



# APPLICATION OF SCENT AND OLFACTION IN CONSERVATION

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### MAUNGATAUTARI'S VISION:

'to remove introduced mammalian pests and predators completely and forever - and to restore the forest to the original diversity.'

- 47 km of pest proof fence around an area of 3400 ha
- 3 x 50 tones of aerial applications of brodifacoum

Ship rats (*Rattus rattus*) and mice (*Mus musculus*) are the most common and widespread rodents in New Zealand.

It has been shown that mice and rats eat native insects, lizards and birds and also compete with native species for food by eating seeds and insects.

Furthermore mice and rats are the most likely survivors and re-invaders of sanctuaries such as Maungatautari.





**Cost effective techniques are required to detect both:**

**a) eradication survivors**

**b) fence invaders**



## APPLICATION OF SCENT AND OLFACTION IN CONSERVATION

1. **Assessment of the reliability of a new generation of tracking tunnels**
2. **Can lab-rats (*Rattus norvegicus*) and their derivatives (urine / bedding) be used to attract wild Norway rats (*Rattus norvegicus*) ?**
3. **Assessment of the efficiency of rodent dogs in tracking and spotting a low density population of mice (*Mus musculus*) and ship-rats (*Rattus rattus*) compared to traditional tracking tunnels**

# 1. Assessment of the reliability of a new generation of tracking tunnels

Auckland Regional Council sanctuary at Tawharanui.

'**Black Trakka**' invented and is distributed by Warren Agnew

- a) Weighing of the animal that passes through the tracking tunnel.
- b) Measuring the length of the animal, while passing through the tunnel
- c) Spraying a colour on the back of the animal with a single spray of dye.
- d) Continuous application of a bait to the animal, which is in size (and if desired in toxicity) correlated with the weight of the animal. This implies, that the bait does not need to be renewed every time an animal passed. Beside this an animal is only given a certain amount of food / toxin according to its weight, which is rather cost-effective.
- e) Taking a photograph of the animal
- f) All data sampled get transferred to a data- logger and sent out hourly via a txt to cell-phone / computer of the receiver within 700km of the location of the tracking tunnel.  
For txt messages, a reception of only one bar is necessary.



## **2. Can lab-rats and their derivatives (urine/bedding) be used to attract wild Norway rats?**

The use of live rats to attract wild rodents is novel and the idea is based on the mate searching behaviour of rodents in the wild.

We like to find out in how far such an approach works for rats. The bush patch to be used for this experiment is located on private land (owned by Mark Seabrook – Davies) north of Massey's Albany campus and has both Norway and Ship rats (trapping data from pest control and tracking tunnel data).

Three rat configurations will be used

- 1) Alternate male rats and empty possum cages, (10 rats used)**
- 2) Alternate female rats and empty possum cages, (10 rats used)**
- 3) Alternating male and female rats. (20 rats used)**

Baited tracking tunnels will be placed around the possum cages. Data can be compared with tracking tunnels data gained in the past.

Analysis of peak scent available using GC-MS

Synthesizing scent and potential production of a `rat - perfume`

Incorporation of the synthetic scent into the Black Trakka





### 3. Assessment of the efficiency of rodent dogs in tracking and spotting a low density population of mice (*mus musculus*) and ship-rats (*rattus rattus*) compared to traditional tracking tunnels

A. Effectiveness of certified rodent dogs in tracking lab mice (*Mus musculus*) and lab Norway rats (*Rattus norvegicus*) in essential pest-free mainland forest. Experiment uses lab rodents

B. Comparative effectiveness and cost of certified rodent dogs and tracking tunnels for locating single mice (*Mus musculus*) and ship rats (*Rattus rattus*) in pest-free mainland forest. Experiment uses wild rodents

To determine and compare the probability of rodent detection by a) certified rodent dogs and b) tracking tunnels. This detection is under conditions of very low population density of mice and ship rats that occur in “pest-free” forests. Comparisons will include time and money costs





## EXPERIMENTS PLANNED:

A. Effectiveness of certified rodent dogs in tracking lab mice (*Mus musculus*) and lab Norway rats (*Rattus norvegicus*) in essential pest-free mainland forest.

All males, mice will be vasocotomized

a) Experiments using the Research Facility the Xcluder Pest Proof Fencing Company

b) Experiments defining the accuracy of certified dogs in finding hidden material using pots.

c) Experiments in the enclosures

Lab-rats have been shownmnn, to adjust to a new environment only hours after their release.

**The Laboratory Rat: A Natural History** by  
Dr. M. Berdoy, University of Oxford



Photo: Xcluder Pest Proof Fencing Company

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## **METHODOLOGY :**

- Up to five rodents (rats or mice) will be released from random places within one of the three enclosures and 150m away from the fence line.
- The rodents will be released at 7 am and will be radio-tracked for three hours. GPS readings will be taken continuously. After this the rodent will be caught and locked in possum traps close to the place where it has been caught.
- After 10 am dog handlers and their dogs come to place. They will take GPS readings from their dogs and note any striking behaviour (when a dog senses the scent of the rodent e.g.). This should enable us to link data of the dog unit with data of the rodent unit.
- Experiment will be conducted on five consecutive days and a max of three weeks.
- Controls will take place



**B. Comparative effectiveness and cost of certified rodent dogs and tracking tunnels for locating single mice (*Mus musculus*) and ship rats (*Rattus rattus*) in pest-free mainland forest. Experiment uses wild rodents All males**

- **One rodent (mouse and rat) per enclosure and per month**
- **Once a rodent is caught and fitted with a radio transmitter , it will be released in an enclosure.** Rodents will be tracked nightly for a week, GPS readings will be taken. Baited tracking tunnels and certified rodent dogs (unaware of transmitter locations) will be used to see if the rodent (with known movements) is detected.
- **Five trials per animal will take place – even if this means that we will get a lot of replicate data.**
- **Certified rodent dogs will be used to look for the rodent – Servicing of tracking-tunnels at the same time**
- **Three to five trials each will take place with either no dog or no rodent in the enclosure enabling as to get a few reference points. After the trials the rodent will be killed**



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## VARIABLES TAKEN INTO ACCOUNT AND MEASURED:

To enable us to set up a cost efficiency analyses the following parameters will be measured and compared:

### **Dogs:**

- The time till the dog first senses the track of a radio-collared rodent
- The time till the dog effectively finds the rodent
- The costs for renting and maintaining the rodent-dogs

### **Tracking tunnel surveillance:**

- The time it takes the three volunteers to check all the tunnels, which will be added up to one figure.
- The costs of tracking cards and bait

### **Timetable:**

The availability of the dogs and trainers will determine the timetable.





## **FUNDING BODIES:**

- **Massey University: Maungatautari Scholarship**
- **Maungatautari Environmental Trust**
- **Environmental Initiatives Funding Waikato**
- **DOC**



## **THANKS:**

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  - Dr. Corinne Watts, Science staff Landcare Research
  - Neil Fitzgerald, Technician Landcare Research
- **Department of Conservation:**
  - Dr. Craig Gillies, Science Staff DoC

Photos by A. Gsell



## **METHODOLOGY:**

### **CAPTURE OF RODENTS:**

- Capture of rodent (mice and ship-rats) outside the reserve
- Only healthy males will be used
- Fitting rodent with transmitter
- Immediate release of the rodent into the enclosure at night
- Capture and release of one rodent (mouse and rat) at a time and per month
- Half of the animals at the periphery and half of them in the centre of the enclosures





## **SURVEILLANCE OF RODENTS**

- The location of the rodent (mouse and rat) shall be taken every 15 minutes all night by individually tracking the animals from the distance.
- Experiment will be conducted in five consecutive days
- After this rodent will be removed using traps
- Experimental trials take place in a monthly basis





## **DOGS' ACTION:**

- Dogs will be brought into action the morning after the rodent has been released
- Only certified dogs will be used-> we will work with 2 dogs
- Dog handlers will be carrying a GPS unit
- Each dog will work alone in one of the two enclosures in the morning and then switch enclosures in the afternoon
- The actual locations of the focal animals (based on transmitter fixes) will not be known to the dog handlers at any time of the experiment
- Dogs will be released at a random location on the periphery of the enclosure for all the trials.



## **SEVICING OF TRACKING TUNNELS**

- **Baited tracking tunnels will be checked daily by three volunteers in the southern enclosure and by two volunteers in the smaller northern enclosure.**
- **The volunteers will place new bait (peanut butter) and tracking cards when necessary**
- **The volunteers will be asked to proceed with the surveillance using the same pattern throughout the experiment.**
- **The sites will be divided into two / three parts and each volunteer will be asked to pass the tracking tunnels in a zigzag way parallel to the mountain.**
- **Having several people working in the enclosure at a time is recommended, so that the dog cannot make a connection between the location of the rodent and the radio-tracker**