

Spatial Ecology & Modelling Project Newsletter August 2008

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Can we predict where ship rats are most likely to 'hang out'?

We have now developed a model that can help predict ship rat distributions in North Island forests. A first step in controlling ship rats (a major predator of native fauna) in forests is to know where and when they are likely to have significant impacts. The aim in this work is to predict the location of ship rats in a forest in order to target rat control at specific areas.

To do this, the team have been trapping rats over large-scale (1km²) grids at the Orongorongo Valley, Te Pua, and in the Kaimais – all North Island podocarp-broadleaf forest. We measured habitat variables such as the presence of logs and food trees to determine which variables were the best 'predictors' of the capture locations of rats:



Emergent canopy trees

Food
Facilitate movements
Nest sites



Sub-canopy

Food
Facilitate movements



Ground

Nest sites
Facilitate movements
Food
Cover from predation risk

We have used PIT tags ('Passive Integrated Transponders' – the same kind of microchip that all dogs in NZ are now required to have) to mark each individual rat so that we can identify it when it is recaptured at a different location:



A ship rat being PIT-tagged for individual identification

Working collaboratively with our colleague Richard Barker from the University of Otago, the data on rat captures have been analysed to bring out any consistent patterns. The Bayesian scientific approach used is innovative and will be of major theoretical significance internationally, but perhaps more importantly, will also be of practical value for DOC managers and community-based conservation groups working within limited pest control budgets. Wouldn't it be great to know that you had the best placement of your bait stations to maximise your chances of catching 'the last' rat?

So far, the following habitat features are either positively or negatively associated with rat captures. The team are currently writing this work up as a scientific paper to be submitted to *Biological Conservation* in September 2008. Watch this space!

Habitat variable	Influence on rat abundance
Podocarp canopy cover	+
Tree canopy cover	+
Slope angle	+
Northerly aspect	+
Vegetation ground cover	+
Moss ground cover	-
Rock ground cover	-
Litter ground cover	-

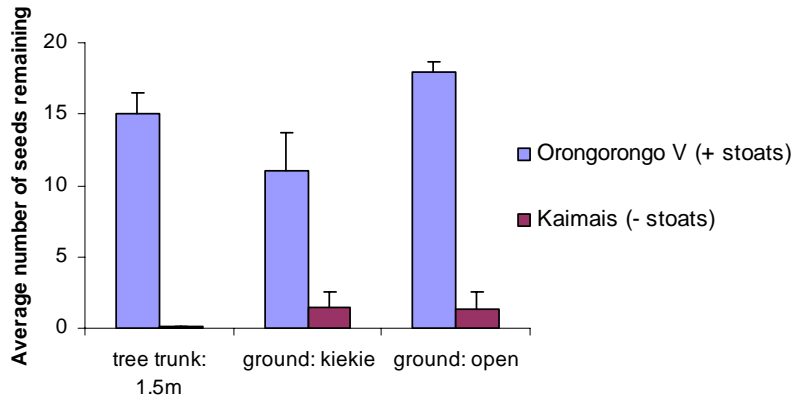
Does predation risk influence rat behaviour in forests?

The project team have also been working on a new technique called 'GUDs' (Giving-up Densities) to determine whether ship rats in NZ forests are influenced in their use of habitat by the presence of predators such as stoats. The technique measures the willingness of small mammals (such as ship rats) to forage in areas where predators (such as stoats) are present, compared to areas where stoats have been removed. GUDs consist of trays of seeds mixed with sand and placed in areas of either high cover (we chose patches of kiekie) or low cover (open areas in the bush). The idea being that if rats are 'scared' to forage when stoats are around, they'll be less scared in areas where they can 'run for cover'. For completeness, and because we know rats use trees, we also placed some GUDs up trees.



A GUD tray surrounded by a tracking plate that has been extensively 'dug through' by ship rats.

We ran two trials: one in the Orongorongo Valley with stoats present, and one in Whirinaki, on a 'Multiple Pest Dynamics' site where stoats have been removed. We found that ship rats forage selectively depending on predation risk, and that ship rats are highly sensitive to the presence of stoats in New Zealand forests, to the extent that the presence of stoats to some extent dictates where ship rats are located.



Number of seeds remaining in trays foraged by ship rats in the presence (blue) and absence (red) of stoats in prdocarp forest.

We're now using this information to to develop a predictive model for ship rats. The work has resulted in a student project investigating the effects of predators on habitat use by rats (Rebecca Lawrence). This is the first time that the GUDs technique has bee used for rodents in New Zealand, although it has been used successfully to monitor predation risk for rodents in Australia, North America and the Middle East.



A GUD tray up a tree

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