Ship rat *Rattus rattus* eradication by trapping and poison-baiting on Goat Island, New Zealand

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SUMMARY

Ship rats *Ratus rattus* were eradicated from 9.3 ha Goat Island in 1994; however, rats were redetected in 1996. From April to June 2005 using between 35 and 51 traps were deployed. Subsequent to trapping, 49 poison bait stations were established across the island on 23 June 2005 to assess if this eradication had been successful; only one was touched. Tracking tunnels and waxtags were left on the island, but with no signs of use. It seems that eradication was achieved. Gnaw marks were subsequently discovered in a waxtag at the site where reinvasion was most likely but there were no further signs over the next two months.

BACKGROUND

Goat Island (or Hawere) is a 9.3 ha island lying off the town of Leigh, north of the city of Auckland, New Zealand. The island is situated in the middle of the Goat Island marine reserve and the channel between the mainland and the island is only 50 m in width at low tide (Photo 1), well within the swimming range of rats *Rattus* spp. and stoats *Mustela erminea*. Ship rats *R.rattus* have been present on the island since at least 1970 and were eradicated by Department of Conservation staff in 1994. However, rats were redetected in 1996 and the population had persisted since that time.

The island was chosen as a study site in a wider investigation into the invasion ecology of rats on islands. Before this investigation could begin it was necessary to eradicate rats from the island, therefore trapping and poisoning was initiated in late April 2005 as part of a University of East Anglia MSc project (MacKay 2005).

ACTION

Rodent detection: Waxtags and tracking tunnels to detect the presence of rats were laid out within the coastal broadleaf/podocarp forest across Goat Island prior to commencement of the trapping and baiting programme. A small population of grey-faced petrels *Pterodroma macroptera gouldi* (approximatley 50 pairs) and little blue penguins *Eudyptula minor* breed on Goat Island. Rat eradication was timed to take place in the non-breeding season when these birds were absent, food for rats thus being more scarce and therefore making rats more susceptible to trapping.

Photo 1. Goat Island.

Trapping: The Island was trapped on two separate occasions with trapping stations arranged on an approximately 50 m x 50 m trapping grid. The southern half of the island was trapped between 26 April to 1 May 2005, before the rest of the grid was established on 19 June 2005, with traps set between 20 June and 24 June 2005. Victor Professional traps (yellow treadle) were baited with peanut butter

and covered with either chicken wire or stiff plastic covers and pinned to prevent non-target interference or traps being removed. Between 35 and 51 traps were deployed on the island at various points during the eradication. The stomachs were removed from all rats caught and preserved in 70% ethanol for diet analysis.

Diet analysis: The stomachs were opened and their contents washed into a 250 µm mesh sieve with a 500 µm mesh sieve beneath. A jet of water was then used to rinse the stomach contents to remove any finely chewed matter. The contents of the 250 µm sieve were then examined under a dissecting microscope and the contents assigned to groups and classified according to volume (trace - <10%; medium - 10-50%; large - >50%). The 500 µm sieve only contained small fragments of the same contents found in the larger sieve. All nematodes present were collected and counted and likewise any easily recognisable items (e.g. insect pupae) collected and counted.

Poisoning and monitoring: Forty nine poison bait stations were established across the island on 23 June 2005. At each location five 50 g blue chocolate-lured brodifacoum Pestoff rodent blocks (Animal Control Products, Whanganui) were wired to trees under a plastic corflute cover (Day 0). These were checked the following day (Day 1). Green brodifacoum Pestoff 20R pellets (Animal Control Products, Whanganui) were spread on cliffs and other inaccessible areas at approximately 10 kg/ha on 28 June to ensure complete coverage of the island. Bait-take was again assessed (Day 5). In an attempt to catch any remaining rats, 47 traps were left out.

On 9 July (Day 16) bait-take was assessed and 10 rodent motel-style ‘Protecta’ bait stations were placed across the island baited with six 50 g rodent blocks and a handful of sawdust and 20R pellets. On 15 September 2005 the island was checked by a member of staff of the DOC predator control programme and a 'rodent' dog (Fin Buchanan and Jak) and all bait stations except one were removed along with dissolved poison stations (after approximately 12 weeks in situ). In order to detect any remaining rodents, 15 tracking tunnels and 15 waxtags were left on the island. These were checked on 5 October 2005.

CONSEQUENCES

Rodent detection: Prior to the onset of trapping and baiting, levels of interference detected with Waxtags and tracking tunnels was very low suggesting that there was a only a small rat population persisting on the island.

Trapping: Twenty rats were caught in the first trapping session and eight in the second. One further female rat was caught after the end of trapping and was found on the first monitoring visit on 9 July 2005. The rat had been dead for around seven days and was too decomposed to determine whether it had ingested poison or not. On 5 December 2005, rat bones were found in a trap that had been lost during the first stage of trapping bringing the total number of rats killed by trapping to 30. Eleven rats caught had white tail tips, possibly due to inbreeding on the island or some founder effect.

Diet and parasite analysis: Most rats had been feeding on fruit and seeds. Some insect fragments were found and one rat had a single feather in its stomach. Many rats had extremely high parasite loads (nematode worms) and some had no food present in their stomachs, only nematodes and hair. A number of rats had orange lesions on their livers which were the result of previous parasite migration.

Poisoning and monitoring: The only poison-take was of two and a half 50 g blocks (a lethal dose), from halfway along the 'summit track' in the middle of the most intensively trapped area of the island. Although rain dissolved some of the bait, interference is still clearly discernible after over two weeks. After 12 weeks no further bait-take was visible amongst the dissolved baits. Rodent dog monitoring found ‘heavy’ rat sign around the flat area west of the summit which was never resolved. This has retrospectively been attributed to the possible last rat survivor eating poison and dying a week later, and its decaying corpse leaving sign two months later (although this is an unlikely scenario).

Tracking tunnels and waxtags were checked on 5 October 2005 and no rat sign was found. On 27 October rat gnaw marks was found on the waxtag on the rocky-platform peninsula, considered the most likely location for rodent reinvasion. Subsequent trapping and detection efforts revealed no further sign. It is possible a reinvader had arrived after only three months and it may be detected in ongoing summer trapping, or the invader may have returned to the mainland. Tracking tunnels and waxtags were removed from the island on 5-7 December 2005 prior to the next stage of the project.

Conclusions: The population of ship rats on Goat Island at the beginning of 2005 appeared very low with only 30 rats subsequently trapped and one poisoned. This low population was probably in part due to food shortages. Goat Island has low invertebrate diversity and abundance, only one rat showed evidence of feeding on a bird and most had been feeding on seeds and fruit. Monitoring on Goat Island is ongoing to ensure the early detection of any rats or other predators invading from the mainland.

Further information about the eradication can be found in the Goat Island report: www.conservationevidence.com/Attachments/242_2.pdf.

REFERENCES

MacKay J.W.B. (2005). The population biology of *Rattus rattus* on three recently reinvaded islands. Unpublished MSc thesis, University of East Anglia, Norwich, UK.