

Rat *Rattus* control at nests of the endangered kakapo *Strigops habroptilus* on Codfish Island, New Zealand

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SUMMARY

A combination of rat *Rattus* baiting, trapping and remote fired detonators was used to protect the eggs of the endangered flightless parrot, the kakapo *Strigops habroptilus*, from rat predation. Incubating kakapos showed no evidence of reacting to detonations themselves, and the baiting/trapping/detonator combination successfully protected nests from predation.

BACKGROUND

There is clear evidence that all three species of rat, ship rat *Rattus rattus*, Pacific rat *R. exulans* and Norway rat *R. norvegicus*, introduced to New Zealand prey upon eggs of nesting birds up to approximately 30 mm in diameter. Rats have also been implicated in the mortality of nestlings and recent studies of two terrestrial endemic birds, North Island kokako *Callaeas cinerea wilsoni* and the North Island race of the New Zealand robin *Petroica australis longipes*, and also shearwaters *Puffinus* spp. have documented their effect. All three rat species occur in a range of habitats on the two main islands of New Zealand (North and South Islands) as well as on many offshore islands either collectively or separately.

In 1997, the Pacific rat (or kiore) was present on Codfish (Whenua Hou), a 1,500 ha island important for the conservation of the critically endangered kakapo *Strigops habroptilus*, a species of flightless parrot endemic to New Zealand. Kakapo eggs and nestlings are extremely vulnerable to rat predation as the female alone incubates; the eggs and chicks are unprotected at night for hours at a time when the nocturnal ground-nesting female leaves to forage for food to sustain herself and her chicks. In the kakapo breeding seasons prior to 1997, mortality from rat predation on Little Barrier Island and Codfish had severely compromised recovery of this endangered species.

ACTION

Twelve months prior to the 1997 breeding season, two approaches were developed and tested in an attempt to significantly reduce the potential for rat induced mortality of kakapo eggs and chicks in the nest.

The first was to trap and poison rats on a grid pattern around each nest. The efficacy of this approach was tested using chocolate as a surrogate for the eggs. The tests were conducted within the island habitat and tested not only the extent of the poison and trap grid required but also the efficiency of different trap and bait covers to maximise rat exposure but minimise risk to kakapo.

The second approach was a series of pyrotechnic fuse igniters used in the blasting industry. These could be fired independently by a 'nest minder'; a person stationed 60 m away from the nest watching on closed circuit television. This person would be responsible for monitoring the nest while the female was absent, the time of most risk. The effect of these small detonations, similar to a small firework within a confined space, was tested to ensure that the rat would react appropriately, i.e. run away. Several rats were caught and held within an enclosure and fed centrally under an upturned cardboard box, similar in volume to a kakapo nest. Using the same closed circuit monitoring equipment rats were observed over several nights to ensure they were comfortable with feeding at this site. The device was then fired resulting in an unambiguous departure of the rats. This was

repeated several times with the same group of rats at the same feeding station. It was noted that the duration of time the rats would stay away from the feeding station diminished the more often they were exposed to the detonations. This was obviously going to be our second line of defence and any rats that did enter the nest would need to receive extra attention to ensure they were captured or killed as soon as possible.

Figure 1 shows the rat control grid, the universal bait and trap cover, and the eight rat detonator caps fitted to the miniature video camera within the nest.

Some concerns were expressed by colleagues of potential injury to kakapo chicks in the nest due to these small explosions and flashes of light or from accidental ignition of the nest contents. To reduce this risk we covered the devices with aluminium expanded mesh to arrest any sparks and to remove the potential for direct contact with the device on detonation. We also developed a mantra to chant while detonating the device - "A scared chick is better than a dead chick". We concluded that at worst, chicks would receive a fright from this device that was far less likely to harm them than having a rat clamp its teeth onto the chick!

CONSEQUENCES

The rat control grids appeared to work well over the four months of the kakapo breeding season. They were applied to all six nests in the 1997 breeding season. However, a rigorous test spanning the whole four month period

from laying to fledging was only undertaken around two nests, other nests either failed part way through incubation or had chicks removed for hand-raising.

At one nest, a rat was seen over two nights inside the nest chamber with a chick. On both occasions the detonators were fired and the rat departed the nest. Several detonations within one nest, with a sitting female on eggs, were due to a fault within the electronic system. Fortunately the female did not react in the slightest to the devices detonation. On another occasion the devices were repeatedly detonated over the course of an evening, again when a female kakapo was present sitting on eggs. On this occasion a Cook's petrel *Pterodroma cooki* (a small seabird) had returned to clean out its nesting burrow, gaining entry via the kakapo nesting cavity. In this situation the female kakapo was seen attempting to drive the intruder from the nest putting her eggs at extreme risk. The detonators were used initially thinking the intruder was a rat as only a small portion of the intruder was observed at one edge of the television monitor. Despite the attentions of the female kakapo and the detonators, the petrel did not give up and had to be removed by other means.

Conclusions: The removal of rats through the application of a poison and trapping grid, in conjunction with remote fired detonators, eliminated rat predation of kakapo eggs and nestlings. Risks to kakapo were negligible and no detrimental effects from any of the technologies employed were revealed.

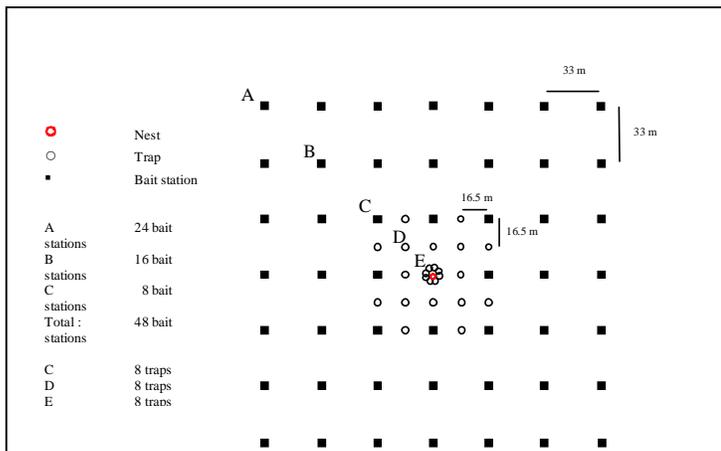


Figure 1. Kakapo nest protection grid

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