Conservation of kakerori (*Pomarea dimidiata*) in the Cook Islands in 2004/05

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ABSTRACT

In 1989, the kakerori (*Pomarea dimidiata*) was one of the ten rarest bird species in the world, with a declining population of just 29 birds living in south-eastern Rarotonga. As a result of conservation management, the kakerori population has rebounded, with a minimum of 281 birds on Rarotonga and 19 birds on Atiu in summer 2004/05. Since 2001, the emphasis of management in the Takitumu Conservation Area (TCA) on Rarotonga has shifted from the 'recovery' of kakerori to 'sustaining' the population at 250–300 individuals. In 2004/05, all rat bait stations were filled fortnightly, and so the labour costs were reduced by 30% to 34 person days, and toxin use (57 kg of Talon®—active ingredient brodifacoum) was reduced 81% from the peak year during the 'recovery phase'. Kakerori breeding productivity was unusually high in 2004/05 because several pairs raised two broods. In the poisoned area, apparent breeding success was significantly higher (1.35 fledglings/breeding territory) than in the unpoisoned area (0.55 fledglings/breeding territory); however, this difference was at least partly due to more effort being spent searching for fledglings in poisoned areas. A minimum of 59 fledglings was detected in 2004/05; however, some territories were not checked during the breeding season, and then a series of five tropical cyclones struck Rarotonga in a 4-week period in February/March 2005, which halted our fledgling searches, and caused severe damage to some habitat in the TCA. We expect that many kakerori perished during these cyclones; however, the population on Atiu, which was only affected by two of the five cyclones, survived unscathed. These catastrophic weather events highlighted the vulnerability of single-island endemic birds, and underlined the value of establishing an 'insurance' population on Atiu. We recommend that the poisoning regime should return to that used during the 'recovery phase' of the kakerori management programme if the August 2005 census reveals that the population has fallen below 220 birds (a 20% decline), otherwise the recent programme of fortnightly poisoning should continue.

Keywords: kakerori, *Pomarea dimidiata*, sustainable management, translocation, catastrophe, rat control, Rarotonga, Atiu

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1. Introduction

1.1 KAKERORI

In a review of bird conservation problems in the South Pacific, commissioned by the South Pacific Regional Environment Programme (SPREP) and the International Council for Bird Preservation (now BirdLife International) in the early 1980s, Hay (1986) identified the kakerori, or Rarotonga monarch (*Pomarea dimidiata*) as one of the species most urgently in need of conservation management (Robertson et al. 1994).

The kakerori is a small (22 g) forest passerine, endemic to Rarotonga. Kakerori display an interesting variety of plumages, and it was not until birds were individually colour-banded that it was shown that males and females undergo the same set changes in colouration: all yearlings are orange, with a yellow base to their dark bill; all 2-year-olds are orange, with all-dark bills; 3-year-olds are a variable 'mixed' colour, ranging from some females that are blotchy grey and orange, through to some males that are entirely grey; all birds 4 or more years old are entirely grey (Robertson et al. 1993; HAR & KS unpubl. data).

Most 1- and 2-year-old kakerori form loose flocks on the ridgetops, away from occupied territories; however, some join adults as 'helpers' to defend a territory and to raise young. Most territories are in valleys, especially those sheltered from the prevailing south-east trade winds. Adult kakerori are strongly territorial and remain on their territory throughout the year. They breed from October to February, though most eggs are laid in October and early November. They lay 1–2 eggs in a bulky nest, often placed on a forked branch overhanging a creek. Replacement clutches are laid if nests fail, but kakerori usually do not re-lay after successfully fledging young (Saul et al. 1998).

1.2 POPULATION TRENDS BEFORE MANAGEMENT (BEFORE 1989)

In the mid-1800s, kakerori were reported to be common throughout the island of Rarotonga, but by the early 1900s they were thought to have become extinct. In the 1970s, a small population was rediscovered in the rugged interior of the island. David Todd found 21 birds in 1983, and estimated that there were 35–50 birds (David Todd, unpubl. report). This estimate was probably pessimistic, because a wider and more thorough search in 1987 found 38 birds (Robertson et al. 1994). Subsequent annual censuses identified 36 birds in 1988, and then 29 in 1989, thus confirming that the conservation status of kakerori was 'critically endangered' (Collar et al. 1994). At an average rate of population decline of 12% per year, a population viability analysis showed that there was a 50% chance that kakerori would be extinct by 1998, and a 90% chance by 2002 (HAR, unpubl. data).

1.3 RECOVERY PHASE (1989–2001)

Hay & Robertson (1988) put forward a conservation management proposal to the Cook Islands Conservation Service (later renamed the Cook Islands Environment Service) and SPREP. The plan identified that ship rats (*Rattus rattus*) were the main predators at nests, and cats (*Felis catus*) were predators of adults and recently-fledged juveniles, and it recommended an experimental recovery programme targeting these predators, supported by scientific study aimed at assessing the effectiveness of this work. The plan was implemented by the Cook Islands Environment Service (Robertson et al. 1994) and ran through to 1995 when it was updated, and more emphasis was placed on establishing an 'insurance' population on another island in the southern Cook Islands (Saul 1995). In 1996, the management of the recovery programme was passed to the Takitumu Conservation Area Co-ordinating Committee. This body comprises representatives of the three customary land-owning families which care for the 155-ha Takitumu Conservation Area (TCA) in south-eastern Rarotonga, the home of most kakerori (Fig. 1). The TCA was established as part of the South Pacific Biodiversity Conservation Programme with the aim of protecting and enhancing the TCA's biodiversity values, at the same time as generating income for the landowners through the development of a sustainable ecotourism venture.

In spring 1989, an experimental programme of rat poisoning and nest protection started in one of the four main catchments used by kakerori. The breeding success there was much better than in the untreated areas, and so the area under protection gradually increased. Since 1992, rats have been poisoned each spring in most of the TCA (Robertson et al. 1998).

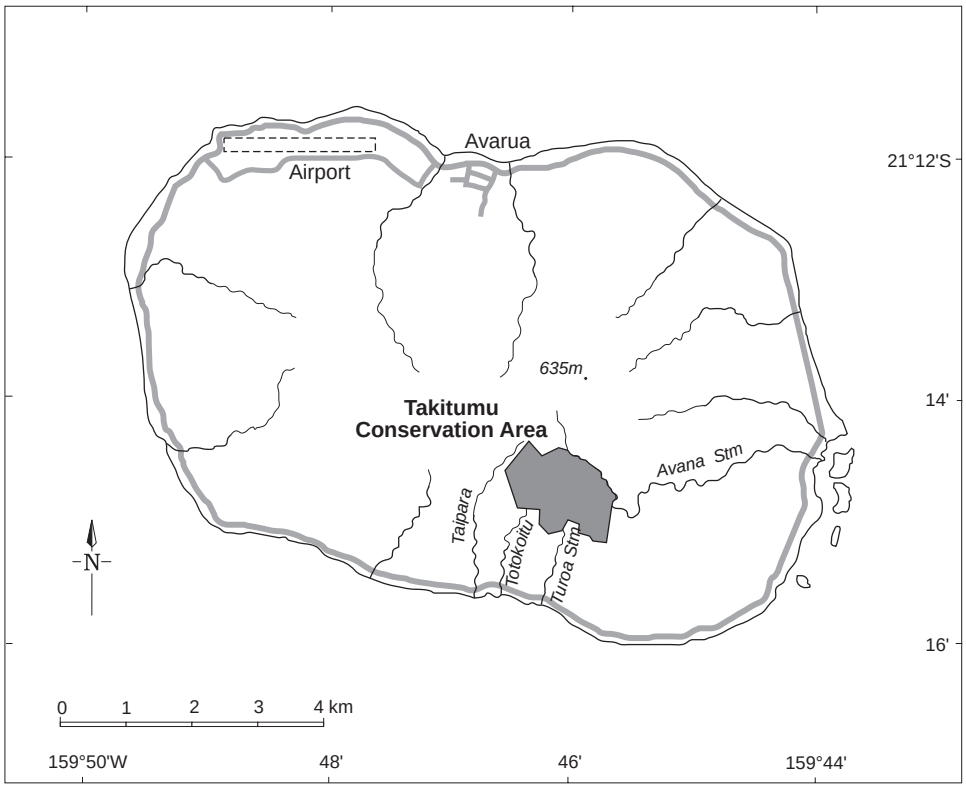

Figure 1. Map of Rarotonga showing the location of the Takitumu Conservation Area.

The effectiveness of predator control has been measured by recording annual breeding productivity in protected and unprotected areas (Robertson et al. 1998; Saul et al. 1998), recording the annual survivorship of individually colour-banded kakerori, and undertaking an annual pre-breeding census each August. The census is made easier by the adult birds generally remaining in the same territory year after year (Saul et al. 1998), and the progressive changes in bill and/or plumage colour of kakerori during their first 4 years of life (Robertson et al. 1993) improve estimates of the survival of unbanded birds.

During this recovery phase, the population of kakerori increased at an average rate of 20% per year, from 29 birds in August 1989 to 255 in August 2001 (Fig. 2). In 2000, BirdLife International downgraded the threat ranking of kakerori from 'critically endangered' to 'endangered' (BirdLife International 2000), one of a very few species to have been downgraded as a result of conservation management rather than improved knowledge (Alison Stattersfield, BirdLife Internat-ional, pers. comm.).

1.4 SUSTAINABLE MANAGEMENT PHASE (SINCE 2001)

In spring 2001 (with funding support from the Avifauna Programme of SPREP, and then the Pacific Initiatives for the Environment, a programme of the New Zealand Agency for International Development), the emphasis of management in the TCA shifted from the 'recovery' of kakerori to a programme aimed at 'sustaining' the population on Rarotonga. The key work during this phase has been two-fold: firstly, the experimental reduction in rat poisoning effort in the TCA to a level where recruitment of kakerori more-or-less balances annual mortality and so maintains the population at 250–300 birds; secondly, the establishment of a secure 'insurance' population away from Rarotonga.

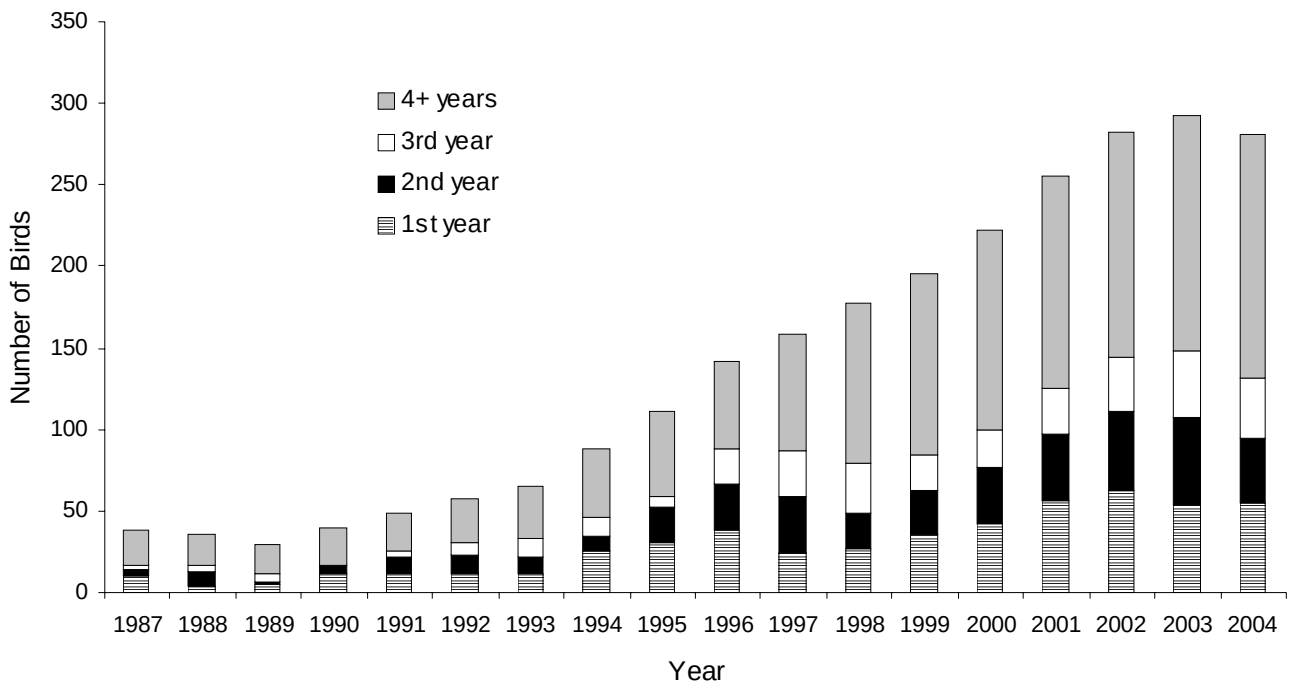

Figure 2. Number of kakerori counted in annual pre-breeding censuses, 1987 to 2004.

A population of 250–300 birds on Rarotonga, while small by international standards, is probably sufficiently large to withstand normal demographic perturbations and maintain adequate genetic diversity, given that the population passed through a bottleneck with just 13 females alive in 1989. Nevertheless, this population, occupying less than 200 ha on one island, is at significant risk of substantial decline or extirpation from a major catastrophic event.

The most obvious risk is from a severe tropical cyclone passing over or close to Rarotonga. In the 14 years between 1969 and 1983, Thompson (1986) recorded that an average of 1.4 tropical cyclones (with mean wind speeds > 33 knots (61 km/h), and strong enough to damage human structures) affected the southern Cook Islands each summer or early autumn. Five of the 19 tropical cyclones were classified as hurricanes, with mean wind speeds of > 63 knots (117 km/h), and they were usually accompanied by great destruction. Between 5 February and 6 March 2005, five tropical cyclones ('Meena', 'Nancy', 'Olaf', 'Percy' and 'Rae'), including four that reached hurricane force at some stage, swept through the southern Cook Islands, generally on a northwest to southeast bearing (Fig. 3). This was the highest number of cyclones ever recorded in a single season in the Cook Islands, and cyclone Percy recorded the lowest barometric pressure (900 hPa) ever measured in the South Pacific (Ngari 2005).

Hurricane-force 'Meena' passed to the east of Rarotonga on 5 and 6 February, with maximum sustained winds on Rarotonga of 46 knots (85 km/h) and gusts of 64 knots (119 km/h), 107 mm of rain, and serious sea-surge damage. Hurricane-force 'Nancy' passed close to Atiu in the early hours of 15 February and uprooted many trees. It then continued southwards until turning westward

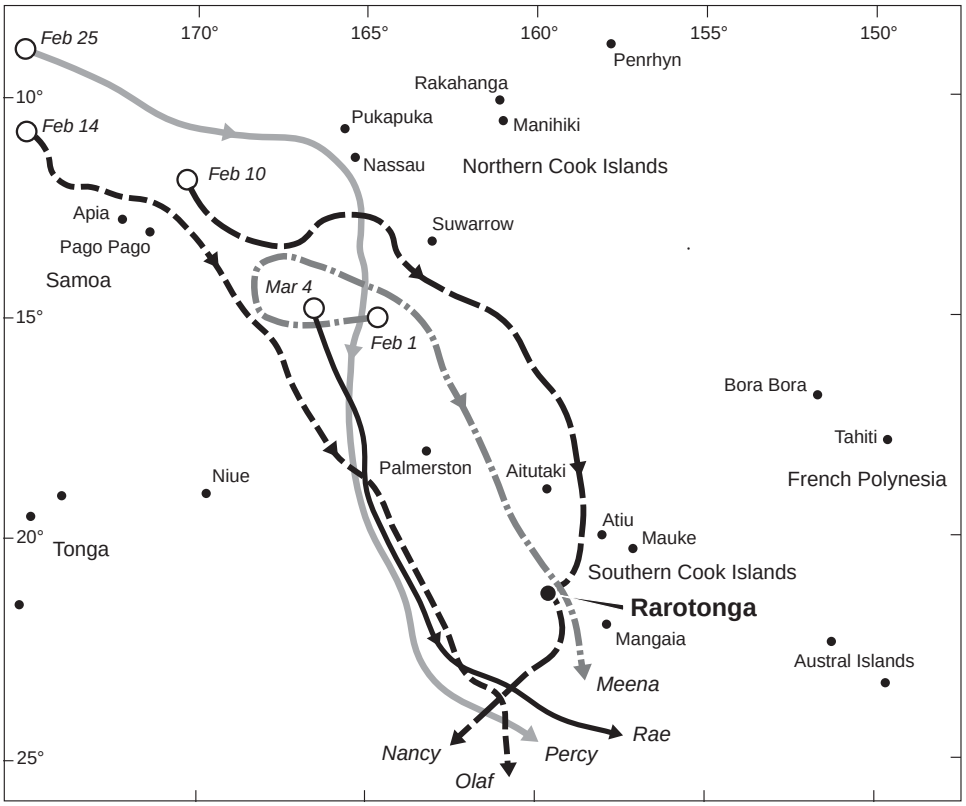

Figure 3. Tracks of the five tropical cyclones that passed through the southern Cook Islands in February and March 2004.

to make a direct hit on Rarotonga that afternoon, before moving away only slowly to the south and southwest. The accompanying 53-knot (98 km/h) winds with gusts to 88 knots (163 km/h) on flat land (but probably much stronger in the hills) on Rarotonga caused severe damage to trees on southward-facing slopes within the TCA. Luckily, this cyclone, which had earlier been classified as a Category 2 hurricane (winds of 84–96 knots), had weakened to tropical storm force by the time it reached Rarotonga, otherwise the damage would have been considerably worse. Hurricane-force 'Olaf' passed to the west of Rarotonga on 17 February and caused more heavy rain and serious sea-surge damage, but the winds on Rarotonga reached only tropical storm force at 38 knots (70 km/h) with gusts to 51 knots (95 km/h). Hurricane-force 'Percy' and Cyclone 'Rae' passed to the west of Rarotonga on 3 March and 6 March respectively. Again, both were accompanied by rain, strong winds (> 30 knots, 56 km/h), and storm surges. We suspect that many kakerori may have perished during the storms associated with 'Meena' and 'Nancy', or from their inability to forage adequately during this abnormal series of five cyclones over a 4-week period.

Because Rarotonga is the main international arrival point, and has the largest human population in the Cook Islands, its wildlife is most at risk from the accidental or deliberate importation of new avian diseases (e.g. mosquito-borne *Plasmodium* haematozoa, or 'Asian bird-flu') or new predators (e.g. brown tree snake *Boiga irregularis,* or red-vented bulbul *Pycnonotus cafer*). After careful consideration of factors such as island size and topography, habitat availability, predators, competitors, disease risk, and community attitudes, Atiu was chosen as the best island for the establishment of an insurance population. If successful, this second population should lower the risk of extinction of kakerori, and allow birds to be returned to Rarotonga if they should ever die out there.

Between August 2001 and August 2003, 30 young kakerori were transferred to Atiu. The early indications are that the transfers have been successful, with successful breeding recorded in a variety of different habitats, and a minimum of 15 birds found in May/June 2004 (Robertson & Saul 2005).

In the 2003/04 season, the rat poisoning effort in the TCA was reduced to fortnightly checking and replacement of baits, rather than the weekly regime used during the 'recovery' phase (Robertson & Saul 2005). This reduced programme was repeated in 2004/05 because it saved considerable time and poison compared with the standard regime, yet still resulted in good numbers of fledglings (Robertson & Saul 2005).

This report outlines the monitoring and management programme in the third full season of the 'sustainable management phase' on Rarotonga.

2. Objectives in 2004/05

The objectives of the 2004/05 field season were to:

1. Conduct the annual pre-breeding 'roll-call' and territory mapping of kakerori on Rarotonga in August 2004.
2. Mist-net and colour-band as many kakerori as possible on Rarotonga in August 2004, with the aim of returning to the situation where > 50% of birds were individually colour-banded (between 2001 and 2003, this ratio had dropped below 50% because 30 banded youngsters were transferred to Atiu).
3. Maintain the new annual rat poisoning effort by replacing the single bait in each bait station fortnightly in the Turoa, Totokoitu and Lower Avana Valleys, and around the perimeter of these three valleys.
4. Compare the breeding success of 20 pairs in territories subject to poisoning with 20 pairs in areas without rat poisoning.
5. Monitor the survival and breeding of kakerori on Atiu.
6. Report results back to the Cook Islands community.

3. Methods, results and discussion

3.1 KAKERORI CENSUS

The kakerori population on Rarotonga declined by 0.7% from 283 birds (after the final translocation of ten youngsters to Atiu) in August 2003 to a minimum of 281 birds in August 2004 (Fig. 2). In the 'sustainable management phase', the population on Rarotonga has increased by an average of 5% per year, after correcting for the transfer of 30 young birds to Atiu.

In August 2004, at least 55 yearlings (69%) out of the minimum of 80 fledglings recorded in summer 2003/04 were recruited into the population, a significant decrease from the usual c. 80% recruitment recorded in previous years. Part of this apparent decline can probably be attributed to greater dispersal or mortality of this cohort. The latter seems most likely because annual survival of adults (79.9%) was also well below the previous long-term average of 91.2% since conservation management began in 1989. This decrease in survival is not entirely surprising given that more individuals are now living outside the managed areas, and so do not receive any protection from predators. There were no abnormal weather events between the August 2003 and August 2004 censuses that clearly contributed to the higher than usual mortality rate.

At 89.7% survival per year, the overall survivorship (s) of adult kakerori remains remarkably high for such a small passerine, with life expectancy (1/(1–s)) of 9.7 years. Two of the eight birds colour-banded by Rod Hay and Gerald McCormack in 1984 were at least 23 years 8 months old in August 2004, but one of them disappeared during the 2004/05 breeding season.

The territory mapping revealed that the distribution of kakerori had shrunk in parts, but expanded in others. The small valleys on the Avana side of the Totokoitu-Avana Ridge that were colonised in 2003/04 were vacant this year, but more birds were found outside the TCA boundaries in the Taipara Valley, and in a side valley well down the main Avana Valley (known as LA 7).

3.2 MIST-NETTING AND COLOUR BANDING

With assistance from Ralph and Mary Powlesland, we set mist-nets on most days during the August 2004 census and caught a record total of 52 different kakerori. Four were recaptures, and so we individually colour-banded 48 new birds: 26 (47%) of the 55 yearlings, ten 2-year-olds, five 3-year-olds, and seven older (grey) birds. These new captures brought the total number of colour-banded birds on Rarotonga up to 142, or 51% of the population. This excellent sample of banded birds reversed the recent trend of a declining percentage of banded birds in the TCA (as low as 45% in 2003) that arose when most captured youngsters were transferred to Atiu rather than being released back into the TCA. The focus of colour-banding over the next few years should be to raise this percentage to over 60%, and so improve the accuracy of our population estimates.

3.3 RAT POISONING

The experimental regime introduced in 2003/04 of fortnightly poisoning in all three main breeding valleys, and around their perimeter, reduced both the effort and the amount of toxin used compared with the regime used during the 'recovery phase' (Robertson & Saul 2005). It also allowed a record number of fledglings to be produced in the 2003/04 season. Because the August 2004 census showed that population had declined slightly between 2003 and 2004, apparently through poor adult survival rather than through poor breeding productivity, we decided to continue with this new regime in spring 2004 rather than reduce it any further.

One 18-g Talon® (active ingredient brodifacoum) waxy block bait was placed in each of 428 bait stations (a 50-cm tube of unperforated 'Novacoil' drainpipe) placed 50 m apart on a 22-km network of tracks in the TCA, starting between 1 and 9 September. Bait take was recorded fortnightly, and all missing or decayed baits were replaced. Because baits quickly became mouldy (and therefore unattractive to rats) in the warm humid conditions on Rarotonga, 95% of uneaten baits were replaced each fortnight.

The pattern of bait take varied considerably between the three valleys, and on their perimeters (Fig. 4). As noted in 2002 and 2003, poison bait take in the Totokoitu Valley remained high throughout the entire season except for late November. In the Turoa Valley, in the Lower Avana Valley, and on the perimeter, the less than 80% bait take in the first three fortnights was low compared with the 88%–100% fortnightly bait take in the Totokoitu Valley, and the 80%–100% bait removal in some single weeks in earlier years (Robertson et

al. 1998). The bait take dropped only slightly as the season progressed, until a modest increase on all lines in late November. In the past, rat trapping has shown that this increase in bait take towards the end of the season has been associated with an influx of kiore (*Rattus exulans*) at that time of year (Robertson et al. 1998). Why the Totokoitu Valley results have, for the last 3 years, been quite different to those from the other valleys is not clear. Last year, a small experiment indicated that two kiore caught in the Totokoitu Valley showed no resistance to the toxin, after 15 years of annual exposure (Robertson & Saul 2005).

The reduced baiting regime used in 2004/05 took 4 person days per fortnight, compared with 7 days per fortnight for the weekly regime used in the 'recovery phase', a reduction in effort of 43%. Because we continued poisoning in the Totokoitu and on the perimeter for a fortnight longer than last year, we spent 34 rather than 32 person days to complete the programme this year. A total of 35 kg of bait was taken by rats in 2004/05, compared with 39 kg the previous year, and 52 kg in 2001/02, the last year of standard weekly baiting throughout the same managed area. Allowing for another 21 kg of baits used to replace mouldy baits, the total weight of baits used in 2004/05 (56 kg) was only 18% of the amount used (304 kg) over the same geographical area during the peak year of baiting (1991), when three baits were placed in each bait station (rather than one, as at present) for most of the season, and bait station density was greater (Robertson et al. 1998).

3.4 BREEDING SUCCESS

The breeding performance of 20 pairs of kakerori in each of the poisoned and unpoisoned areas was recorded by Ed Saul and Lynette Dagenais (volunteer, University of Alberta, Canada), with help early in the season from Derek and Ros Batcheler (volunteers, Ornithological Society of New Zealand). After the

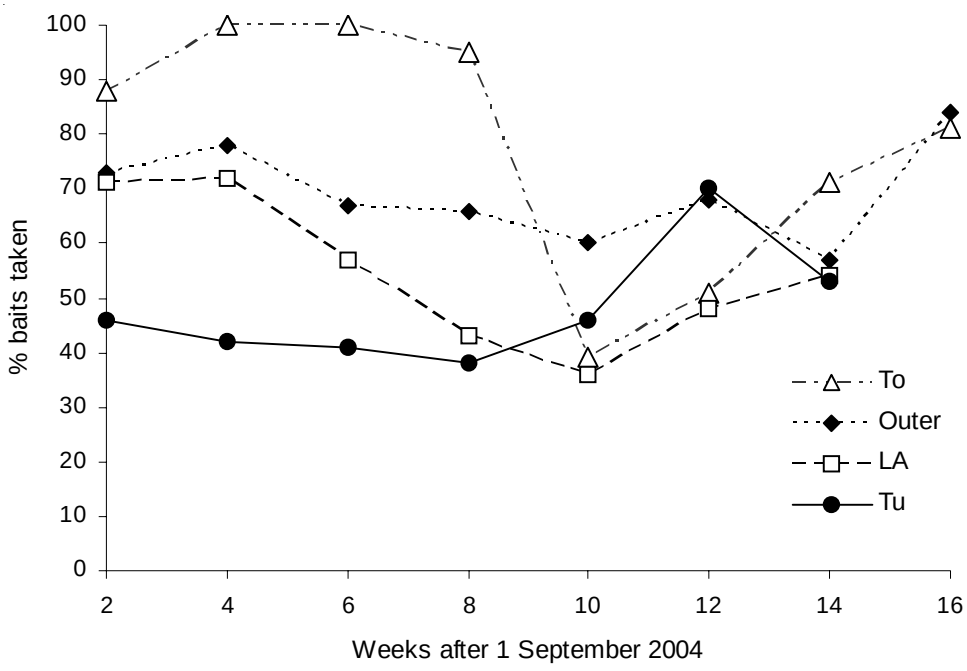

Figure 4. Fortnightly bait removal by rats in the Totokoitu (To), Turoa (Tu) and Lower Avana (LA) Valleys, and around their perimeter (Outer) in late 2004.

breeding season had finished, Ed Saul and Jasmine Braidwood (volunteer, New Zealand) attempted to count fledglings, but five tropical cyclones in the space of 4 weeks in February/March 2005 meant that the count was far from complete, because of the prolonged bad weather and because tracks were impassable with wind-thrown trees for many weeks afterwards.

Breeding success was good throughout the TCA in the 2004/05 season. The 20 pairs in the poisoned area that were monitored intensively produced a minimum of 27 fledglings (1.35 fledglings/ pair) and 16 (73%) of 22 incubated nests produced fledglings. The 20 monitored pairs in the unpoisoned areas produced 11 fledglings (0.55 fledglings/pair) and 11 (58%) of 19 incubated nests produced fledglings. On the face of it, breeding productivity was significantly better in the poisoned area (Mann-Whitney $U = 293$, $z = 2.67$, $P < 0.01$); however, we suspect that some of this difference was due to different sampling effort in the two areas. In the unpoisoned area, each of the 11 successful breeding attempts apparently produced a single fledgling, whereas in the poisoned areas 11 of the 16 successful nests produced two fledglings and five produced a singleton. While competition for food with rats could potentially produce this sort of result, it seems much more likely that the more frequent visits to territories (as part of a separate study aimed at determining incubation and fledging periods of kakerori; L. Dagenais, unpubl. report) in the more accessible poisoned area often resulted in two fledglings being found shortly after they left the nest. The less frequent checks in the unpoisoned areas meant that more fledglings were either missed or had died before they could be detected. Next season, greater effort is needed to search for fledglings more evenly in both the poisoned and unpoisoned areas.

The overall productivity in the 2004/05 breeding season was better than normal because three (8%) pairs re-nested after a successful first breeding attempt. In the 18 breeding seasons since 1987, we have recorded only six previous instances of successful double-clutching in a season (0.35/ season), and for the first time, a pair successfully fledged four chicks in a season, from two broods of two chicks.

A total of 59 fledglings was found this season, but this represents a bare minimum because little time was available for searching for fledglings in January, and then the search was largely curtailed once the first of the five cyclones hit Rarotonga on 5 February, and about 20 territories (including all five in the Taipara Valley) were not visited, or visited only briefly during the season.

3.5 ATIU MONITORING

George Matearíki and Ed Saul have monitored kakerori on Atiu since the first release of ten youngsters in August 2001. They have also solicited records of kakerori from the local community. This season they worked with the staff and pupils of Enuamanu School to survey the inland valleys of the northern one-third of the island in October 2004. Further surveys in January and April 2005 covered most of the remaining inland habitat of the island, but much of the extensive 'makatea' habitat remains unexplored.

Five pairs were monitored in the 2004/05 season, and a 'new', but not positively identified, pair of banded 'grey' (4+ year old) birds was found with a fledgling in April 2005. Another pair and an apparently single male were seen intermittently during the season, but not followed closely. Altogether, these seven pairs raised a minimum of six fledglings in 2004/05. One pair raised two fledglings, four raised a single fledgling, one pair had three failed nests in a row, and the productivity of one elusive pair was uncertain. In April 2005, following the loss of one banded female during the breeding season, a minimum of 18 adults plus at least three fledglings from the 2004/05 season were still alive (Fig. 5), despite the damage caused to the forests of Atiu by tropical cyclones 'Meena' and 'Nancy'.

The total of 21 birds was still likely to have been an underestimate of the true size of the population on the island at the time, because although most of the inland valleys have now been systematically searched, only a small part of the 900-ha forested makatea belt around the island has been visited, as the terrain is very difficult to traverse.

The high survival of released birds, together with the excellent productivity in 2003/04 and moderate productivity in 2004/05, indicates that the birds are becoming established despite having to live with kiore and cats, and without

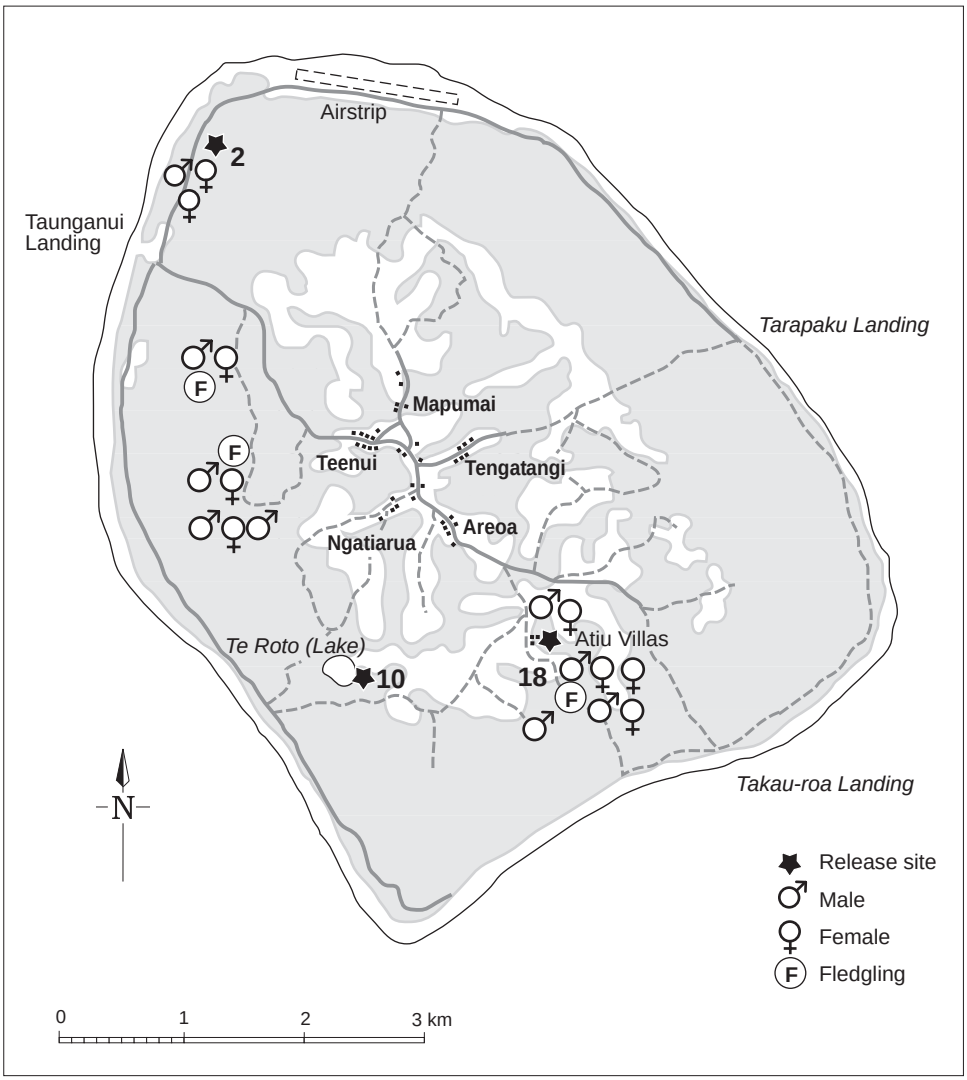

Figure 5. Map of Atiu showing the location of kakerori seen in April 2005.

Aerobryopsis moss, their main nesting material on Rarotonga. Pairs have now bred successfully in vastly different habitat types on Atiu, including inland riverine forest, makatea forest, and leeward coastal forest.

3.6 ADVOCACY

We have continued to work closely with the TCA project, and its ecotourism business. We were interviewed on Cook Islands television and by the Cook Island News newspaper about the August census results, the success of the breeding season, and the monitoring of birds on Atiu before and after the cyclones.

On Atiu, George Matearíki runs ecotours which now include a visit to the territory of one particularly cooperative pair of kakerori. Ed Saul, Lindsay Milne and George Matearíki spent several days working with staff and pupils of the Enuamanu School to survey inland valleys of Atiu.

4. Conclusions and recommendations

The 2001/02 season marked a major turning point in the Kakerori Recovery Programme, from one aimed principally at 'recovery' to one aimed at 'sustainability' of the population. A key element of this shift has been the experimental reduction in management effort on Rarotonga; not only to find a regime which maintains the kakerori population at 250–300 individuals, but also to enable the programme to be economically sustainable for the TCA Project to run in the long term.

The progressive reduction in the frequency of replenishing poison baits has reduced both the effort and the amount of toxin used. The new fortnightly poisoning regime seems adequate to maintain good breeding productivity in normal circumstances. So, to assess its longer-term effectiveness, we recommend that this fortnightly regime of rat poisoning continue in 2005/06. The main caveat is that if the kakerori population was hit particularly hard by tropical cyclone 'Nancy' and the other four cyclones that swept through the southern Cook Islands in late summer 2005, then the programme should return to the weekly poisoning used during the 'recovery phase' that allowed an average 20% increase in the population each year, rather than the 5% during the 'sustainable management phase'. We recommend that if less than 220 birds are detected in the August 2005 census (a 20% decline), then a return to weekly poisoning is warranted, but if there are more than 220 birds, then fortnightly poisoning should continue.

In the 2005/06 breeding season, all breeding attempts of a pre-selected sample of 20 pairs should again be monitored closely in each of the poisoned and the unpoisoned areas; however, to provide an unbiased estimate of breeding

success in these areas, the effort spent searching for nests and fledglings must be approximately even between the samples. Towards the end of the breeding season and through January and February 2006, an attempt should be made to record the number of fledglings in all territories, to provide an estimate of overall productivity.

The other main element in the shift to 'sustainable' management of kakerori on Rarotonga was the establishment of an 'insurance' population on Atiu, in case some environmental catastrophe should strike Rarotonga. The transfers are now complete, and there is no immediate need to transfer more kakerori to Atiu, given that this population seems to be becoming well established, and apparently came through tropical cyclones 'Meena' and 'Nancy' unscathed. We recommend that thorough searches for banded and unbanded birds continue as opportunities arise, and that all records of kakerori on Atiu should be collated by the TCA Project team.

5. Acknowledgements

The Department of Conservation, New Zealand, allowed Hugh Robertson to take special leave on pay to assist with the field project in August 2004. The Pacific Initiatives for the Environment of the New Zealand Agency for International Development supported the research efforts on Rarotonga and some of the costs of monitoring the birds on Atiu. The TCA Project contributed substantially by covering poison bait costs and some of George Matearikiʻs expenses on Atiu. The TCA Project also provided accommodation and safety equipment for volunteers helping with the field programme on Rarotonga.

Ralph and Mary Powlesland helped with the annual census and colour-banding of kakerori. Linda Nia and Lynette Dagenais provided invaluable field assistance with rat poisoning and the monitoring of nesting attempts in the poisoned area for much of the field season on Rarotonga. Derek and Ros Batcheler helped with the rat poisoning and search for nests early in the season, and Jasmine Braidwood helped to search for fledglings in late summer until the succession of cyclones made the task impossible.

George Matearikiʻ continued to monitor the breeding attempts of birds on Atiu. The staff and pupils of Enuamanu School searched for kakerori in inland valleys of Atiu in October 2004, and Lindsay Milne helped with this survey and with another in January 2005. Roger Malcolm of Atiu Villas assisted with monitoring the pairs in a nearby valley. Euan Smith of Air Rarotonga very kindly provided some free return flights for the monitoring work on Atiu.

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Chris Edkins drew the maps, and Ralph Powlesland and Greg Sherley improved the manuscript.

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