Rarotonga Flycatcher *Kakerori (Pomarea dimidiata)*:

Species Status Report 2020

***Kakerori* (Rarotonga Flycatcher)**
Adult and juvenile, Julien Ueda (2019)

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Species Status Report – *Kakerori*, Rarotonga Flycatcher (*Pomarea dimidiata*)

Summary

Conservation work in the form of rat baiting to control rat numbers within the Takitumu Conservation Area (TCA) has been ongoing since 1989, to protect 7 of the then 13 breeding pairs of *kakerori* (Robertson et al 1998). More than 20 years later, a desk-based assessment of the Cook Islands Key Biodiversity Areas (KBA) and Important Bird Areas (IBA) was developed (Evans 2012). In this report, it was identified that the Rarotonga Flycatcher (*Pomarea dimidiata*), known locally as *kakerori*, was 1 of 8 threatened national land bird species found in the Cook Islands. *Kakerori* are still predominantly found within the Takitumu Conservation Area (TCA) on Rarotonga, also identified as a KBA. The bird is currently listed as 'Vulnerable' under the IUCN Red List of threatened species (Birdlife International 2018).

The *kakerori* was included in the Strategic Results Framework (SRF) of the Ridge to Reef project (R2R) as a priority species for continued management and conservation actions. The R2R baseline figures at the start of the project in 2015 recorded *kakerori* population numbers at 428 individuals on Rarotonga and a translocated population of 125 individuals on Ātiu . The project's target goal for the species over the programme period aimed to achieve '*no net decline in kakerori population numbers'* (UNDP project document. Undated).

The R2R project (2015-19, later extended to 2021) provided funds to assist the TCA in their ongoing recovery programme, including biennial population surveys, continued rat control programmes, an updated management plan and guidebook, materials and equipment to support management operations including an electric vehicle, amongst others.

The most recent 2017 census recorded an increase in *kakerori* numbers to 471 on Rarotonga. A 2018 survey found a minimum of 123 birds in Ātiu , however this was considered to be an underestimate due to surveying difficulties associated with inaccessible terrain. A full census was planned for August 2020 to inform the R2R terminal evaluation, but is pending Covid-19 travel restrictions. Thus, the total population of *kākerōri* is currently estimated at around 600 birds.

This demonstrates that the overall project target of no net decline in *kakerori* numbers from 428 has been achieved, with populations actually increasing as a result of continued management actions supported by the R2R project.

The Rarotonga Flycatcher Background

The Rarotonga Flycatcher (*Pomarea dimidiata*), locally known as the *kakerori*, is a small monarch flycatcher, endemic to Rarotonga. It has been listed as critically endangered in the past but has made significant progress over the past 30 years.

Both males and females undergo the same set changes in colouration as they grow older, with 1-3 year olds birds distinguished by an orange colour and all birds over 4 years becoming entirely grey (Robertson et al 1993). *Kakerori* are territorial birds and are likely to occupy valleys sheltered from the prevailing south east trade winds (Robertson & Saul 2008). Adult *kakerori* pairs remain within their territory throughout the year (Robertson & Saul 2008). They breed from October to February, though most eggs are laid in October and early November. Adults can lay 1 to 2 eggs in nests positioned on forked branches. sometimes overhanging streams (Robertson & Saul 2008). A new clutch will be laid if the nest fails, but not if clutches are successful (Saul et al 1998).

Effective management since 1989 has brought the *kakerori* back from the verge of extinction, and they now have a stable population found within and adjacent to the areas of the Takitumu Conservation Area (TCA), a 155-ha community managed forest area on the south-eastern side of Rarotonga. A total of 40 birds were also translocated, on four separate occasions between 2001-2011, to Ātiu (Robertson et al, 2020). This was to establish an insurance population, in case a disease or cyclone was to wipe out the Rarotonga population.

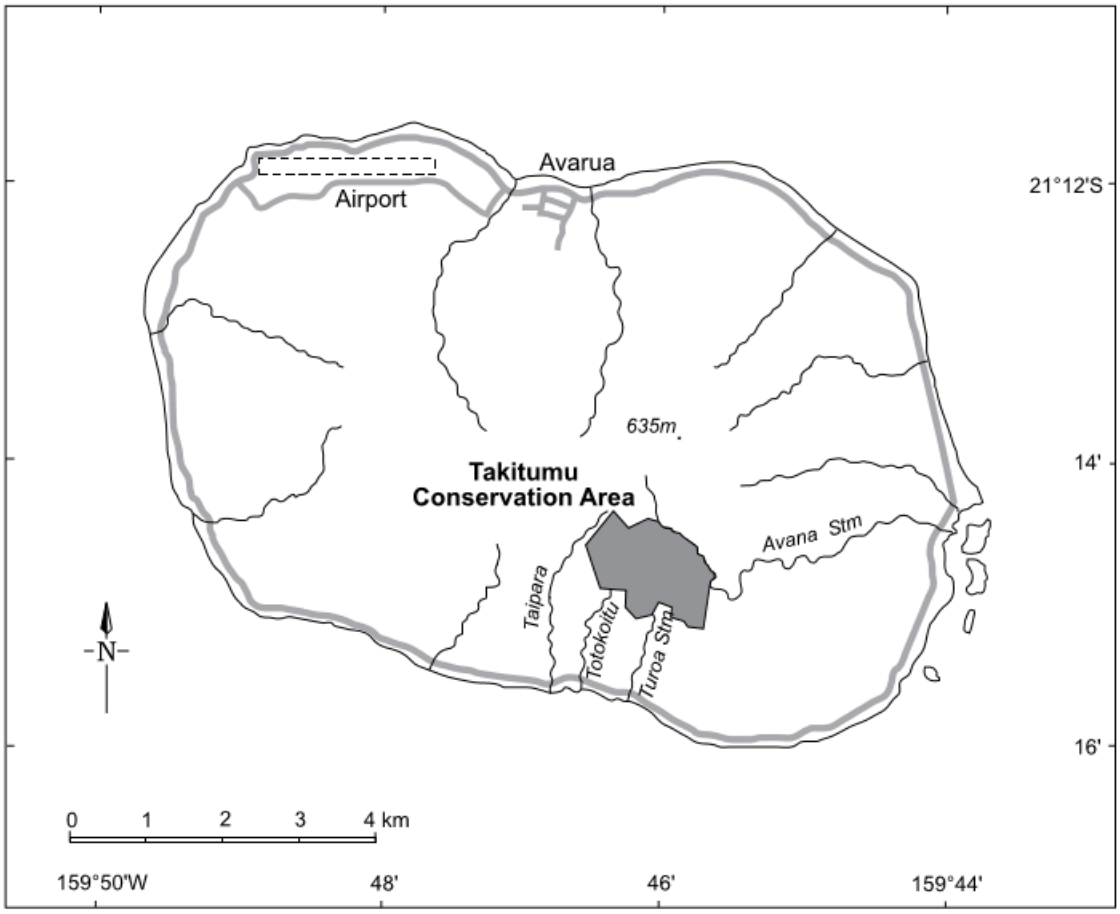

Figure 1. Map of Rarotonga, showing where the 155 ha (approximately 2.5% of Rarotonga's land area) Takitumu Conservation Area is located. The TCA is a landowner community designated and managed area (Robertson & Saul 2008).

Population History and Distribution

In the mid-1800s, *kakerori* were reported to be commonly seen throughout Rarotonga. However their numbers declined rapidly as a result of what was then attributed to deforestation (Gill 1885). By the early 1900s, the *kakerori* were thought to have become extinct but were rediscovered in 1973 within the rugged interior of the island (Robertson et al 1994). In 1983, David Todd found 21 birds and estimated that there were 35-50 birds (David Todd unpubl. Data cited in Robertson et al 2020). A thorough search was conducted in 1987 and found 38 birds (Robertson et al 1994) but after further annual censuses it was reported that there were 36 birds in 1988 and 29 in 1989. This resulted in the *kakerori* being classified as 'critically endangered' under IUCN Red List criteria, as well as being listed as one of the 10 rarest bird species in the world (Collar et al 1994). During this time, population predictions found that the *kakerori* were experiencing an average rate of population decline by 12% per year, suggesting there was a 50% chance that the *kakerori* would be extinct by 1998 and a 90% chance of extinction by 2002 (Har unpubl. Data cited in Robertson et al 2020).

Current Population

The 2017 census found 471 *kakerori* on Rarotonga (Robertson et al 2020). There were 320 birds living in or immediately adjacent to the area of the TCA, which is managed by rat baiting programmes annually. A further 154 were found outside the protected area, mainly in the lower Avana valley (47), Upper Avana Basin (32) or the Taipara Valley (27).

In 2017, the Ātiu population was estimated at about 150 birds (Ed Saul & Lynda Nia pers. Comm in Robertson et al 2020). A survey in 2018 found a minimum of 123 birds, but this was considered to be an underestimate as only 7 yearlings were found, and other bird sightings were difficult to achieve due to inaccessible terrain e.g. makatea (raised coral) habitats (Tui Wright pers. Comm in Robertson et al 2020).

The global population of *kakerori* in 2017 across these two sites was therefore approximately 600 birds, a more than a 20-fold increase from their lowest recorded population number of 29 in 1989 (Robertson et al 2020).

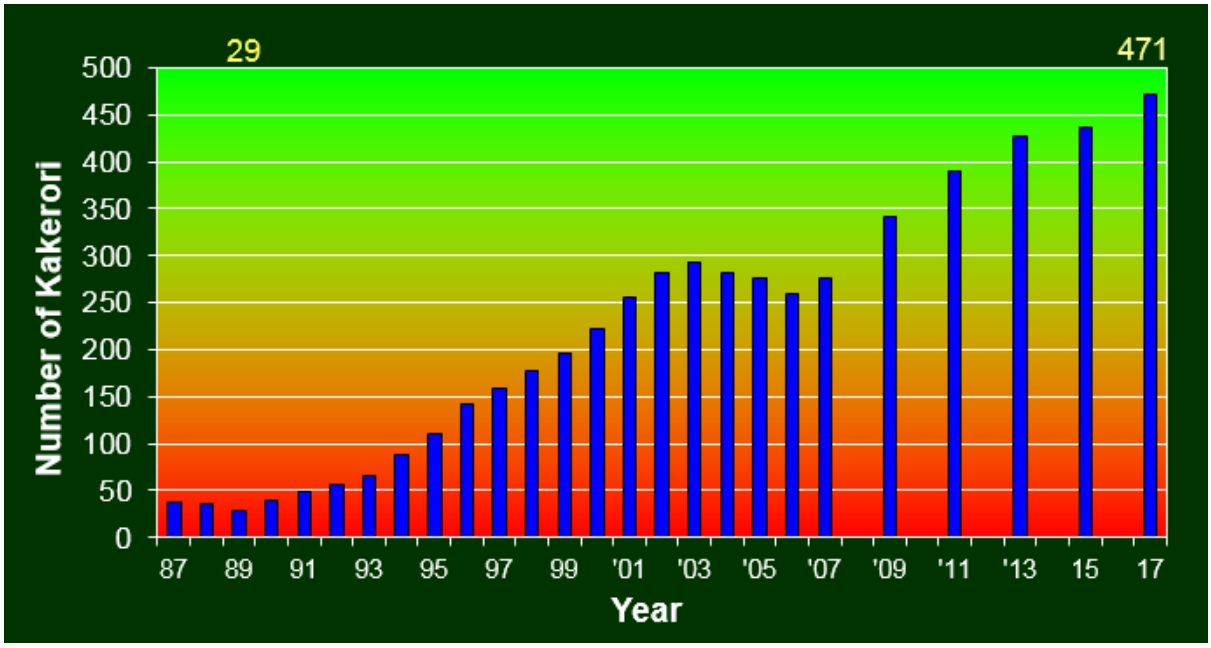

Figure 1. Population change in the kakerori on Rarotonga, showing the minimum of 29 birds in 1989 and the peak of 471 birds found in 2017. The drop in numbers between 2003 and 2006 was the result of translocating 30 birds to Ātiu , plus the impacts of 5 cyclones that passed through the southern Cook Islands in February-March 2005 (Roberston et al 2020).

Conservation status and management

To save the *kakerori* from extinction, an experimental recovery programme was established in 1989 to determine why the bird had become critically endangered. Early findings demonstrated that the *kakerori* were declining as a result of invasive ship rats (*Rattus rattus*)

and possibly Pacific rats (*Rattus exulans*), that were preying on eggs and nestlings (Hay & Robertson 1988).

Management of these main predation threats followed (Saul et al 1998). This involved improving the breeding success of *kakerori* through seasonal poisoning of rats within the main habitat of the *kakerori* (later known as the Takitumu Conservation Area). Key nesting trees were also encircled with metal bands to prevent rats from climbing trees to access nests (Robertson et al 1998). This activity was later discontinued as inefficient compared to poisoning efforts. As a result of the management programme, the breeding success of the *kakerori* improved significantly. The number of *kakerori* increased at an average rate of 20% per year from 29 birds in 1989 to 153 birds in 1997 (Saul et al 1998) and 255 in 2001 (Robertson & Saul 2007). In 2000, the IUCN Red List threat ranking of the *kakerori* was changed from 'critically endangered' to 'endangered', one of the very few species to have been downgraded as a result of on the ground conservation management rather than improved knowledge (Stattersfield et al 2000).

Additional risks to the *kakerori* include catastrophic events such as cyclones or disease. To mitigate such risks, a translocation of a small number of birds to Ātiu as an insurance measure was approved and supported by TCA landowners as well as the Ātiu island leaders and community. The initial translocation took place in 2001, when 10 young *kakerori* (1 and 2 year olds) were transferred from the TCA to Ātiu , and another 10 young birds were transferred each year for the next two years, making a total of 30 initial founders (Robertson et al 2006). A further 10 birds were translocated in 2011 to further strengthen the genetic diversity of the population there (Robertson et al 2020). Signs of initial breeding were identified in 2002/03 with the population steadily increasing to 150 birds in 2012 (Robertson et al 2020).

In 2005, the southern Cook Islands were hit by five tropical cyclones within 4 weeks in February and March (Robertson & Saul 2007). Much of the *kakerori* habitat e.g. forest on exposed faces, spurs and ridges, was severely damaged as a result (Robertson & Saul 2007). Despite significant habitat destruction, the population survived remarkably well, with a minimum of 274 adults known to be alive within the TCA in August 2005 (Robertson & Saul 2007). Breeding productivity however was exceptionally poor in 2005/06. This was noted by 2007 surveys which identified 277 birds (Robertson et al 2020). Poor productivity levels were attributed to nesting failures, as nests were more exposed to weather conditions due to defoliated canopies (Robertson & Saul 2007). Additionally, rats were more commonly seen during the day, possibly due to a shortage in food supply as a result of fewer trees that were fruiting (Robertson & Saul 2007).

In 2011, the population was estimated at 380 birds including 69 yearlings, and around 310 mature individuals (Robertson et al 2011). The 2011 population estimates suggested that the species should be further down-listed to 'Vulnerable' on the IUCN Red List, as the population had more than 250 mature individuals with no evidence of decline within the last five years (Robertson et al 2011). The *kakerori*'s 'Vulnerable' listing would remain on the basis that the number of mature individuals remained below 1000 and that the bird was only present at two locations (Robertson et al 2011).

Having applied an effective management programme for the *kakerori* since 1989 with the support of multiple stakeholders, including projects such as R2R, *kakerori* numbers have been on the rise and also have been able to bounce back from minor declines. The success of the management regimes through poisoning, along with establishing an 'insurance' population on Ātiu , has allowed the *kakerori* population to bounce back from the brink of extinction as well as expand its geographical range.

The Ātiu population is expected to increase over time, but recommendations have included that 10 juveniles (1-2 years old) should be translocated from the TCA to Ātiu every 20 years (or 5 birds every 10 years) to maintain genetic diversity (Robertson et al 2020). Further recommendations for Ātiu include population monitoring to occur at 5 to 10-year intervals in order to better understand broad population changes.

Social learning platforms, particularly on Rarotonga are encouraged through school tours and bilingual brochures or pamphlets that were developed under R2R to target specific age group audiences to increase awareness.

Ridge to Reef (R2R) Project Funding 2015-2021

The R2R project funding has provided the assistance needed to continue and expand species management and conservation efforts both within the TCA and on Ātiu . These activities include assistance to continued biennial censuses, investigating reports of sightings and actively seeking new areas of colonization, ongoing rat control programmes that include poison baiting, observing and recording nesting and fledgling activity during rat control activities and for 3-4 weeks after, as well as providing equipment and materials needed for more effective management of the area by the landowners.

Additionally, the development of an updated TCA Management Plan (see references, Robertson et al, 2020) for the species over the next decade was supported to strengthen and direct management capacities. Recommendations and activities made within this Management Plan are attached as Annex 1.

Conclusion

The R2R baseline population figures for the *kakerori* in 2015 were recorded at 428 individuals on Rarotonga and 125 on Ātiu , representing a total population of 553 individuals. This report has found that in the final year of the R2R project, prior to terminal evaluation in 2020, the most recent surveys identified an increase in *kakerori* numbers to 471 on Rarotonga (2017) and a minimum of 123 birds on Ātiu (2018), though this was considered to be an underestimate. This results in a total population of at least 600 individuals, representing a 10% increase in total net population from baseline levels, as at 2017. Unfortunately the planned 2020 survey was not possible due to travel restrictions caused by the Covid-19 pandemic. However, there have been no reasons identified to expect any declines in populations since the 2017 surveys. During this period (2015-2020), R2R funding directly contributed towards supporting the ongoing recovery programme of the *kakerori*, as well as the development of a 10 year Management plan for the TCA (2020-2030) to ensure sustainability and planning of ongoing efforts beyond the life of the project.

This report therefore concludes that the initial targets set by the R2R project in 2015 of achieving 'no net decline in population' numbers of the Rarotonga Monarch (*kakerori*, *Pomarea dimidiata*) has been achieved.

SRF #	Description of Indicator	End-of-project target level	End-of-project indicator	Target status
14b.3	Conservation of priority species at selected sites: Rarotongan Monarch (Rarotonga 428 & Ātiu 125)	No net decline in population	Total population 600 (Rarotonga 471 & Ātiu minium 123 but believed to be underestimate)	Achieved

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Annex 1. Management recommendations for the Takitumu Conservation Area, from Robertson et al, 2020.

- At a minimum, maintain the current programme of rat-poisoning in the Tōtoko'itu, Tūroa, and Lower Avanā Valleys on Rarotonga, the core area used by *kākerōri*.
- Investigate whether the frequency of baiting could be further reduced.
- The "interim" bait round in May-July should be maintained.
- Index both rodent and cat numbers in the TCA by using baited camera traps. This may help to show the effectiveness of rat poisoning.
- Continue looking for ways to reduce cost of effective rat control.
- Investigate using self-resetting traps, such as Goodnature A24 traps which can kill up to 24 rats between each service.
- Consider using PAPP (para-aminopropiophenone), a toxin that has been developed and registered in New Zealand for control of feral cats.
- Consider expansion of pest control to other valleys in the TCA, or beyond, if the current management can be further streamlined.
- Promote the concept of rodent-free Cook Islands, and advocate that the Cook Islands government follows the development of rodent eradication methods in New Zealand, with the possibility of New Zealand offering to trial some of the methods on small but inhabited islands, before scaling-up to Rarotonga.
- Respond quickly to threats to nature in the TCA, such as roading or housing developments, feral animal incursions, biosecurity, cyclones and weed encroachment.
- Erect signs at entry points into the TCA warning hunters of the risks of secondary poisoning from eating feral animals that have strayed into the TCA.
- Maintain a contingency fund to allow a quick response to fix damaged tracks and roads following cyclones.
- Partner with other conservation organisations, such as Te Ipukarea Society, National Environment Service, and even SPREP, to support scientific programmes to use biological control to overcome weed problems facing the TCA.
- Continue to monitor the demography of *kākerōri* by catching and marking birds with a unique combination of coloured leg bands.
- Support 2- or 3-yearly census by doing a "roll-call" of banded birds and mapping their territories.
- Review the frequency of censuses after the first 3-yearly census to determine if 2-yearly censuses are more practical.
- To answer questions about the demography of *kākerōri*, about $10,000 ($35 per sample) is needed to get commercial DNA sexing of the feather samples collected in the past decade, and to budget $2000 per year for sexing of feather samples.
- Continue to monitor the *kākerōri* population on Ātiu at least every 3 years.

- Aim to add 10 new founders to the Ātiu population from the TCA every 20 years, or 5 new founders every 10 years to maintain genetic diversity of the 'insurance' population.

- When genetic samples are taken of Ātiu birds, all handled *kākerōri* should be individually colour-banded to help refine later population estimates.

- Improve knowledge of the benefits that other native wildlife receives from the rat and feral cat control programme.

- Support research aimed at improving management of the TCA, such as studies of the ecology of *ī'oi*/ Rarotonga starling and *kūkupa*/ Rarotonga fruit dove; studies comparing the survival of *kākerōri* or the abundance of feral cats in territories with and without rat-control, and determining with camera traps whether residual feral cats in the TCA would pose a risk to petrel if they were to be attracted back using playback of their calls.

- Introduce systematic monitoring of other bird species, *moā kirikiri*/fruit bats, and lizards inside and near to the TCA.

- Resurvey the vegetation plots that were established in the early years of the TCA to record changes in abundance of both native plants and weed species.

- Work with the Cook Islands Natural Heritage Trust to develop an identification guide to rare plants in the TCA, and map, tag and count them during each *kākerōri* census.

- Improve the educational resources about the TCA by updating bilingual brochures, booklets, photomontage posters and display panels at the TCA office and/or TCA shelter.

- Concentrate on providing a high-quality natural history experience for Cook Islanders, especially for school groups.

- Initially target the niche birder/ naturalist market when international tourism resumes following the Covid-19 pandemic.

- Consider establishing a trust of the landowner representatives, and possibly others, as a formal legal entity to seek and manage funds from environmental donors.

- Carry out urgent succession planning to ensure continuity in staffing and volunteer support for managing the TCA, doing the rat poisoning, doing the banding and census work, and running ecotours and school visits.