



DOC Fact Sheet
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Invasion ecology of rats on New Zealand Islands

The controlled release of introduced Norway rats onto small islands off the north-eastern North Island has been proposed by the Department of Conservation, in support of a PhD study conducted at the University of Auckland.

Why are rat releases being proposed?

New Zealand is a world leader in eradicating rats, which to date have been permanently removed from 40 islands. The largest-ever rat eradication was recently completed by Department of Conservation staff on 11,400 ha Campbell Island. Unfortunately, all islands that are free of rats could be re-invaded, either accidentally from ship wrecks or naturally by rats swimming from other islands. Should rats reinvade large and remote islands, treatment of the entire island for rats would be prohibitively expensive. We therefore need to study rat invasion behaviour to discover how far rats move when they arrive and how quickly the populations increase. This will help to identify the size of areas for treatment after an invasion, and how soon after an invasion detection is likely. This will have two benefits:

- Cost-effective protection of islands—either naturally free of rats, or from which rats have been removed.
- Protection of islands that are reinvaded by rats swimming from the mainland.

What species will be released?

The only species of rat released will be Norway rats. The species probably escaped from Cook's ships in the late 18th Century and are now the most common rats around New Zealand harbours and waterways. They are also the best swimmers, able to cross water gaps of at least 500 m.



Photo: Rod Morris

Which islands will be used?

Small islands of 8-15 ha will be used. Rat-free islands are not suitable because of likely damage to their flora and fauna. Instead, the selected islands have been repeatedly invaded by rats swimming from the mainland or other islands. Islands will only be used after permission from the island land owners, the Department of Conservation, the Auckland Regional Council and Environment Waikato. So far, two locations have been approved: Hauturu Island off Whangamata and Motuhoropapa Island in the Noises Group near Auckland. These islands were chosen because they are forested, have limited access points for rats, and resemble some of our most important naturally rat-free islands. Rats have been eradicated at least once from each island, only to re-invade some years later.

What will be done before the releases?

The existing rodent populations on each island will be eradicated before the project starts using a combination of traps and poison. Hauturu Island also has mice, which will be removed before the project begins. The eradications will most likely be conducted in winter when alternative foods for rodents are most limited.



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Te Papa Atawhai

How many rats will be released?

Each experiment will begin with a single rat. The released animal will have a radio-transmitter on a collar so that movements and survival after release can be regularly monitored. On at least one island, the first releases will be of unmated females or males. This will enable testing of detection methods and the effectiveness of the radio transmitters. Subsequent releases will be of a pregnant female in order to mimic invasions that succeed. These females will be allowed to give birth and breed naturally for one season, at which point there may be 30-50 rats, depending on island size. The rats will then be trapped using live traps until no further rats are caught.

What information will this provide?

A single radio-collared rat should provide answers to several questions:

- How far does a rat move on arrival?
- If the rat remains near the landing place, how long is this for?
- Does a rat show any interest in the wax tabs or gnaw sticks (vegetable-oil soaked lengths of wood) commonly used to detect invasions?

Once the rats produce offspring, additional questions can be answered:

- What is the rate of increase?
- Does this rate follow theoretical models?
- How quickly do the rats spread across the island?

Could the results be affected by other rats?

Before each rat is released, its genetic fingerprint will be determined using a small piece of tail. Such fingerprints reflect the characteristics passed on through the offspring as the rats breed. When the rats are trapped at the end of the experiment, another series of tests can be conducted to check whether the rats are all of the same family line. Any additional "invaders" can then be identified from these tests. If any rats leave the island, they can also be identified using their fingerprint.

What native species will be affected?

Native species remaining on islands used for these experiments are those that survive with rats. They include some seabirds, such as grey-faced petrels, which will co-exist with rats at low densities. However, there are many invertebrates, lizards, the tuatara and small seabirds that cannot survive rat invasions, and these have already been lost from the islands being used for these experiments.

What happens at the end of the project?

Once the experiments are completed, all rats will be removed. Three methods will be used to ensure complete eradication:

- 1 Traps will catch as many rats as possible for genetic and ecological study.
- 2 Follow-up poisoning campaigns with bait stations will then be used to eliminate any rats that escaped the traps.
- 3 Rat-detecting dogs from the Department of Conservation will then check whether the eradication has been successful. If not, the poisoning campaign will be repeated. Rats have already been removed using bait stations on these islands after previous invasions.

How will the experimental islands benefit?

At the end of the project, at least three small islands frequently invaded by rats will again be rat-free. The challenge will then be to apply the lessons learnt from the study to prevent any more invasions of these islands. If the methods of intercepting rats are successful, it may be possible in future to see large invertebrates, lizards, tuatara and small seabirds returned to these islands. Success on these islands would also mean that many others near the mainland could be cleared of rats and re-populated with a range of native species.

For more information: Contact DOC Warkworth Area Office (09) 425 7812; Auckland Area Office (09) 445 9142; Hauraki Area Office (07) 867 9180.
DOC website pages at www.doc.govt.nz