Programme overviews

Beating environmental weeds — Simon Fowler

Weeds pose a significant and increasing threat to New Zealand's natural and primary production ecosystems. For example, unless current control is improved, a suite of invasive weeds, including exotic grasses, woody shrubs, vines and trees, will threaten over 575 000 ha of high priority conservation land within 10–15 years, mainly by out-competing and smothering native plants, and have increasingly significant multi-sector impacts. In the longer term, weeds may alter hydrological regimes, disturb the flow of energy and nutrients, and change the structure and composition of native communities. Our proposed research will ameliorate these threats through the outcomes of two research themes: modelling to improve our understanding of the population dynamics of environmental weeds, and action to improve the abilities of end-users to take effective and environmentally safe action against weeds

Invasive mammal pests impacts on biodiversity — Roger Pech

New Zealand’s unique and diverse native species are highly vulnerable to invasive mammals. New Zealand has an excellent record of conserving biodiversity by managing pests at relatively few high-value sites, but conservation strategies centred on single sites face constant pressure of pest reinvasion and risk local, irreversible extinctions of native species. In this MSI-funded programme we build on New Zealand’s conservation achievements by conducting research to manage threats from pests in a broader landscape context to create resilient networks of sites.

The aim of the programme is to determine ***when*** and ***where*** to control pests by managing threats to native biota at local and regional scales. It has three main components to:

- develop conceptual frameworks for landscape-based pest animal management
- quantify the impacts of mammal pests on native biota and develop models linking pest abundance to impacts
- measure and model changes in pest species’ abundance under a range of scenarios: natural fluctuations (masts); climate change; in successional landscapes; after pest control; and following reinvasion of pest mammals across control boundaries

Control of small mammal pests — Bruce Warburton

This programme has three research aims, with the first and largest focussing on the cost-effective management of rabbits. Because of the waning effectiveness of RHD, many farmers are now spending considerable sums of money aerially applying 1080 or pindone poison. Our research is testing a range of sowing applications that could reduce the cost and the amount of toxin applied per hectare by more than 50%. The second research aim is focussed on determining the extent to which anticoagulant residues are being accumulated by harrier hawks (as an indicator of anticoagulant "leakage" into the environment), and more specifically gaining a better understanding of the residue profile of pindone poison in rabbits. The third aim is focussed on determining whether genetic resistance to anticoagulants has developed in any rat populations in New Zealand as it has overseas.

Strategic technologies for managing pests — Bruce Warburton

Mammal pests (possums, rats, stoats, and mice) are a major threat to NZ's biodiversity, and possums also the major wildlife contributor to TB persistence. The cost of control tools for these species limits the extent and frequency that control can be applied, and consequently, much of NZ's iconic biodiversity is still sliding towards local extinction. High control costs impact in the same way on achieving TB freedom for New Zealand, which depends on maintaining possum densities at very low levels for 10 or more years. Furthermore, the on-going use of some control tools, especially 1080, is being increasingly challenged because of public concerns about risks of adverse impacts on non-target species and the environment, and on animal welfare grounds. To address these needs our research is developing cost-effective tools and applications for multi-species pest control by: (1) reducing costs, (2) reducing adverse impacts, and (3) increasing community engagement with pest control. In the first aim we are re-engineering smart new delivery technologies for aerial delivery, and new approaches to ground control with an improved understanding of pest behaviour that together minimise pest survival over large areas. The second aim will mitigate adverse impacts through (a) novel use of synergists to minimise welfare, residue, and economic costs, (b) repellents to minimise risks to non-target species, and (c) novel bait delivery systems to improved target specificity. In the third research aim we are developing and testing ways to achieve positive public dialogue and participation in pest management decision-making, including the novel use of ecological games to help participants visualise the ecological, wildlife disease, and economic trade-offs in their decision-making.

Pest suppression and sustaining Tb freedom

Graham Nugent

New Zealand currently spends over $100 million each year on controlling possums, rats, and other small mammal pests to eradicate bovine Tb and to reduce the impacts of these species on our native plants and animals. In spite of this expenditure, Tb remains widespread and native species are still in decline.

We aim to help managers identify what combination of operational approaches is likely to be most efficient and cost-effective in providing long-term control of multiple pests. We will do this by using models that will enable managers to predict the relative cost-effectiveness of alternative operational approaches within each of three major pest suppression systems (Tb eradication, local elimination of pests, and combined on-going control of possums and rats). Thus far, we have focussed very largely on Tb eradication.

New Zealand has achieved 'official Tb freedom' in livestock, with <0.2% of herds now infected annually. However, Tb is still present in possums, and TB-possum management still costs farmers c. $54M p.a. That cost could be reduced by regional eradication of TB from wildlife, but that faces two impediments: high initial costs, and reliance on 1080 poisoning, use of which will be increasingly constrained.

We aim to overcome these constraints to Tb eradication by:

- targeting Tb control expenditure and greatly shortening its duration
- developing better multi-source surveillance systems to identify Tb-free areas sensitively and cheaply
- reducing reliance on 1080, by using other tools, including (as a back-up) the development of aerially deliverable Tb vaccine for possums and using that in conjunction with lethal control.

Long-term, the resulting gains in efficiency and cost-effectiveness could potentially halve the currently predicted 50+yr timeframe and $1billion cost estimated for national eradication of Tb. Such gains in efficiency could also more than double the total area in which native species are adequately protected.