitutaki, where breeding likely occurs in low numbers. The exception is Moturakau which hosts a large colony of 100–200 birds nesting in trees, consistent since at least 2012 (I. Armitage, 2012, ebird.org/checklist/S11548135). Chicks were observed in March 2024 on Moturakau (E. Bell & P. Garner-Richards, 2024, ebird.org/checklist/S163489068); however, we saw none and so breeding is evidently complete by October (Child 1981).

Sooty tern *Onychoprion fuscatus*

Seen flying in ones or twos over Aitutaki Island and Tavaerua Nui. Irregularly recorded from Aitutaki; however, seven were seen at one time on the northern end of Aitutaki Island in November 2024 (J. Smith, 2024, ebird.org/checklist/S203520076). Nearby breeding sites include Suvarrow atoll as well as some islands in the Leeward Islands of French Polynesia (Thibault & Cibois 2017).

Crested tern *Thalasseus bergii*

A single crested tern was seen roosting on the sand spit extending from Motukitū. Although common in neighbouring archipelagos, they are surprisingly infrequent visitors to the Cook Islands. Nearby breeding sites are some islands in the Leeward Islands of French Polynesia (Thibault & Cibois 2017).

Red-tailed tropicbird *Phaethon rubricauda* Tavake

Red-tailed tropicbirds were recorded breeding in large numbers on Maina and in small numbers on Maina Iti and Motukitū. Birds were also observed flying over the seaward side of Angarei and the southern (native forested) end of Tekopua; however, breeding in these areas was not confirmed. Most chicks were close to fledging, indicating that we were present as the breeding season was ending. We estimated 50–100 pairs on Maina, a substantial increase on the single nest observed in November 1999, although this was at the very end of the breeding season (Carter & Carter 1999). Evidently, there are annual fluctuations; for example, we found only a few nests on Maina Iti, and we were told this was a poor season for them on this

island, and more nests have been found in previous years (e.g. G. Maslowski, 2022, ebird.org/checklist/S105261071).

White-tailed tropicbird *Phaethon lepturus* Rākoa

White-tailed tropicbirds were observed only on Aitutaki Island, where they were often seen hovering around the tops of large ava (*Ficus prolixa*) and the invasive jambolan tree (*Syzygium cumini*). Preference for nesting in large trees is known to be the case in the presence of introduced mammals (Russell *et al.* 2024). Although we only observed this bird on Aitutaki Island they are occasionally observed over the smaller islands.

Wedge-tailed shearwater *Ardenna pacifica* 'E'engu / 'E'emu

Wedge-tailed shearwaters were last recorded breeding on Aitutaki in the 1980s on the cliffs above the Pacific Resort (then Rapae Motel) on Aitutaki Island and on Maina; however, they have not been recorded since. G. Hancock reported frequently hearing birds calling inland of the Rapae Motel from after dark until about 3 am from Nov to Mar, 1983–84 (Smith *et al.* 2025); however, Taylor (1984) stayed at the Rapae Motel in November 1983 and did not record them. We identified ten burrows on the eastern ridgeline of Rapota and about 50 on the south-western dune faces of Maina, but did not search on Aitutaki Island. Some of the medium-sized burrows we found had recently been excavated on each island, indicating the commencing of prospecting and start of the breeding season. Adult feathers collected around burrows on Rapota appear to be wedge-tailed shearwater, and wedge-tailed shearwaters are observed off the coast (B. Wedderburn, 2010, ebird.org/checklist/S12941537; Steibl *et al.* in press).

Great frigatebird *Fregata minor* Kōta'a

The most common frigatebird species observed flying overhead across all of Aitutaki. Approximately 60 counted over Motukitū where they roost, and a few also observed roosting on Rapota. Numbers on Motukitū are consistent with observations over 40 years earlier (Child 1981). Nearby breeding sites include Suvarrow atoll and Takūtea island as well as some islands in the Leeward Islands of French Polynesia (Thibault & Cibois 2017).

Lesser frigatebird *Fregata ariel* Kōta'a

A few occasionally observed flying overhead across all of Aitutaki. Nearby breeding sites include Suvarrow atoll as well as some islands in the Leeward Islands of French Polynesia (Thibault & Cibois 2017).

Red-footed booby *Sula sula* Toroā

A few hundred adults observed nesting and roosting on Motukitū, with a systematic count from the coast of 59 nests comprising 21 adults on eggs (or very small chicks), 38 chicks at all stages of development, and 21 sub-adults. The number of nests is consistent with observations 8 years earlier (P. Lowe, 2016, ebird.org/checklist/S30913448); however, red-footed boobies were absent from Aitutaki in 1999 (Carter & Carter 1999). Using the equation of Russell *et al.* (2024), a population estimate for Motukitū would be between 354 to 390 adult birds. This estimate assumes a 450-day cycle with 45 days incubation and 91 to 105 days of chick rearing, as recorded from nearby Fiji (Langham 1984). It also assumes asynchronous breeding; however, breeding typically occurs in peaks, and so our estimate may be an under- or over-estimate depending on when in the breeding cycle it took place. A few birds were also observed roosting on Moturakau and Rapota.

Table 2. Resident land and sea bird distribution on Aitutaki. p = present, b = breeding, a = absent. Number of letters indicates abundance in three classes: 1–10, 11–100, >100.

English	Aitutaki	Aitutaki	Ootu	Akitua	Angarei	Ee	Mangere	Papau	Tavaerua Iti	Tavaerua Nui	Akaiami	Muritapua	Tekopua	Tapuaetai	Motukituu	Moturakau	Rapota	Maina Iti	Maina
Grey duck	Mokorā rau-vai	p	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
Red junglefowl	Moa	bbb	bbb	bb	a	a	a	a	a	a	p	a	p	p	a	p	p	a	a
Brown noddy	Ngōio	a	a	a	b	b	b	b	b	b	bb	b	bb	b	bb	a	a	a	a
Black noddy	Ngōio	a	a	a	a	a	a	a	a	a	a	a	b	a	b	a	a	a	a
White tern	Piraki	bb	b	b	b	b	b	b	b	b	b	b	b	b	b	bbb	b	a	b
Red-tailed tropicbird	Tavake	a	a	a	p	a	a	a	a	a	a	a	p	a	b	a	a	bb	bbb
White-tailed tropicbird	Rākoa	pp	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
Wedge-tailed shearwater	‘E’engu / ‘E’emu	b?	a	a	a	a	a	a	a	a	a	a	a	a	a	a	b	a	bb
Great frigatebird	Kōta’a	a	a	a	a	a	a	a	a	a	a	a	a	a	pp	a	p	a	a
Lesser frigatebird	Kōta’a	a	a	a	a	a	a	a	a	a	a	a	a	a	p	a	a	a	a
Red-footed booby	Toroā	a	a	a	a	a	a	a	a	a	a	a	a	a	bbb	a	a	a	a
Brown booby	Toroā	a	a	a	a	a	a	a	a	a	a	a	a	a	p	a	p	a	a
Reef heron	Kōtuku	pp	pp	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Blue lorikeet	Kurāmo’o	bbb	b	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
Common myna	Manu kavamani/ Manu kāomani	bbb	bb	bb	a	a	a	a	a	a	p	a	a	a	a	a	a	a	a

Brown booby *Sula leucogaster* Toroā

A few were observed in the trees on Rapota and Motukituu, but with no sign of breeding.

Reef heron *Egretta sacra* Kōtuku

Seen along coasts on all the islands of Aitutaki and regularly observed on each visit. Dark, light and intermediate colour morphs were all observed in a similar ratio (the majority dark, the minority light, and intermediate as a rarity) as earlier records (Child 1981; Taylor 1984).

Blue lorikeet *Vini peruviana* Kurāmo’o

Probably introduced, and well-established by the end of 19th century (Townsend & Wetmore 1919). It is widespread across Aitutaki Island (Wilson 1993; Gill 1996). The population was estimated at around 1,000 birds in the late 20th century (McCormack 1997) and higher in the early 21st century (Koutsofta 2009) but apparently crashed by half after Cyclone Pat in 2010 (Jennings 2011). It has evidently recovered since that time. Although we only observed lorikeets on Aitutaki Island, they are occasionally observed on the other smaller islands as well.

Common myna *Acridotheres tristis* Manu kavamani / Manu kāomani

Introduced in November 1916 (McCormack 1993) and now abundant across Aitutaki Island, Ootu, and Akitua, with a few also seen around occupied buildings on Akaiami. The population crashed after Cyclone Pat in 2010 (G. McCormack, per. obs.) but has recovered in numbers since.

Pacific rat *Rattus exulans* Kiore

Rat sign indicating high densities of rats was found on all islands except Papau, Muritapua, Tapuaetai, Moturakau, Maina Iti, and Maina, where rats are either absent or at very low densities.

Cat *Felis catus* Ngīāo

Cats or cat sign were observed on Aitutaki Island, Ootu, Akaiami (possibly only the pet cat of the lodge caretaker), Tekopua, and Tapuaetai.

DISCUSSION

The almost-atoll of Aitutaki contains a diversity of island types, sizes and land-uses that promotes avian diversity. Human colonisation with associated species introductions and habitat modification (especially on the main island of Aitutaki), has caused declines and extinctions for many species. A record of 50-year island coastline change is available from the 1974 aerial photography of the Royal New Zealand Air Force (fotoweb.airforcemuseum.co.nz) and 55-year vegetation change from the 1969 vegetation maps of Stoddart (1975). These inform our understanding of changes in bird distribution and abundance on Aitutaki, which reflects a combination of environmental and habitat factors, overlaid with legacies of historical and current human land-use and species introductions. Because Aitutaki is often visited only briefly by birdwatchers, counts of birds can be heavily dependent on what stage of the breeding cycle species are in; for tropical seabird species these cycles may not be a regular 12-month calendar year (Schreiber & Burger 2001).

On Aitutaki Island, the large area and volcanic landform could support large population sizes. However, clearing of virtually all native forest coupled with the introductions of mammals and birds means that today only introduced land bird species are abundant. This includes the blue lorikeet, which was probably introduced as a pet species and established in the wild in the 19th century (Townsend & Wetmore 1919) and which is unlikely to have been sympatric with the locally extinct Kuhl’s lorikeet/Kura (*Vini kuhlii*) (McCormack & Künzlé 1996). Fossil bone records indicate that Kuhl’s lorikeet was the original native lorikeet species of the southern Cook Islands, but it was hunted to extinction for its prized red feathers (Steadman 1991). Pacific imperial-pigeon (*Ducula pacifica*) and Cook Islands

fruit-dove (*Ptilinopus rarotongensis*) were not noted during a brief visit in 1899 (Townsend & Wetmore 1919) but were reported by locals as persisting uncommonly and locally until the mid-20th century (Steadman 1991). They may be good candidates for reintroduction if suitable habitat was available.

The reef islands along the eastern reef rim are dominated by coconut woodland with interspersed native trees, primarily 'ara (*Pandanus tectorius*) and 'ano or beach gardenia (*Guettarda speciosa*) as well as smaller shrub species such as kōpara (*Timonius uniflorus*), kōpara (*Scaevola taccada*) and tai'inu (*Heliotropium arboreum*), and also introductions such as toa (*Casuarina equisetifolia*) and tamanu (*Calophyllum inophyllum*). The only birds present in this habitat are breeding white terns (and brown noddies to a lesser extent), along with over-wintering long-tailed cuckoos. The more isolated of these reef islands are potentially rat-free and this should be confirmed. Human structures (mostly rarely-used fishing huts) are present on many islands, but only where they are regularly occupied does this modify bird abundance. On Akaiami for example, at the former docking site for Tasman Empire Airways Limited (TEAL) flying boats, a small number of common myna and red junglefowl were present around the boutique tourist over-night accommodation, along with yellow crazy ants (*Anoplolepis gracilipes*), and at least one cat was detected (potentially this was just the pet of the resident caretaker). Similarly, on Tapuaetai, red junglefowl and a small number of cats were present (J. Kok, pers. comm.). Cat footprints were also detected across the beach of Tekopua. The presence of cats obviously has severe repercussions for the distribution of some bird species, although on Tapuaetai regular over-night visitors for the past decade have not reported seeing rats.

At the very southern end of the eastern reef rim, Motukititi stands apart from the other reef islands for its relatively natural ecology today. The vegetation in 1969 was described as coconut woodland similar to the rest of the reef islands on the eastern rim (Stoddart 1975). However, today Motukititi is dominated by native forest consisting predominantly of pukatea (*Pisonia grandis*). With this change in dominant forest state, the seabird fauna of Motukititi has also recovered dramatically. Motukititi is an important island for black noddy, red-footed booby, and great frigatebirds. We believe the change in dominant forest state that initiated seabird recovery on Motukititi occurred sometime in the early 21st century, possibly triggered by a major disturbance event such as a cyclone and/or the control operation upon rats, whereby the recovery of pukatea and red-footed booby initiated a positive feedback loop. Monodominant pukatea forests are unique to reef islands, and their occurrence and functioning is closely coupled to seabirds (Steibl, Bunbury *et al.* 2024) and recovers following rat eradication (Wolf *et al.* 2018). Seabirds are the key seed disperser for pukatea, and several seabird species find suitable nesting habitat in the trees (Burger 2005). Vice versa, pukatea is uniquely adapted to effectively utilise the nutrients from seabird guano and sustain high growth rates even under increasingly heavier guano load that causes other shrub and tree species to die-back (Young *et al.* 2011; Steibl, Bunbury *et al.* 2024). A growing and establishing pukatea forest provides increasingly more nesting space for seabirds, while the increasingly larger guano nutrient input loads of the seabird population generate the nutritional advantage for pukatea trees to dominate over other tree and shrub species, likely resulting in the whole forest converging towards pukatea monodominance (Walker 1991).

The two volcanic islands in the lagoon, Moturakau and Rapota, provide distinctly different habitats for birds compared to the reef islands, due to their steep slopes

and elevation, and a mostly broadleaf species dominated forest. Moturakau is an important island for white terns. Although Moturakau is visited regularly by tourists, it is potentially rat-free. While rats are present on Rapota, we found procellariid burrows among the volcanic boulders, with signs of recent excavation and feathers consistent with wedge-tailed shearwater breeding commencing. Red junglefowl are present on both islands, apparently introduced around the time that the reality TV series *Survivor* was filmed in 2006. We also documented the continued presence of Mauritius hemp (*Furcraea foetida*) growing on the summit and volcanic bluffs on Moturakau (Sykes 2016). This large, spreading plant has the potential to disrupt recruitment of native vegetation or hinder seabird burrowing, and changes in its distribution on the island should be monitored. A large rock shelter on Moturakau has been an important site for documenting the extinct bird fauna of Aitutaki (Allen & Schubel 1990).

Maina is the most isolated island in the lagoon and has a much drier inland habitat than the eastern reef islands, consisting mostly of exposed sandy flats and open shrubland especially on the western half. This habitat is evidently preferred by the healthy population of red-tailed tropicbirds, and the island is also important for wedge-tailed shearwaters, which are burrowing into the stable sand dunes on its south-western margin. Maina is also visited regularly by tourists but potentially remains rat-free.

The current threats to the birds of Aitutaki are predominantly from introduced species and unregulated tourism. The potentially rat-free status of some islands needs more robust validation. If rats are absent, the continuing maintenance of rat-free status is an urgent biosecurity need, as is ensuring that the entirety of Aitutaki remains free of rats of European origin (i.e. *R. rattus* and *R. norvegicus*). That these rat species are absent despite the presence of a large wharf servicing international vessels and a major military presence in World War II is surprising. The presence of cats on some islands is particularly problematic. Although cats may disrupt rat activity, they seriously disrupt virtually all bird populations (Russell & Kaiser-Bunbury 2019). There also seems to be negative impacts of red junglefowl presence on the islands, as we observed that their foraging disrupts native forest recruitment. Yellow crazy ant is recorded from Aitutaki Island (Gruber *et al.* in press) and were found on two of the more disturbed islands (Akaiami & Tapuaetai); however, we did not systematically search for them across all islands. Invasive ants such as these can also negatively impact birds (Plentovich *et al.* 2018).

Carter & Carter (1999) 25 years ago noted the negative impact of unsupervised and uninformed tourism on Aitutaki (and also Tetiaroa atoll in French Polynesia). We re-iterate their call for well-managed ecotourism, which is also supported by our experience on Tetiaroa (Russell *et al.* 2011). The human use of islands is currently focused on only a subset of the islands (Akaiami, Tapuaetai, Moturakau, Maina, and Maina Iti), which reduces overall pressure on the remainder of the islands and their wildlife, but more effort could be put into tourist education and supervision during visits to these islands. Tourism operators should be made aware that some of these islands (Moturakau, Maina, and Maina Iti) may be rat-free and that this contributes to their tourism value. Motukititi is not rat-free but appears to be rarely visited by either tourists or locals; we encourage this to continue as the proliferation of birdlife here relies on minimising human disturbance.

The almost-atoll of Aitutaki with its diverse islands is a mosaic of communities at different stages of ecological intactness or disturbance, as well as a mosaic of human land-uses from tourism and local community island use. This setting offers great potential to facilitate both

tourism-based economic income and local resource extraction (e.g. coconut harvesting) on some islands for the community, while other islands can be managed as important conservation sites for Polynesia's unique island biodiversity. Through active management and ecological restoration, e.g. removal of introduced species such as feral red junglefowl, rats and cats, as well as reforestation and bird translocations, the ecological value of islands could be greatly elevated. Restoring the islands of Aitutaki not only enhances their ecological integrity and resilience to global change (Steibl, Kench *et al.* 2024) it feeds back to the human community in positive and diverse ways (de Wit *et al.* 2020), perhaps most directly as a revenue stream from delivering tourism wildlife experiences of an intact and vibrant tropical Polynesian reef island ecosystem.

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