What's happening with stoat research?

Report on the five-year stoat research programme

JANUARY 2000

Department of Conservation
Te Papa Atawhai

What's happening with stoat research?

Report on the five-year stoat research programme

JANUARY 2000

Published by
Department of Conservation
PO Box 10-420
Wellington, New Zealand

Cover: Dog stoat in tussock, Otago Peninsula. *DOC Audiovisual Library.*

ISBN 0–478–21915–6

Introduction

In the May 1999 budget, the New Zealand Government announced that an extra $6.6 million over five years would be given to the Department of Conservation to fund an integrated stoat control research programme.

Stoats, ferrets and weasels were introduced to New Zealand in the 1880s in an attempt to control rabbits. Although stoats were implicated in the decline of some native bird species soon after their introduction, the extent to which they are still contributing to the decline of native species is only now becoming clear. Their impacts on threatened and endangered birds are of particular concern.

Stoat control in New Zealand will have to be ongoing if some endemic species are to survive on the mainland. Currently, stoat control relies largely on labour-intensive trapping and the use of poisoned hen eggs. New, more cost-effective and sustainable approaches to controlling stoats are urgently needed. The extra funding means that there is now a real opportunity for finding cost-effective solutions for managing stoats.

A Stoat Technical Advisory Group (composed of experts from the Department of Conservation, Lincoln University and Auckland University) has been established to develop and oversee this new research programme. Funding for the first year is $338,000 with funding increasing in 2000/01 to $1.406 million and for the subsequent three years, $1.631 million, each year.

The Stoat Research Programme has identified as its vision:

'That stoats will no longer be a threat to indigenous biodiversity'

The Advisory Group has identified four key objectives:

- To make stoat control more cost-effective where it is already successful.
- To develop new techniques so that control can realistically be undertaken in more and larger areas.
- To expand the arsenal of methods to ensure sustainability of control.
- To seed new, longer-term projects for their potential to increase control effectiveness dramatically.

It is intended that an annual report will be prepared every July to provide an update on the outcomes of short-term research, progress of long-term research and new research initiatives.

Details are provided at the end of this newsletter on the process for applying for research funds from the stoat research programme. Expressions of interest will be sought each year, although the amount of money available will be dependent on what funds are already committed to on-going contracts.

(*L to R*) Stoat, ferret, and weasel.

Initial research being funded

A programme for the first year has been developed by the Advisory Group to enable the scoping and initial set-up of research projects prior to the first year of full project operation, which commences in July 2000. It will also take advantage of the current stoat plague in beech forests by trialing two new methods of controlling stoats on a large scale.

A REVIEW OF OVERSEAS STUDIES RELEVANT TO STOAT CONTROL

Robbie McDonald (Bristol, UK) and co-worker Serge Lariviere (Memphis, USA) have been contracted to conduct a literature review of stoat research with particular emphasis on:

- Demography—including the effects of trapping on population size and growth rates.
- Captive breeding—especially with respect to delayed implantation, reproductive pathology and diseases.
- Diseases—known pathogens including viruses, bacteria and parasites and their relevance to control or limiting mustelid populations.
- Biocontrol—options for biocontrol of stoats and areas for further investigation.
- Metabolism—identification of novel approaches to toxin development based on specific aspects of mustelid metabolism.

This literature review will include less accessible research such as that published in languages other than English and 'grey literature' (unpublished technical reports and University theses).

This project will be completed by April 2000.

A REVIEW OF MUSTELID STUDIES FROM THE FORMER SOVIET UNION

Artyom Polkanov, a wildlife scientist from Khazakstan now resident in New Zealand, has been contracted to compile information on relevant mustelid studies from the former Soviet Union. Of particular interest are studies on the captive breeding of stoats, what is known about their diseases and parasites, as well as their behaviour, ecology and biology.

This project will be completed by July 2000.

PRELIMINARY MODELLING OF STOAT CONTROL OPTIONS

Nigel Barlow (AgResearch, Lincoln) and David Choquenot (Landcare Research, Lincoln) have been contracted to develop modelling approaches capable of enhancing the control of stoats where they threaten key native species. These will include beech forest and non-beech forest habitats. Modelling for non-beech forest habitats will be important as populations in these habitats are less cyclic, more key species are at risk and the stoat data available is often limited and only partly analysed. One of the important outputs from this project will be the identification of parameters that need to be established through fieldwork in non-beech forest habitats.

This research will have three key outcomes:

- The review of existing models for mortality and fertility control.
- The collation of existing relevant data on stoat population dynamics and the interactions between stoats and their prey species, particularly kiwi.
- The identification of feasible and appropriate modelling approaches.

Preliminary framework models will form the basis for:

- Assessing the effect of reduced stoat densities on predation of key native species to determine ecological thresholds for management.
- Assessing the level of control (fertility and/or mortality) required to achieve the desired reductions in stoat predation.
- Identifying and providing recommendations for priority research required for further modelling and fieldwork in the above areas.

The results of this research will be available by April 2000.

COLONISATION OF NEW AREAS BY STOATS: TIME TO ESTABLISHMENT AND REQUIREMENTS FOR DETECTION

David Choquenot (Landcare Research, Lincoln) has been funded to develop a model to predict the rate at which a colonising stoat population would reach specified sizes. The model will be used to explore how the size and composition of the founder population, and its demography, influence this rate. The number of tracking tunnels necessary to detect the presence of the colonising population will also be predicted, taking into account the detection characteristics of tracking tunnels (e.g. their 'catchment' and the probability that a stoat will enter a tunnel).

The results of this research will be available by March 2000.

The contents of one female stoat's den included the feathers of four endemic bird species, three of them vulnerable and declining.

SCOPING REVIEW: FEASIBILITY OF IMMUNO-CONTRACEPTION FOR MANAGING STOATS IN NEW ZEALAND

Lyn Hinds and her project team (Wildlife and Ecology Division, CSIRO, Canberra, Australia) have been contracted to provide a scoping review to assess the potential value of immuno-contraception and other sterility and mortality agents for stoat control. They will also provide recommendations for research programmes to develop reproductive or lethal biocontrol for stoats.

The scoping review will present an analysis of relevant published material. It will also provide an assessment of the potential for the successful development of an immuno-contraceptive vaccine for stoats in the laboratory and the potential of using fertility control, with other management techniques, to effectively control wild stoat populations.

The feasibility of developing immuno-contraceptive vaccines compared with other potential chemical fertility control agents and lethal biocontrol agents will also be addressed. The potential effectiveness of new stoat control techniques in the management of ferrets and weasels will also be assessed.

A strategic research plan for the development of biocontrol techniques for stoats and an analysis of the ecological, social, political and economic consequences of the options for stoat control will be prepared as part of this scoping exercise.

This project will be completed by April 2000.

DEVELOPMENT OF A PROTOCOL FOR THE IDENTIFICATION OF PATHOGENS FROM SICK STOATS IN NEW ZEALAND

Joseph O'Keefe and co-worker David Tisdall (Ministry of Agriculture and Forestry, Upper Hutt) have been contracted to prepare a protocol for the diagnostic testing of sick stoats. The determination of the types and nature of pathogens existing in New Zealand stoat populations is considered to be the first step towards determining the feasibility of biological control.

Stoat on a rabbit kill.

The protocol will include details for shipment of sick or dead animals to the agency carrying out the testing, which types of assays should be conducted, who would be suitable to carry out this work and cost estimates of this diagnostic testing.

This project will be completed by May 2000.

DISEASE AND PATHOGENS IN STOATS IN GREAT BRITAIN

Robbie McDonald, Michael Day and Richard Birtles (Bristol, UK) will undertake a study on the pathology of disease in British stoats. There have been no previous routine screens of diseases in stoats in Great Britain, the source of stoats for their introduction to New Zealand. This study takes a first step towards identifying the level and types of disease found in British stoats and will identify productive areas for future work. They will conduct research in two main areas:

- A histopathological examination of key tissues to screen for inflammatory disease and neoplasia.
- A culture and PCR analysis of blood samples for arthropod-borne bacterial infections.

The results from this research will help towards the development of agents for biocontrol of stoats. Such agents may include viruses, bacteria or protozoan organisms. These agents may act by killing stoats or by reducing population growth or productivity. Alternatively, benign but highly transmissible agents could be used for the infectious dispersal of immuno-contraceptive agents.

This project will be completed by August 2000.

TESTING THE EFFICIENCY OF CURRENT STOAT CONTROL DURING THE PREDICTED STOAT POPULATION IRRUPTION (SUMMER 1999/2000) IN SOUTHERN BEECH FOREST ECOSYSTEMS

Peter Dilks and Barry Lawrence (Science & Research Unit, DOC) will test on a landscape scale (6000–8000 ha valley systems) the efficiency of Fenn trapping during a stoat irruption. Previous work has been undertaken only on a small scale or during non-plague years.

The investigation will test the efficiency of valley-wide control of stoats using two techniques:

- One-off control during the summer of a stoat irruption (expensive during a stoat plague, with little cost in intervening years but only protects wildlife about one year in five). This study will be undertaken in the Caples and Dart Valleys, Otago.
- Continuous low-level control (relatively low cost and has benefits for wildlife each year but its effectiveness at limiting the impact of stoat irruptions is untested). This study will be undertaken in the Eglinton Valley, Fiordland.

Stoat in a Fenn trap.
Photo: J.A. Mills

The productivity of mohua (yellowheads, a small forest passerine bird) will be the main indicator of the success of the experiments. Kaka (a forest parrot) will also be monitored in

the Eglinton Valley as another indicator of control efficacy.

The secondary objective of this investigation is to determine if the predictors of predator population irruption (seedfall and rodent indicators) are accurate, and to calibrate these against a proposed new technique for indexing rodents and mustelids using footprint tracking tunnels.

The results of this investigation will have direct relevance to mohua and kiwi recovery programmes and recovery strategies for other threatened species in southern beech forests.

This project will be completed by July 2001.

STOAT HABITAT USE AND TRAPPING IMPACTS STUDY

Des Smith (MSc student) and Ian Jamieson (University of Otago, Dunedin) have been contracted to provide information on stoat movements and the effect of low-density trapping in part of the Takahe Special Area (representative of much of eastern Fiordland).

Previous research on the movement of stoats and control techniques in Fiordland has been undertaken in the Eglinton Valley. While this valley is typical of many other large South Island valleys, much of Fiordland is made up of smaller, higher-altitude, montane valleys and alpine areas.

The aim of this study is to look at stoat movements using live capture and radio-tracking techniques and to estimate the effect of low-density trapping on stoats in the Takahe Special Area (a smaller, higher-altitude alpine valley). The study will look at both kill-trapped and non kill-trapped catchments.

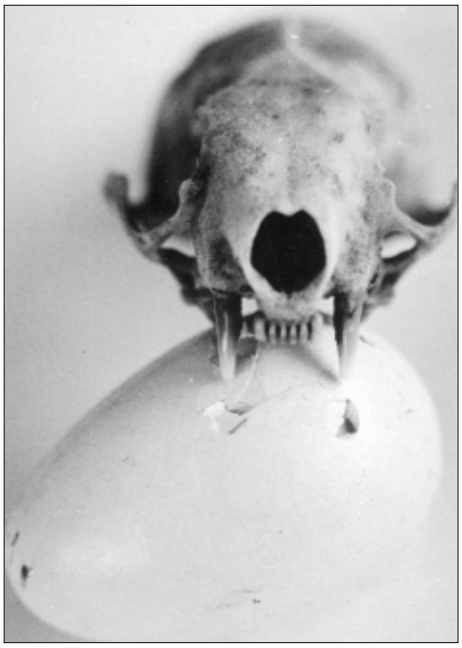
The effect of a stoat outbreak on takahe survival and productivity is currently being assessed by the Department. This research on stoat movement and the effectiveness of low-density trapping will assist in the design of a stoat trapping regime to effectively control stoats in this area.

This project will be completed by January 2001.

Stoat wearing a radio collar.
Photo: John Dowding

EVALUATION OF CHOLECALCIFEROL AS A NEW TOXIN FOR STOAT CONTROL

Craig Gillies, Elaine Murphy (Science & Research Unit, DOC) and Eric Spurr (Landcare Research, Lincoln) will conduct an investigation using cholecalciferol to control stoats.



Stoat skull with hen's egg.
Photo: J.E.C. Flux

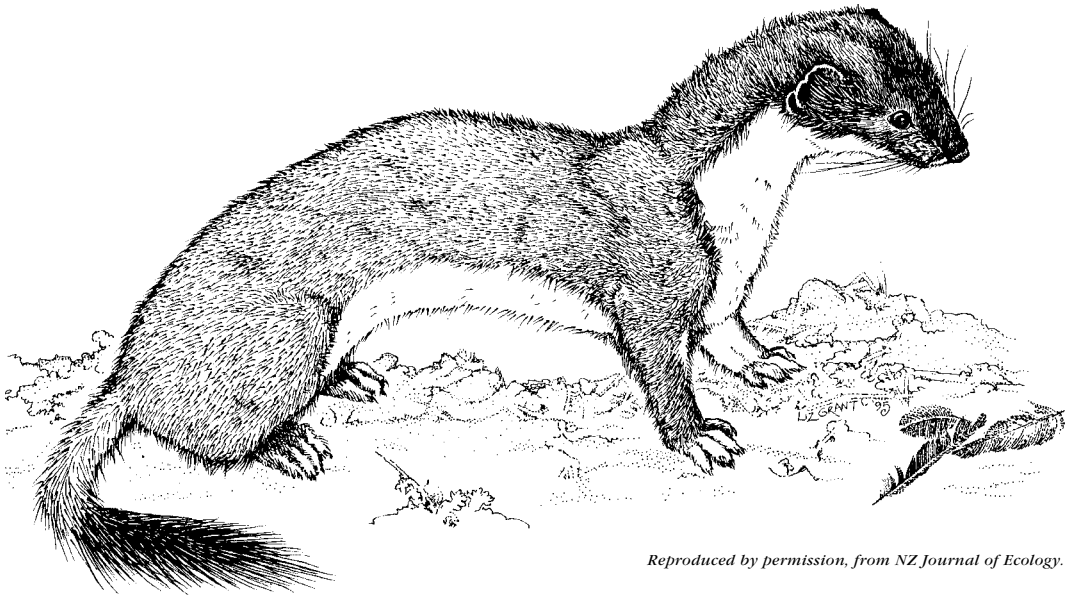
Cholecalciferol injected into hen eggs may provide an efficient, cost-effective method of controlling stoat populations. Eggs laced with 1080 have been shown to be an effective alternative to Fenn traps; however the widespread use of 1080 poison is limited in many areas due to public concern. Alternatives such as diphacinone take much longer to work, resulting in stoats being able to continue to eat native species before succumbing to the poison. Cholecalciferol, like diphacinone, can be used in areas where the use of 1080 carries a high risk of public rejection. However, unlike diphacinone, the stoat will stop eating once a lethal dose of cholecalciferol has been ingested.

Diphacinone and cholecalciferol are currently (or soon to be) available on the market and these products have not been tested in the field by the Department.

The objectives of this study are to:

- Evaluate the effectiveness of cholecalciferol in hen eggs under simulated management conditions to control a marked population of stoats.
- Provide best practice for the preparation of cholecalciferol in hen eggs and, if successful, provide best practice recommendations for controlling stoats using cholecalciferol in hen eggs.
- Evaluate the effectiveness of commercially available mustelid baits under simulated management conditions to control a marked population of stoats.
- Provide recommendations for controlling stoats using commercially available baits.

This project will be completed by July 2001.



Reproduced by permission, from NZ Journal of Ecology.

Expressions of interest for the stoat new initiative fund

The Stoat Technical Advisory Group invites any organisation or individual interested in proposing new research within the high priority areas identified below to submit an expression of interest by **17 March 2000**. Authors of expressions of interest will either be asked in early April to submit full proposals, or they will be informed that their expressions of interest will be evaluated further after the workshop to be held mid April. As a result of the reviews commissioned in 1999/00 and the workshop, some specific work may also be directly tendered by the Group.

Not all the expressions of interest will be able to be funded and projects will be prioritised by relating their cost to their likely benefit of increasing the effectiveness of stoat control.

Priority areas for stoat research funding:

- New baits and delivery systems.
- More effective traps.
- New toxins.
- Better lures.
- Improvements to aid current best practice (could include stoat habitat use).
- Non-lethal methods of control (could include deterrents).
- Refining monitoring techniques.
- Evaluating stoat parasites, viruses and bacteria for biological control.
- Possible use of canine distemper as a control agent.
- Possible use of a chemical fertility control agent such as cabergoline.
- Research into the social acceptability of the various control options for stoats.
- Modelling the dynamics and control of stoats, and the effect of reduced stoat numbers on key native species to determine ecological thresholds for management.
- Stoat demography and interaction studies in different habitat types, to provide information on how any potential control could be used most effectively (could include the critical factors regulating stoat populations).
- Consequences of stoat control on other predator and prey species.

Stoat killing a pukeko.
Photo: Wayne Hutchinson

Seeding/leverage type projects for novel projects in areas other than those listed above (c. 15% budget)

- Innovative research that has the potential to increase dramatically the effectiveness of stoat control.

Expressions of interest

Expressions of interest for DOC stoat new initiative funding must be sent by mail or email to:

Elaine Murphy, Department of Conservation,
Private Bag 4715, Christchurch
(emurphy@doc.govt.nz)
no later than Friday 17 March 2000.

Include the following information:

- Research leader and contact details.
- Project title.
- The research objective(s) (which must be specific, time-bound, and measurable).
- Proposed research (outlined in 1–2 paragraphs).
- How will what you propose measurably help meet one or more of the four key objectives of the stoat research programme? (Outline in a paragraph.)
- Likely time frame to complete the research.
- Estimated annual cost to complete the research.
- What other funds will or may be aligned with this project or other related work? (Outline any collaborations or leverage benefits.)