

Motu-o-kura (Bare Island), Hawkes Bay: Monitoring since rat eradication

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Summary

Maori-owned Motu-o-Kura, the only island on the Hawkes Bay coast, was infested with Norway rats for many decades. However, in winter 1990, a successful rat eradication operation was mounted. A monitoring programme was established to check on any rodent presence and to follow changes in the island's ecosystem. Although visiting the island on a regular basis has been difficult, the monitoring has shown dramatic recovery of lizard and invertebrate populations, and a major regeneration of the vegetation, following rat eradication. Meanwhile, there has been a decline of the titi (sooty shearwater) population breeding on the island, virtually to extinction. It is recommended that the monitoring programme be continued, but that it be adjusted so that the main ecosystem changes continue to be tracked annually, but the demand for formal measurement and on people's time is lessened. Some aspects, such as photographing of photopoints, measurement of vegetation plots, invertebrate sampling, sea bird burrow counts and checks of archaeological site condition, need be done at 3-5 year intervals only. In the short term, the presence/absence and status of the titi, small petrels and geckos need to be investigated in detail. In the longer term, the potential to restore populations of some nationally rare plants and animals offers exciting possibilities, although there are many issues to work through first. An excellent working partnership has developed between the Tangata Whenua and the Department of Conservation over management of this interesting island.

1. Background

Motu-o-Kura is a small island off Waimarama (Appendix 1, Map 1), one of very few on the North Island's eastern coast between Wellington and East Cape. It is owned by Ngati Whakaiti and Ngati Kurukuru of Ngati Kahungunu. A partnership between the owners and the Department of Conservation has developed for nurturing the island's natural attributes.

The first comprehensive natural history survey of Motu-o-Kura was done by a DSIR party in February 1988. The report from that survey (Walls et al. 1988), and the two papers that followed (Walls 1988, 1989) described the climate, geology, soils, history, archaeology, vegetation, flora, fauna and human use of the island. The main finding was that Norway rats were present in large numbers and were having a serious negative impact on the native vegetation, birds, lizards and terrestrial invertebrates. This led to the prime management recommendation being to eradicate the rats as soon as possible.

Two poison operations were carried out in winter 1990. No signs of rats have been found on the island since. A programme to regularly monitor the ecological changes was established in 1990, but because of the vagaries of weather and the availability of the key people it has not been followed as assiduously as planned. It has, however, demonstrated a remarkable recovery of plant and animal life on Motu-o-Kura.

It is the history of the monitoring effort, and how best to proceed in the future, that is the subject of this report.

The rat eradication operation is described in Adams (1997). Details of visits to Motu-o-Kura, taking the form of a series of reports, most of which I have written, are on file at the Department of Conservation office in Napier (file ECO 052). On file also are various communications regarding the island, its ownership and its management. Included is the Rodent Contingency Plan drafted by Department of Conservation staff in consultation with the Tangata Whenua.

2. Monitoring results

2.1 SEQUENCE OF VISITS TO MOTU-O-KURA, 1990-98

- 14 August 1990
Visit to erect platform and make other preparations for rat-poisoning operation.
- 15 August 1990
First poisoning operation.
- 3 September 1990
Second poisoning operation.
- 11 November 1990
Visit to check on results of rat poisoning and to set up bait stations.
- 19-20 December 1990
Overnight visit to check for rat sign, replenish bait stations, establish vegetation monitoring plots, survey birds and lizards.
- 15 January 1991
Visit to check bait stations and establish photopoints for monitoring future changes.
- 31 July 1991
Visit to check bait stations and condition of vegetation and birdlife.
- 9 December 1991
Visit to check bait stations and set up pitfall traps to sample lizard and invertebrate populations.
- 18 February 1992
Visit to check bait stations and clear pitfall traps of their catches.
- 1 April 1992
Visit to check bait stations, clear pitfall traps of their catches and close down the traps.

- 24 June 1994
Visit to check bait stations and monitor changes.
- 7-9 February 1995
Visit to check and replace bait stations and monitor changes.
- 20 March 1995
Visit to check and complete replacement of bait stations.
- 7 February 1997
Visit to check bait stations and monitor changes.
- 22 May 1997
Visit to check and reposition bait stations.
- January 1998
Visit to check bait stations and monitor changes.

2.2. THE MONITORING PROGRAMME

Rats and other rodents

The presence or otherwise of rodents has been monitored via a network of plastic bait stations baited with Talon® waxed baits. For the first two years after the poison operations, these were supplemented with fresh apples and "gnaw sticks" (sticks impregnated with cooking oil). Not a single indication of live rodents has been found on the island since September 1990.

Sea birds

Blue penguins are the most abundant sea birds on Motu-o-Kura. It is their safe haven and prime breeding site on the Hawkes Bay coast. Their numbers have proven very difficult to monitor. In 1988, counts were done of birds coming ashore at night. Attempts were made to repeat this in 1990 and 1995, but were not sufficiently reliable to detect any trends. Proper monitoring would require a large commitment of time and resources, and would need to focus on tagging, burrow counts, fixed-interval shore counts and breeding success.

Titi (sooty shearwaters) breed on the island in such low numbers now that they are almost extinct there. They used to be present in large enough numbers to allow a harvest, and as late as 1960 there were about 100 occupied burrows (Merton 1961). By 1988 there were only 20, in three separate localities, but now there are a mere five or so, all at the southern end. The cause of this decline is not known. Monitoring the breeding success and tagging adults and fledglings would be necessary to get to grips with the issue. Otherwise, all that can be done with limited resources is to count the occupied burrows in midsummer - early autumn.

It is possible that small petrels such as fluttering shearwaters and diving petrels may recolonise the island now that rats are gone. Searches for their burrows should be routine.

Shags, gulls and terns roost and breed on the island. Whilst they are relatively common on the Hawkes Bay coast, periodic estimates of their numbers on Motu-o-Kura could be a valuable bioindicator for the region.

Land birds

Land birds have not been formally monitored on the island. Most of the species present are probably not resident, but come and go from the adjacent mainland. However, there appear to be many more small birds such as silvereyes, finches and blackbirds on the island now than in 1990. This may be the result of a much improved food supply and no predation since the rats have gone. There probably isn't much point in formally monitoring the island's land birds, but a fauna survey card should be filled out following routine visits.

Seals

Until recently, only the occasional fur seal was seen on the island's shores. Over the last few years, however, the numbers of those hauling out on the island have risen dramatically. This is probably due to the build-up of numbers further south in New Zealand, but there could be a relationship to local food supplies. Annual counts have been begun by the Department of Conservation.

Lizards

The only lizards known on the island currently are common skinks. They have burgeoned in numbers since rat eradication and are now abundant, due no doubt to lack of predation and a much improved food supply (invertebrates, nectar and fruits). Only if they appear to become uncommon again should their numbers need to be monitored.

One gecko skin was found in 1988. Since then, no further sign of gecko presence has been found. Searches by day and by night should be carried out to see whether geckos are still present.

Invertebrates

In summer 1991-92, 30 pitfall traps were set on the island for 70 days (10 December-18 February). They were placed in three localities and were cleared twice. This produced an excellent sample of the terrestrial invertebrates of the island. This effort was repeated in 1995, when the traps were set for 41 days (7 February-20 March). The results were analysed by Trevor Crosby of Manaaki Whenua, Auckland (Crosby 1996). Of note are the presence of certain ground beetles (the northernmost record of *Mecodema sulcatum*, the occurrence of the Australian *Anomotarus variegatus* and the largest-known population of *Holcaspis sinuiventris*) and of large numbers of cave weta and large ground spiders, but the total absence of terrestrial amphipods (sand

hoppers). The 1995 catch was considerably smaller than that in 1991-92, the most likely explanation being that the major drought between July 1994 and January 1995 had had an adverse impact on the invertebrate fauna.

The pitfall traps and their lids remain on the island, in place but not set. The option is there to repeat the monitoring. Because this summer is a prolonged El Nino drought, it would not be a good indicator of the invertebrate status of the island. Maybe next summer will be better. It is recommended that the sample period falls within both the 1991-92 and 1995 periods (say late January-early March). The same traps and bait/preservative (1 part antifreeze:1 part water:3 parts ethanol) should be used.

Vegetation and flora

Two 20 m x 5 m quadrats were set up in 1990-91 to measure vegetation changes. Four 1 m x 1 m seedling plots were also set up in different localities to measure seedlings. All these plots were remeasured in June 1994 and February 1995. The basic findings were that the existing trees of taupata (*Coprosma repens*) and karo (*Pittosporum ralphii*) were spreading, that seedlings of both trees were suddenly becoming established in large numbers, especially beneath parent trees (now that rats weren't eating the seeds and seedlings) and that the coastal flax, already so dominant on the island, was thickening up in places. Whilst it would be desirable to repeat this vegetation monitoring at regular intervals, say 5-yearly, it is a specialised and fairly demanding task. The only substitute is casual observation and the use of photopoints.

Nine photopoints were set up in 1990-91. Some of these were repeats of photos taken in 1988. They have been rephotographed in June 1994, February 1995 and February 1997. They show a substantial spread of taupata in particular, a thickening of flax and a thickening of pampas grass, the only exotic plant on Motu-o-Kura that could be regarded as a weed, on one northern face of the island. They also show considerable erosion by the sea in places. Most of the photopoints are quite easy to relocate. They should be rephotographed every five years.

In the light of the rapidity of the erosion around the island, the pampas grass is not a serious problem and may in fact be providing a service. It does not appear to be spreading, and is unlikely to penetrate the dense flaxlands. It should, nevertheless, be checked periodically.

Other changes in the vegetation and flora on the island have been noted but not formally measured. They include the rapid and substantial increase in small ground ferns, orchids and coastal herbs, such as iceplant and sea celery, the appearance of various new plant species and the appearance of seedlings and saplings of small trees such as rangiora (*Brachyglottis repanda*) and karamu (*Coprosma robusta*). These all indicate that rats had a major impact on the vegetation, eating flowers, seeds, roots, bark, small plants and even the foliage of trees. Now they are gone, the vegetation is healing the island, and in time most of the flaxlands will become low coastal forest. This kind of plant regeneration has been recorded from other islands following rat eradication, for instance Breaksea Island in Fiordland (Allen et al. 1994).

Intertidal zone

Since 1990, there has been a noticeable change in the intertidal platform zone that surrounds Motu-o-Kura. Although it hasn't been formally measured, we have observed a large increase in the numbers of molluscs and small crabs, and the appearance of considerable numbers of the large shore crab *Leptograpsus variegatus*, which was not evident at all in 1990. Norway rats are known to prey on molluscs and crabs in the intertidal zone elsewhere (King 1990), and it is probable that they had a significant impact on the island's intertidal fauna, which is now recovering. Some quadrats should be established to follow this recovery. It would be a valuable complement to the terrestrial monitoring.

Archaeological sites

The 1988 survey identified 12 archaeological sites on Motu-o-Kura. These have not been monitored since in any formal way. It has been observed, though, that a couple of midden sites have been eroded by slipping and sea erosion. It is very likely that as the sea keeps eating at the island's flanks more archaeological sites and material will be revealed or destroyed. Nothing much can be done to mitigate this impact, but the situation should be monitored, by regular inspection at least.

Human use

The use of the island by people is currently low, and has been since 1988 at least. The reason is that the island does not look particularly inviting to visitors, with its forbiddingly steep flanks and its seemingly impenetrable flaxlands, and it is well protected by a fringe of complex reefs and razor-sharp limestone rocks. Should people begin to visit in greater numbers, some of the natural and cultural features of the island could be in jeopardy. Therefore it would be wise to quietly monitor the human use of the island. In this regard, there are no better people to do the monitoring than the Tangata Whenua.

3. Monitoring and management recommendations

3.1 MONITORING

• Monitoring in general

The monitoring programme as set up in 1990-91 has proven its worth in terms of detecting and recording the most significant trends in Motu-o-Kura's ecosystem and the responses to the eradication of Norway rats. However, because of the practical difficulties of getting to the island, and staff changes in the Department of Conservation, it has been hard to adhere to the programme.

It is therefore recommended that the monitoring programme be somewhat simplified from now on.

There should be one visit each year as a minimum, to check the rodent bait stations and to monitor the main components of the island ecosystem. It should be done in summer, when most of the fauna is conspicuous. Ideally, it should be an overnight visit, so that the state of the penguin, titi, gecko, nocturnal invertebrate and shore crab populations can best be assessed. The Department of Conservation should seek always to have a Tangata Whenua representative along if possible.

Formal measurement techniques are probably not essential, except for titi. The general condition and trend of the components of the ecosystem are what is important, and so long as a report is compiled following each visit that addresses each component then that should be sufficient. Each component should be assessed annually along the following lines, unless otherwise indicated. Monitoring site locations are shown in Appendix 1, Map 2.

- **Rats and other rodents**

Essential: bait station monitoring and maintenance;
periodic review of Motu-o-Kura rodent contingency plan.

- **Sea birds**

Essential: counts of occupied titi burrows;
general assessment of numbers of other species.

Desirable: titi breeding success;
penguin burrow counts;
penguin breeding success;
estimates of numbers of shags, terns and gulls;
survey for small petrel presence.

- **Land birds**

Essential: general assessment of species and numbers.

- **Seals**

Desirable: regular counts of numbers hauling out.

- **Lizards**

Essential: general estimation of skink relative abundance;
search for gecko presence.

- **Invertebrates**

Essential: general estimation of the relative abundance of beetles, weta, moths, flies, spiders, etc.

Desirable: pitfall trapping assessment every 3-5 years (last done in February 1995 - due next February 1998-February 2000).

• **Vegetation and flora**

Essential: photopoint rephotography and comparison every 5 years (last done in February 1995 - due next February 2000);
general assessment of the condition of the vegetation and flora;
check on the distribution and role of the pampas grass.

Desirable: remeasurement of the two 20 m x 5 m quadrats and the four 1 m x 1 m seedling plots every 5 years (last done in February 1995 - due next February 2000).

• **Intertidal zone**

Essential: general estimation of condition of crab and small mollusc populations.

Desirable: quadrat establishment and remeasurement every 3-5 years of mollusc and crab densities.

• **Archaeological sites**

Essential: inspection of condition of known sites every 3 years, beginning as soon as possible.

• **Human use**

Essential: informal monitoring, under the guidance of the Tangata Whenua of Motu-o-Kura, of who visits, when and why.

3.2 RESTORATION

Motu-o-Kura has been thought about by both the owners (Tangata Whenua) and Department of Conservation staff as a place with potential for the restoration of rare plant and animal populations. The following plants and animals could be reintroduced or established:

- Renga lily (*Arthropodium cirratum*): nearest source Kairakau, Hawkes Bay.
- Cook's scurvy grass (*Lepidium oleraceum*): nearest source Mana Island.
- Large ground weta (*Deinacrida* species): nearest sources Mana I, Little Barrier I.
- Various rare skinks and geckos confined to restricted North Island mainland or island sites.

- Tuatara (*Sphenodon* species): nearest source Cook Strait islands.
- Small petrels: nearest source the surrounding ocean for colonising adults; Portland Island or Cook Strait islands for fledglings.

Clearly there are many things to be considered for any of these potential restorations, paramount among which are the wishes and desires of the tangata whenua, the security of the species once on the island and their likely ecological impact. It is no light thing, but the prospect is as exciting as the already wonderful response of the island to the eradication of the rats. Motu-o-Kura is Hawkes Bay's only island: it deserves all the nurturing it can get.

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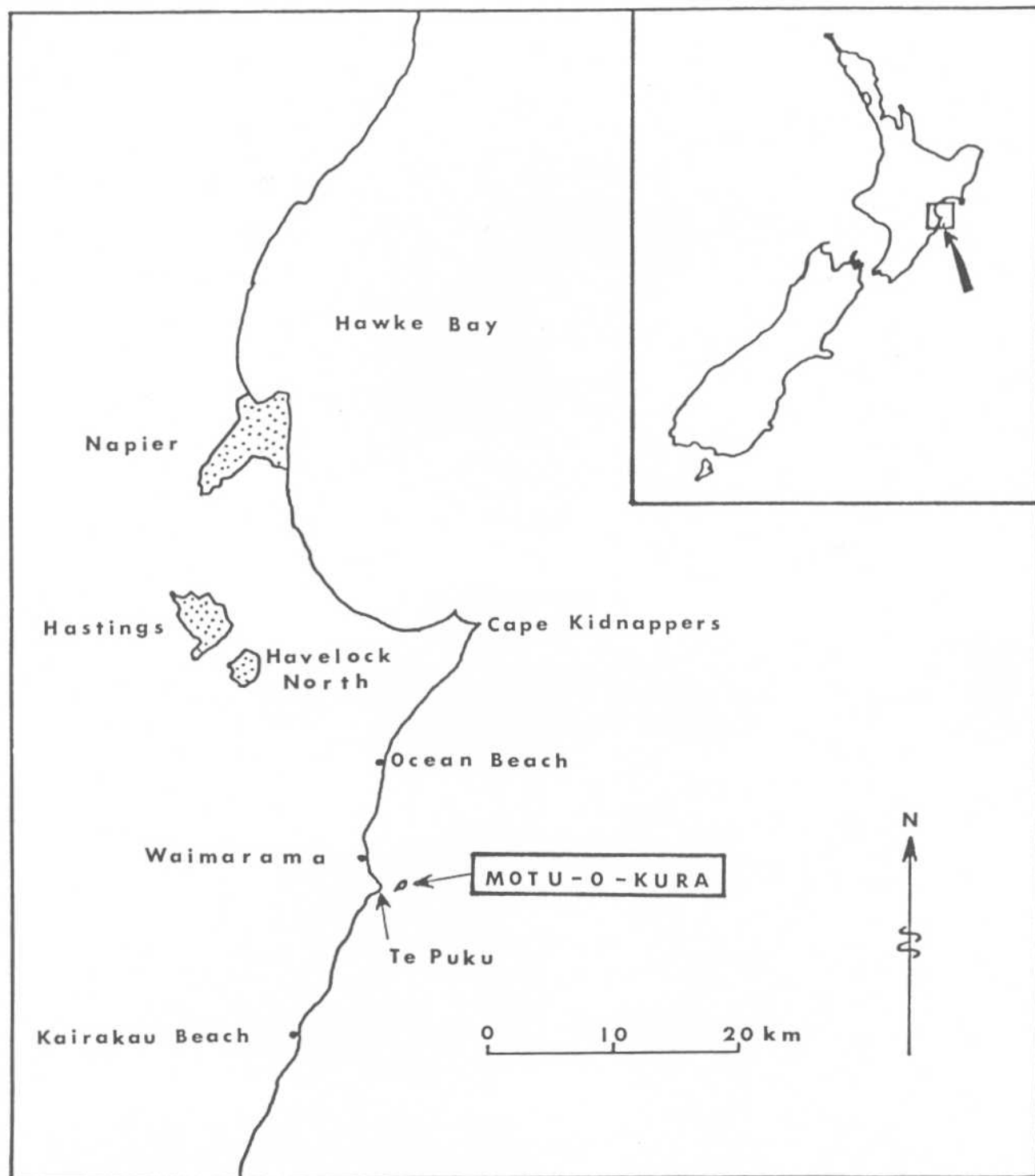
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6. Appendices

Map 1 Location of Motu-o-Kura



Map 2 Location of monitoring sites

