

# Conservation of kakerori (*Pomarea dimidiata*), Rarotonga

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# Summary

The Department of Conservation has assisted the Cook Islands Conservation/Environment Service, and more recently the Takitumu Conservation Area Project, to plan and implement a recovery programme for the endangered endemic forest bird, the kakerori. In November 1995, I received a grant of \$32,000 from the Pacific Development and Conservation Trust (PDCT) to help implement the Kakerori Recovery Programme and get the programme to the stage where it is self-sufficient. In 1996, the 155 ha area of southern Rarotonga which is occupied by kakerori was adopted by the South Pacific Regional Environment Programme (SPREP) as a Conservation Area as part of its South Pacific Biodiversity Conservation Programme. Management of the area has been passed from the Environment Service to the Takitumu Conservation Area Project (TCAP). The aim of the project is to manage the area as a conservation area in which ecotourism will generate income for the local landowners.

In 1989, the kakerori was classified as 'critically endangered' (Collar et al. 1994) as the population had declined to just 29 birds because of nest predation by rats. Between 8 and 29 August 1998, I worked with Anna Tiraa and Ed Saul of the TCAP to carry out a population census, colour-band as many young kakerori as possible, plan the 1998/99 field programme, and liaise with the landowners who run the conservation area project.

During the August 1998 census we counted 160 birds in the TCA, and we also found two pairs in a previously unexplored valley, about 1 km from the nearest known bird. We individually colour-banded these four birds and will monitor them in future years. In the TCA, we individually colour-banded eight yearlings, three second-year birds and one third-year bird, and recaptured an adult bird. Of the 160 birds seen in the TCA in August 1998, 108 (68%) were colour-banded. The 5% population increase from 1997 to 1998 was modest, mainly due to poor recruitment of yearlings. Annual adult survival was again over 90% (92.2%), but from a minimum of 39 fledglings raised in the 1997/98 breeding season, only 22 yearlings were positively identified in August 1998, whereas from previous survivorship data we expected that there would have been about 34 yearlings. A very severe and sudden storm hit Rarotonga at night in late July, and caused more damage to trees in the TCA than during any tropical cyclone in the last decade. Storm damage was especially evident on the ridges, which are mainly frequented by juvenile birds, and so we surmise that many yearlings died during this storm.

I recommended modifications to the rat control programme to try to give better protection of Kakerori, to reduce costs of labour and poison baits, and to reduce the use of poison baits. The new programme involved starting the poisoning a fortnight earlier than usual, redesigning the route taken on the baiting rounds to make them more efficient, and lowering the density of bait stations on the perimeter of the control area. The use of bait hoppers and tropical formulation baits was discontinued due to the poor results obtained in 1997/98.

I attended two meetings of the Takitumu Conservation Area Project Committee (landowners) and discussed options for managing the conservation area, with the view to developing a sustainable income for the landowners derived from ecotourism.

I recommend continued involvement in this very successful conservation programme, which has not only helped to conserve the kakerori, but which can be used as a model for tackling similar conservation problems in New Zealand and elsewhere in the Pacific. This project also provides a model for community involvement in the sustainable development of a conservation area, and much interest in the Pacific is focused on its success to date.

# 1. Background

In a review of the bird conservation problems in the South Pacific, commissioned by SPREP and the International Council for Bird Preservation in the early 1980s, Hay (1986) identified the kakerori, or Rarotonga flycatcher (*Pomarea dimidiata*), as one of the species most urgently in need of conservation management (Robertson *et al.* 1994). This small flycatcher, which is endemic to Rarotonga, was critically at risk of extinction.

As a result of a study between September 1987 and January 1988, Rod Hay and Hugh Robertson reported to the Cook Islands Conservation Service (CICS) and SPREP that ship rats were having a very detrimental effect on the breeding of kakerori, and that cats were likely to be predators of recently fledged juveniles and adult birds. The report provided a draft plan for the recovery of the kakerori, with recommendations on a cost-effective recovery programme and scientific study aimed at assessing the effectiveness of this work.

The draft recovery plan was adopted by the CICS and SPREP (Project PA 12) in July 1988, to be implemented by DSIR Ecology, the CICS and SPREP. Subsequently, both Hugh Robertson and Rod Hay shifted from DSIR to the Department of Conservation. The Department has continued to provide some support to Hugh Robertson for the ongoing field and education programme.

The original objectives of the recovery plan (from Robertson *et al.* 1994) were:

1. To monitor, on an annual basis, the dynamics of the kakerori population on Rarotonga.
2. To research, develop and implement an effective predator (rat and feral cat) control programme; this would include an assessment of rat populations in relation to kakerori distribution.
3. To research, develop and implement, where appropriate, a programme of managing the kakerori population by protecting nests, providing supplementary food, and as a last resort by translocation or captive breeding.

4. To describe the habitats used by kakerori, and determine the relationship between habitat features and the distribution of kakerori.
5. To develop and implement a programme of public education, awareness and participation, where appropriate, in the kakerori conservation programme.
6. To encourage the protection of the kakerori, by creating a suitable reserve, and developing appropriate national and international policies regarding scientific collection or trade in kakerori, and the importation of wildlife (and hence potential diseases) into the Cook Islands.

Our 'unofficial' aim was to have over 100 birds by the year 2000.

The Kakerori Recovery Plan was updated in 1995 in a Cook Islands Environment Service document (Saul 1995). This re-affirmed the above aims, but expanded on aim (3) by promoting a feasibility study into the possibility of translocating kakerori to another island in the southern Cooks which is free of ship rats (e.g., Aitutaki or Atiu).

In 1996, SPREP adopted a joint proposal from the new Ministry of Works, Environment and Physical Planning of the Cook Islands Government and the Takitumu Conservation Area Co-ordinating Committee (representatives of the three customary land-owning families involved) that a 155 ha area of the southern part of Rarotonga, which is the home of the kakerori, be adopted as a Conservation Area as part of the South Pacific Biodiversity Conservation Programme. The goal of the project on the Takitumu Conservation Area (TCA) is "to conserve the Conservation Area's biodiversity for the benefit and enjoyment of present and future generations on Rarotonga". More immediate objectives are:

1. To develop partnership arrangements between government, landowners, NGOs and others for effective management and sustainable use of biodiversity in the TCA.
2. To develop and implement management plans for the wise management and use of biodiversity with the TCA.
3. To raise public awareness about the importance of and means for conservation of biodiversity in the TCA.
4. To promote, implement and support sustainable economic activities by communities associated with the TCA.
5. To develop, as appropriate, a model for the implementation of Conservation Areas in other parts of Rarotonga and the Cook Islands.

The project is expected to run for 5 years to 2001, and is being funded by SPREP. Anna Tiraa, the Conservation Area support officer for the past 3 years has left the Cook Islands and her place has been taken by Ian Karika, a member of one of the land-owning families and former chairman of the landowners' committee. Ed Saul, former Wildlife Service officer and DSIR staff mem-

ber, and more recently a conservation volunteer and part-time staff member of the Cook Islands Environment Service, is the part-time technical adviser to the project. Mataiti Mataiti was been appointed as an ecotour guide in 1998, and helped this season with the annual census, the rat poisoning programme and the nest monitoring work.

## 2. Implementation and results: 1987-1997

In 1987 the kakerori population stood at 38 birds, but it fell to 36 in 1988, and to 29 in 1989, and at that rate of population decline, a population viability analysis showed that there was a 78% chance that kakerori would be extinct by 1999. An intensive programme of rat poisoning and nest protection began in spring 1989, and the kakerori population had recovered to 153 birds by 1997.

## 3. Aims of 1998 visit

The aims of my visit in August-September 1998 were to carry out a detailed pre-breeding season population assessment, to colour-band as many birds as possible to aid with the annual "roll-call" of birds, to help design the 1998/99 field programme which is being done by staff of the Takitumu Conservation Area Project, to develop a long-term sustainable management programme in the Takitumu Conservation Area as part of SPREP's South Pacific Biodiversity Conservation Programme, and to train local staff in field techniques.

## 4. Results: August 1998

### 4.1 KAKERORI

The Kakerori Recovery Programme was again very successful in 1996/97, with a minimum of 22 yearlings being recruited into the population. Although this figure was slightly down on the previous year (24 yearlings), it was sufficient to help the population increase from 153 birds to 160, a 5% increase. The number of yearlings found was disappointing given that a record 39+ fledglings had been raised in the 1997/98 breeding season. A very severe and sudden storm hit Rarotonga at night in late July, and caused more damage to trees in the TCA than during any tropical cyclone in the last decade. Storm damage was especially evident on the ridges, which are mainly frequented by juvenile birds, and so we surmise that many yearlings died during this storm. This

storm did not cause much damage in the valleys, where most of the adults live, and their survival was again very good - only 2 (2.8%) out of 71 grey birds (4+ years old) could not be found (assumed dead). This year 10 (12%) of 82 orange/mixed birds (1-3 years old) had disappeared - see Robertson *et al.* 1993 for details on determining the age of kakerori). The overall adult survivorship remains outstandingly high, with 20 of the 29 birds alive in spring 1989 still alive in spring 1998, and three grey birds banded by Rod Hay and Gerald McCormack in 1984 are at least 18 years old! This study has confirmed that some birds in the tropical and temperate southern hemisphere (including New Zealand) have quite different life-history strategies than those in the northern hemisphere, where most ecological theory has developed.

We followed up reports from local landowners that they had seen kakerori in a nearby valley, and as soon as we reached suitable habitat in that valley we discovered two pairs of birds. We had searched two intervening valleys between the TCA and the new valley each year since 1995, but had not come across any birds, and so had not extended our search further. Checks on other nearby valleys failed to reveal any further birds. None of the four birds (3 grey (4+ years old) and one yearling) was banded and so we do not know whether they are the remnant of a former population, or whether this population formed as a result of yearlings (therefore unbanded) dispersing from the TCA. We also found an old nest from the 1997/98 season in one of the territories, and so at least one of the pairs had been resident for some time before they were first seen. We are trying to contact locals who may have visited the valley to collect i'i (*Inocarpus fagifer*) fruit to find out how long the birds have been resident. We caught and individually colour-banded all four birds and will monitor them in future years. This brings the total population of kakerori known in August 1999 to a minimum of 164 birds.

The census is becoming more difficult and time-consuming as the population has increased; however, we are lucky that, apart from the new population discovered this year, the range of the birds has increased only marginally since 1989. Ed Saul, Anna Tiraa and I mist-netted and colour-banded eight of the 22 yearlings plus four older birds (three 2-year olds and a 3-year old). This brought the number of colour-banded birds to 108 (67%) of the 160 birds in the TCA, or 114 (68%) of the 164 birds, which enables the annual roll-call and census to be reasonably accurate, although somewhat conservative.

## 4.2 RAT CONTROL

I helped to design the 1998/99 rat control programme. Because we saw an unusually high number of rats (more than a dozen) out during daylight hours during the August census, it was likely that the rat population was very high, and so we decided to start the poisoning a fortnight earlier than in 1997. We redesigned the routes to be taken on the poisoning rounds so that the perimeter of all the valleys (the ridge tops and some leading spurs) was done as a single long round, and then the three valley circuits were done separately. At the same time, we also reduced the bait station density on the perimeter circuit from 1 station/25 m (or closer in places) to 1 station/50 m, because we felt that some rats were probably visiting multiple bait stations and so eating

many times a lethal dose before succumbing to the toxin. This meant that 370 rather than 599 bait stations were used, with a consequent reduction in labour - the distance travelled remained constant, but the number of stops to service bait stations decreased, as did the size of the load of bait carried. The total amount of bait used was actually very similar to that used the previous year because bait-take remained at over 50% for at least 6 weeks compared with 3-4 weeks in most years. We felt that this prolonged period of high bait-take was due to the high density of rats rather than the decreased density of bait stations around the perimeter, but we intend to follow the same timing of baiting and use of bait stations in spring 1999 to test this hypothesis.

In 1998, we abandoned the experimental use of 'Philproof' bait-hoppers because bait take was again low in 1997/98 and was ineffective for controlling rats in this field situation (Robertson *et al.* 1998). This season we used only standard Talon baits, rather than the tropical formulation baits which had proven unattractive to rats in 1997/98 (Robertson 1998, Robertson & Saul *in press*). During my visit, Ed Saul and I worked on a management paper describing the experiment comparing the persistence and palatability of standard and tropical formulation baits (Robertson & Saul *in press*), and made minor modifications to a scientific paper on the breeding biology of kakerori (Saul *et al.* 1998).

#### 4.3 TCA LIAISON

I attended two meetings of the Takitumu Conservation Area Project Coordinating Committee (landowners) as a scientific adviser to the committee. We discussed options for the long-term community management of the conservation area, with the view to develop a sustainable income for the landowners derived from ecotourism. The main attraction to international tourists is undoubtedly the kakerori and its management programme, but the area also hosts breeding populations of the other three species of native landbird and four of the six species of seabird on Rarotonga, a fruit-bat colony, and several rare shrubs and orchids. It seems logical and likely that when the TCAP becomes self-supporting in 2001 (South Pacific Biodiversity Conservation Programme funding ceases then) that the 20% of profits being returned to the Kakerori Recovery Programme will be spent on the actual rat-poisoning programme, rather than the scientific recording of bait take and other experiments aimed at reducing poison and labour costs. Likewise, the recording of kakerori nesting success and the annual census of birds (the measures of the success of the rat-poisoning) are unlikely to be funded by the landowners, despite their acknowledgement that these have been critical in developing the current management programme. If this very valuable scientific element of the Kakerori Recovery Programme is to continue, funding will have to be obtained from alternative sources.

#### 4.4 OTHER

I helped Ed Saul to do the annual census of the rare *Habenaria* orchid, which was flowering during my visit. The numbers were well down on previous

annual counts, but it is unclear yet if this is part of a natural cycle in numbers, or if there is a serious problem with the species.

During searches for kakerori in valleys outside the TCA, I was impressed by the paucity of lizards. In the TCA, where rats have been poisoned for up to 10 years, ground-dwelling lizards are extremely common, and virtually always one or more is in sight. In valleys about 1 km from the TCA area, I saw only a handful of lizards all day. It therefore seems likely that lizards have also benefited from the reduction in the numbers of rats and cats in the TCA as a result of the rat poisoning programme.

## 5. The future

The aim of building kakerori numbers up to 100 by the end of the century has already been achieved and we are now aiming at 200 birds by 2000. Continued population growth seems assured with the injection of support to the project from the Pacific Development and Conservation Trust and from SPREP, at least until 2001. We have applied to BirdLife International to downgrade the threatened status of kakerori from 'critically endangered' to 'endangered' for their next edition of *Birds to Watch*.

We are still trying to refine the ongoing rat control programme, mainly through experiments aimed at minimising the labour and poison costs, and minimising the amount of poison put into the environment each year. In 1999/2000 season we plan to try to make the remaining tropical formulation Talon baits more palatable by dipping them in coconut oil in an attempt to mask the flavour that rats clearly dislike.

The Takitumu Conservation Area Project, as a community-based and ecologically sustainable conservation venture, is very exciting, and is providing a good model for the integrated management of ecotourism and biodiversity conservation in the South Pacific. The continuing success of the Kakerori Recovery Programme provides a firm basis for attracting tourists to an accessible and biologically interesting conservation experiment; however, if the scientific side of the recovery programme is to continue, funds will have to be obtained from outside funding agencies, as it is unrealistic to expect the ecotourism venture to pay for the scientific research programme once it has to become self-sustaining.

The severe storm of July 1998, which probably killed many juveniles, highlights the vulnerability of kakerori to catastrophic events such as tropical cyclones. We are starting to look at practical options for the long-term survival of kakerori, such as making a translocation to an island in the southern Cooks that is free of ship rats and preferably cats, especially if we can show that kakerori pose no disease risk to birds naturally occurring on the possible recipient islands. If a very severe cyclone hit Rarotonga and wiped out all or most of the population, birds could be returned to the TCA from this insurance population. Some of the landowners are concerned that they could no

longer claim to have the only population of kakerori in the world, and that ecotourists might bypass the TCA to see kakerori on another island. The TCA population would remain the only natural population, however, and the TCA is very accessible to tourists as the international airport is on Rarotonga, and so all ecotourists (bar a few yachties) must pass through Rarotonga. The current Kakerori Recovery Plan runs out in the year 2000, and revision of this plan should address some of these issues and highlight future innovative management options.

The technology developed during the Kakerori Recovery Programme has now been exported to French Polynesia, where members of the French Polynesian Ornithological Society, *Manu*, have started management of the critically endangered Tahiti flycatcher *Pomarea nigra*. In April 1999, a joint SPREP/Birdlife International workshop to determine bird conservation priorities in Polynesia was held in Rarotonga in April 1999 - this venue was chosen to highlight the success of the Kakerori Recovery Programme and to show Pacific Islands delegates that conservation problems can be turned around.

## 6. Acknowledgements

Many thanks to Anna Tiraa and Ed Saul for their great help throughout my visit. Ed Saul and Maddie Midwinter again provided warm hospitality during my stay. The Pacific Development and Conservation Trust paid for my travel expenses this year, and the Department of Conservation allowed me 15 days of special leave on pay during the 22 days I was in Rarotonga. Rod Hay improved this manuscript.

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