



# What we do ourselves

Our environmental performance



# Our environmental performance

We aim to show leadership in environmental performance. This section comprehensive environmental policy, we strive to conduct all activities care, to transfer knowledge to our clients, and bring our influence to

- minimising our consumption of resources and minimising waste
- minimising and mitigating the adverse effects of our activities on the environment
- striving to continually improve our environmental performance, by establishing objectives and targets
- carrying out regular audits and acting on complaints and incidents.

## How we do it

### *Commitment from staff*

Excellent environmental performance requires awareness and involvement. Volunteer groups have formed at our major sites and meet regularly to discuss ways to improve the sustainability of the organisation. Awareness of sustainability issues within Manaaki Whenua increased following our first report. Staff give particular thought to the potential to recycle and reuse rather than dispose, as some of the following examples illustrate. An indication of the level of approval for the direction the organisation is taking is shown by the positive comments about our sustainability initiatives in a recent staff survey.

### *Our Environmental Management System (EMS)*

Since 1995 our environmental performance has been underpinned by an EMS, with documented policies, objectives, targets and standards to ensure compliance with legislation and codes of practice, and to ensure continual improvement. The EMS was certified in late

1998 to ISO14001 standard. We are externally assessed by independent auditors, to ensure that our processes continue to meet the requirements of the standard.

Our EMS includes incident and complaint reporting. The 11 incident reports filed in 2000/01 were mainly for procedural non-compliance. No incidents resulted in environmental damage.

### **Resource use & waste production**

Our long-term aims are to achieve zero waste and zero net emissions from all our activities, and to optimise our use of resources. In our activities we use a wide range of resources and produce a range of wastes.

### *Our research laboratories*

We use a small quantity of chemicals in a wide range of laboratory activities, such as for biochemical analyses of soil. We dispose of most of these chemicals via the sewer system, in line with trade-waste guidelines. In

reports our progress. Through our  
with a high standard of environmental  
bear on environmental matters by:

future reporting we will quantify our chemical usage (from stocktake and accounting information), and the disposal of toxic chemicals.

Working with radioactive materials is a necessary component of our technical capability. In total, the amount of unsealed radioactive material that we use and dispose of is very small, equivalent to the amount of naturally occurring radiation present in 17 New Zealand brick houses.

Very small quantities of unsealed isotopes of sulphur, carbon and phosphorus are used as chemical tracers to study metabolism. They help us to understand immune, reproductive and feeding systems in possums, and also to understand how various pesticides and hydrocarbons are naturally broken down in contaminated soils.

Sealed sources (e.g. as in the radioactive component of smoke detectors) are used for measurements based on emitted radiation. This includes soil moisture probes to monitor soil moisture in situ and x-ray diffraction for analysing minerals.

We comply with the Radiation Protection Act 1965 and the Radiation Protection Regulations 1982. Sites where radioactive materials are used are licensed by

the National Radiation Laboratory. Each of these sites has designated staff members responsible for ensuring that we meet legislative requirements, including keeping a record of the quantities of radioisotopes held and used within the laboratory.

Some of our work, such as testing new possum and stoat control products, involves killing animals. Carcasses from our Animal Facility in Lincoln are disposed of in an offal pit, for which we hold a resource consent. At our Palmerston North site animal carcasses are disposed of via a licenced waste disposal company. Our use of animals in research is described on page 43.

#### *Field work*

We have begun to identify and measure the environmental impacts of techniques and tools used in our field research. These include wood and metal plot pegs, plastic and aluminium transect markers, wire exclosures, wooden walkways, sampling cores and towers, weirs, tree bands, hip-chain cotton, and human and other waste. We plan to quantify these, determine measures of impact, and monitor efforts to reduce the visual and ecological impacts of our field research.

Our use and removal of hip-chain cotton has been monitored for several years. The fine, biodegradable cotton, applied using a hip-chain device, is used in many field studies to temporarily mark travel routes and sampling transects such as faecal-pellet survey



Richard Harris

Surveying Argentine ants on Tiriti Matangi

lines, trap lines, and sampling plots. Where practical, all hip-chain cotton is removed and in 2000 we removed 85% of the nearly 210 km of hip-chain cotton used.

Laura Fagan



***From offices & general activities***

This year paper use decreased, and recycling increased. We are now recycling more paper than we purchase. Recycling saved 204 trees, based on 17 trees per tonne of paper recycled. However, we are still using about 13 reams of paper per person per year.

Many of our printers are now capable of double siding, and most new printers purchased are capable of this function. Staff are also encouraged to use 'two up' printing, which prints half size.

***Electricity savings***

Electricity use has been declining since 1998/99. For our Lincoln site in 2000/01 it was 30% lower than 1995/96. We have set a target of a 5% reduction for 2001/02 and plan to benchmark our performance against Energy Efficiency Control Authority (EECA) guidelines for office and laboratory space.

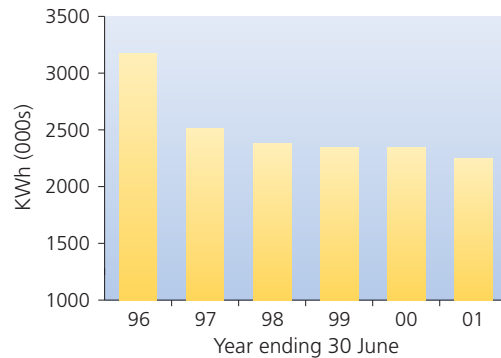
Energy audits have been carried out at all our sites, with recommendations made on ways to reduce energy. We have appointed an energy manager to coordinate the savings campaign, and have signed a contract with EECA to make 15% energy saving overall

we recycle more paper  
than we purchase

by the end of 2005. Reducing our consumption by this amount will be a challenge, particularly at our Lincoln site where energy savings of just over \$300,000 have been achieved over the last five years. A large proportion of electricity used at Lincoln is in our insect quarantine facility, which is primarily used for rearing insects for biological control of weeds, and which requires constant high temperatures. Our Energy Manager Grant McPhail says, that in winter, this building equates to 30% of all energy used on the site. In summer it can be as high as 50% of the total. Grant's achievements in energy savings at Lincoln were recognised with two EECA 'Energy wise awards 2001'.

To date we have not reported energy supplied from other sources such as coal and gas for heating. We plan to measure and report these in future.

***Electricity use***



***Motor vehicle travel***

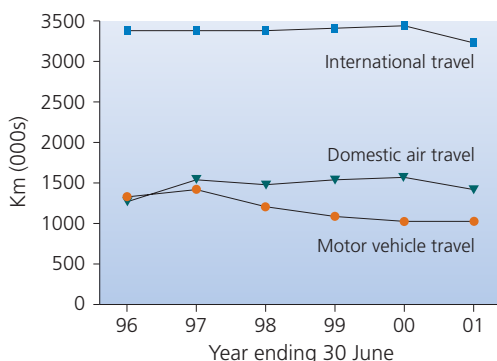
The use of motor vehicles is part of our business. We need to travel for field work, to interact with peers, to keep in contact with customers, and to disseminate information to a range of stakeholders. Much of our work is located off site, often in remote areas. Our vehicles, and those we hire, use conventional petrol or diesel fuel. The amount of motor vehicle travel, at just over a million kilometres, was similar to 1999/2000, and down on 1998/99.

**Air travel**

Our offices are scattered from Auckland to Dunedin, and our field sites spread over an even wider area. The amount of domestic air travel decreased by about 10% between 1999/00 and 2000/01, and was the lowest per full-time employee (FTE) since 1995/96.

Senior managers are our most frequent domestic air travellers. Each manager was set a target and a measure-to-manage approach taken. Travel was reported and discussed at monthly meetings. This monitoring helped reduce the senior managers' travel by 16% for the 2000/01 year, contributing about 35% of the total reduction for the year.

**Travel**



Science is very much an international activity. Most scientists live in countries other than New Zealand. We seek to have most of our scientists travel overseas at least every few years. International air travel is essential for staying in touch with scientific developments around the world, and for our work in sustainable development and poverty alleviation in Asia as described on page 32.

Our international travel for 2000/01 is lower than it has been in the last five years. Where possible, we try to optimise travel. Staff are encouraged to extend a trip, rather than make several trips within one year.

**Driving to work**

During presentations previewing key elements of this report, it became clear that staff are interested in determining their 'travel to work' environmental footprint. At Lincoln, for example, many staff live in Christchurch and travel about 20 km to work every day. To address

this the Lincoln sustainability group has drawn up a survey to determine the size of this footprint, and is looking at ways to increase car pooling and bus use. There are issues that need to be resolved, such as, whose footprint is this?

When Manaaki Whenua moved part of its operations from Christchurch to Lincoln in 1995, staff were offered a relocation package but uptake of this was low. Our employment contracts recognise that where staff are required to change work sites within the same city, extra travelling costs may be incurred and additional travelling expenses are reimbursed for up to 12 months. Relocation costs are also provided where the relocation will significantly reduce travel distance and time.

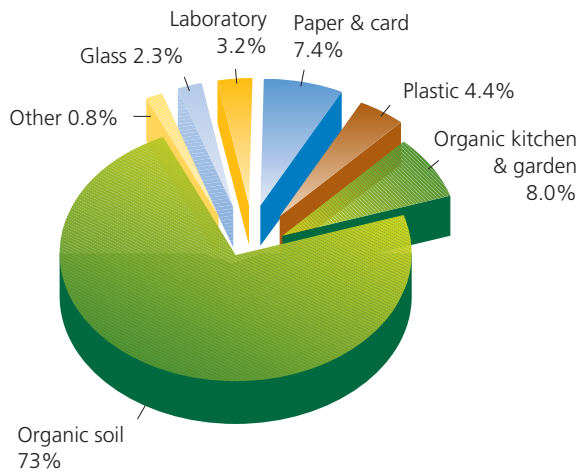
Our Auckland site will relocate to the University of Auckland campus at Tamaki in the near future. Staff will be entitled to the relocation and reimbursement provisions of the employment contract. We will report their extra travel as part of Manaaki Whenua's footprint for at least the first year after the move.

travel is essential for  
our science



Diana Leufkens

Scientists from Moscow State University and University of Southern California visiting Manaaki Whenua, Palmerston North



Composition of our solid waste, from skip audits at our main sites

### Solid wastes

Most of our solid waste is sent to landfill via skips at our sites. At Lincoln, where we have information on the weight of skips collected, we produce about 138 kg of solid waste per year per person (FTE). A large part of our solid waste is soil. Although the potential for recovery of soil appears to be limited, we will investigate further where such recovery is feasible. A mulcher, to be purchased soon, will be used to process green waste from the Lincoln grounds and also soil from experimental work, thereby diverting a significant amount of waste from landfill.

Another initiative, put forward by the Lincoln sustainability group, has been the setting up of worm farms to recycle lunch scraps and tea and coffee residues. With the excellent staff support that we have received it is estimated that this will divert approximately 1.5 tonnes of waste from landfill per year (equivalent to one less skip). The combination of mulched material being used on Lincoln grounds, and

we are restoring 155 ha of native forest to offset our CO<sub>2</sub> emissions

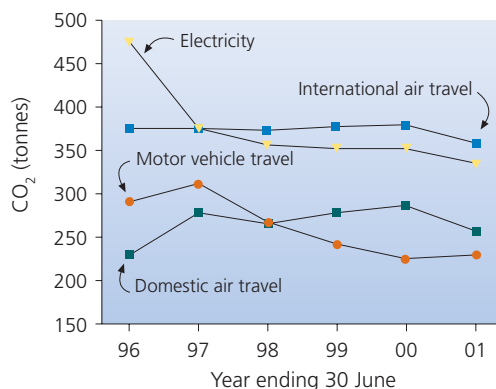
compost and worm 'juice' from the worm farms being used by staff, will close the loop on these particular waste streams. The sustainability group in Hamilton is also considering setting up a worm farm, and all the sustainability groups are investigating ways to reduce our waste to landfill. The initiatives at Lincoln, along with paper recycling, reduced skip weights there by 30% in 2000/01 compared with 1999/2000.

### Our eco-balance

#### The sustainability cost of CO<sub>2</sub> emissions

The activity data we have gathered on electricity use, motor vehicle travel, domestic air travel and international air travel allow us to estimate how much fossil fuel would have been consumed in supporting these activities, and the amount of carbon dioxide (CO<sub>2</sub>) emitted.

#### Imputed CO<sub>2</sub> emissions



#### Native forest restoration to offset CO<sub>2</sub> emissions

Our target is zero net emission of greenhouse gases from our activities. Through our new project, the Emissions/Biodiversity EXchange (EBEX21™), we have developed partnerships with the Queen Elizabeth II National Trust and the Department of Conservation to invest in the regeneration of native forest on marginal hill farmland. A five-year strategy has been adopted by Manaaki Whenua, combining a native forest restoration programme (31 ha per year with the Queen Elizabeth II National Trust) with our national energy conservation agreement with EECA to achieve zero net emissions.



#### INTERNET

- [www.landcare.cri.nz](http://www.landcare.cri.nz)
- environmental policy and EMS
  - record of EMS incidents for 2000/01
  - use of electricity, paper (and recycling), hip-chain cotton (1995/96 to 2000/01)
  - air travel data (1995/96 to 2000/01)
  - motor vehicle travel (1995/96 to 2000/01)



#### DIALOGUE

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#### TARGETS 2002

- quantify chemical usage and disposal of more toxic chemicals
- identify and measure impacts of field research
- reduce domestic air travel by 5%
- reduce imputed CO<sub>2</sub> emissions to 1,150 t

#### TARGETS 2005

- make 15% energy saving (compared with 2000/01)
- achieve zero net emissions of greenhouse gases by restoring native forest to offset emissions



Harley Betts

## Animals in research

Use of animals in research is essential for:

- developing better control and monitoring methods for vertebrate pests (e.g. overcoming cyanide-induced bait shyness in possums; developing fertility control for possums and predicting the likely impact of fertility control on possum populations)
- evaluating the safety of vertebrate pest control methods to non-target species (e.g. assessing the likelihood of humans being exposed to 1080 or brodifacoum through contaminated meat)
- understanding ecological relationships between vertebrate pests and the habitats they occupy (e.g. dispersal of possums and juvenile ferrets)
- developing and quantifying 'biological indicators' —some animal species are particularly sensitive to bovine Tb or environmental pollutants, e.g. wild pigs as indicators of low levels of Tb in the wild.

Carefully controlled preliminary pen trials take place in our captive animal facility. These trials minimise the number of animals needed to obtain consistent results before costly field research is undertaken. There is also a need to observe animal behaviour in assessing pest responses to new types of poison bait or traps, or in learning how social behaviour might affect the success of new fertility control technologies. The animal facility's proximity to laboratories also permits rapid analysis of fresh experimental samples, which enhances the precision of research results.

Field studies relate to management of introduced species (e.g. possums, pigs, stoats and ferrets) for the eradication of Tb, and to conservation of native fauna and flora.

All animal research, both in pens and in the field, must be approved by our Animal Ethics Committee. Research trials must comply with the Animal Welfare Act 1999 and animal usage reported to the Ministry for Agriculture and Forestry (MAF) on conclusion of the trials.

## High regard for animal ethics

Our Animal Ethics Committee (AEC) comprises representatives from the New Zealand Veterinary Association, the Royal Society for the Prevention of Cruelty to Animals, Ngāi Tahu, the general public, and two members of our own staff. The committee met three times during the year. A total of 36 projects were AEC approved in the 2000 calendar year. The Committee ensures that animal-based research by Manaaki Whenua is conducted in accordance with our Code of Ethical Conduct for the Use of Live Animals in Research, which has Ministerial approval as required by law.

Our Code of Ethical Conduct permits use of animals only when the AEC considers the benefits of the research outweigh the suffering imposed on animals. Only the minimum number of animals needed to produce unequivocal findings can be used. Our Code of Ethical Conduct is being revised to ensure it meets the requirements of the Animal Welfare Act 1999.

The total number of animals and the range of species used in our research depends entirely on the spectrum of funded projects. Consequently usage can vary markedly from year to year. We report on projects completed each calendar year, as required by MAF. Projects that finished in the year 2000 involved use of 4,000 animals of which 85% were possums and other vertebrate pests and 9% were native animals (eels). Projects that finished in 1999 used twice as many animals but this included tagging nearly 6,000 Adelle penguins over about a ten year period. Research projects completed in 2000 killed 2,465 animals, of which 83% were possums and other vertebrate pests, and 15% were eels. More detailed information is given on our web site.

### *Non-compliances*

Two cases of non-compliance with the Code of Ethical Conduct were identified during the year. In a study investigating restraint-traps and kill-traps for the control of a range of vertebrate pests, a researcher mistakenly believed that the Animal Ethics approval included feral cats (six of which were killed) whereas the approval related only to possums, ferrets and stoats. In the second instance, a study designed to maximise female possum's production of ova (part of the research into developing fertility controls) was started before final AEC approval had been granted. In both cases, immediate corrective measures, as specified in the Animal Facility Quality Manual, were taken.

### **Animal bycatch in the field**

Manaaki Whenua records the non-target impacts (bycatch) of wild animal research programmes. Our policy is to choose trap types, sets, and set times to reduce the number of non-target animals caught or killed and to minimise injuries. There has been a marked decline in bycatch over the last two years. If animals cannot be released, they are destroyed humanely. All staff working with animals must undergo training in how to kill animals humanely. In 2000, 33 non-target indigenous animals were killed

Andrea Byrom



*Releasing a harrier hawk*

## our use of animals in research meets strict ethical approvals

—26 harrier hawks, mostly from research trials where meat baits were being used to catch ferrets for Tb control, six weka from research trials on possums for Tb control using soft-catch leg-hold traps, and one rifleman from a research trial on the interactive impacts of rodents and stoats in beech forest.

In 2000, the amount of leg-hold trapping was the highest recorded (37,850 trap-nights). However, the total number of non-target leg-hold captures (< 3%) was the lowest yet. This can be partly attributed to the greater use of raised trap sets (about 14% of all leg-hold trapping), particularly in areas where weka occur. Only 13 non-target animals (all rats) were caught in about 5,300 trap-nights using raised sets.



### INTERNET

[www.landcare.cri.nz](http://www.landcare.cri.nz)

- statistics on animals used in research
- bycatch data (1996–2000)



### DIALOGUE

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### TARGETS 2002

- reduce bycatch, particularly native animals
- continue high regard for animal welfare

Biological bycatch 1998–2000 <sup>1</sup>	1998	1999	2000
Number of studies	27	34	32
Number of target animals caught	7774	10424	9122
Number of non-target animals caught (% of total captures)	2507 <sup>2</sup> (24%)	1459 (12%)	1383 (13%)
Number of non-target indigenous animals caught <sup>3</sup> (Number of species) <sup>4</sup>	663 <sup>2</sup> (3)	229 (7)	224 (4)
Number of non-target introduced animals caught (Number of species) <sup>5</sup>	1844 (17)	1230 (14)	1159 (19)
Number of non-target indigenous animals killed	107 <sup>2</sup>	49	33

<sup>1</sup> These data are for calendar years.

<sup>2</sup> A study on ferrets resulted in high numbers of harrier hawks being caught even when baits were hidden down rabbit burrows. Harrier hawks share the same habitat as ferrets and scavenge for carrion baits used to trap ferrets.

<sup>3</sup> Most (79–85%) of the captured non-target indigenous animals were released, but less than half (40–44%) of the introduced animals were released, the remainder were killed either during capture or by euthanasia.

<sup>4</sup> Non-target indigenous species caught were harrier hawk, kea, red-billed gull, rifleman, robin, silvereye, and weka.

<sup>5</sup> Non-target introduced species were mainly hedgehogs (26–43%), feral cats (15–25%), possums (16–19%), rats (5–29%), stoats (3–7%), and magpies (1–4%).

### Genetic modification in our research

Manaaki Whenua uses genetic modification techniques in research for improving environmental management. These projects include developing and using biosensors for detecting contamination, understanding contaminant degradation pathways for bioremediation, and a Marsden funded project on potential impacts of natural gene transfer on bacterial systematics. Another significant Manaaki Whenua project that relies on using genetically modified material (imported into the country) is the development and evaluation of fertility control for possums.

Our ecological genetics research uses DNA sequence data to assist conservation and biosecurity management in New Zealand, but the research has not used genetic modification techniques during this reporting period.

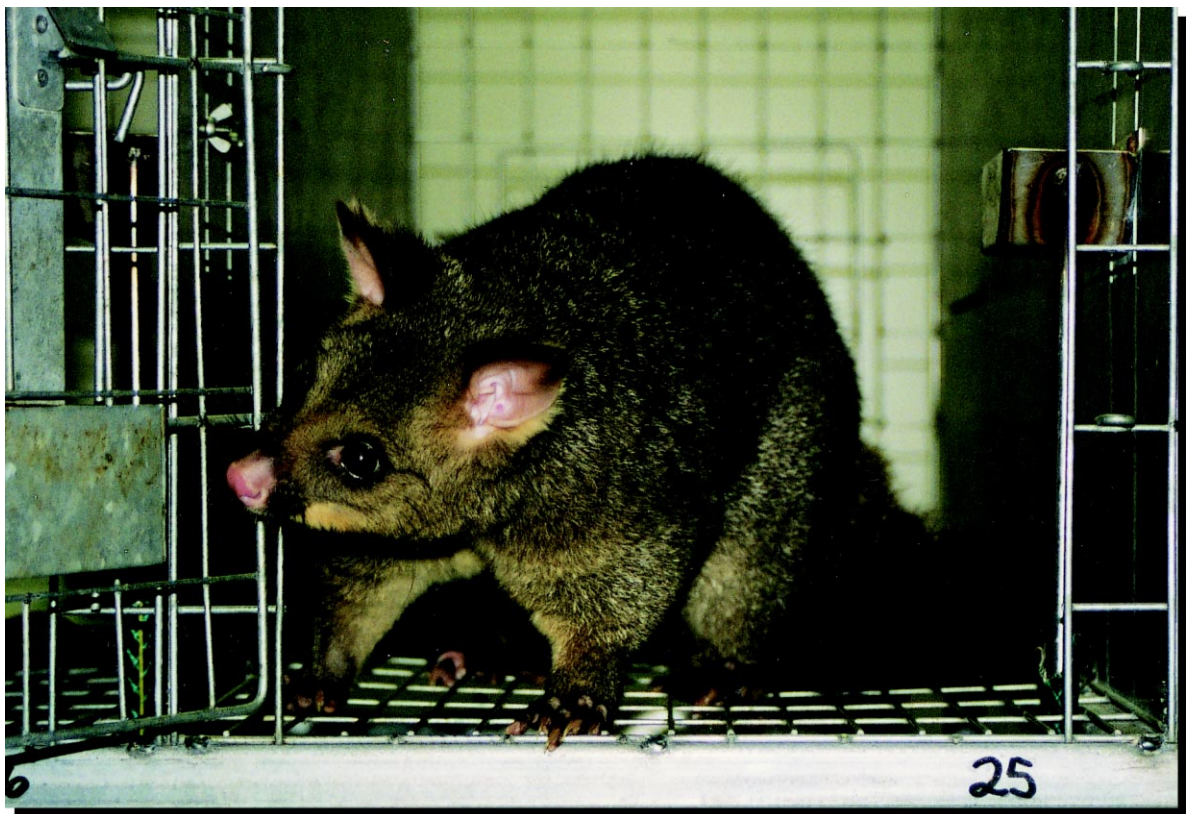
We made a submission to the Royal Commission on Genetic Modification. The Commission's report quoted extensively from the material in our submission on possum fertility control and ecological genetics.

### Compliance with the HSNO Act

All research involving genetically modified material had appropriate approval to ensure compliance with the Hazardous Substances and New Organisms Act (HSNO). This was obtained either directly from Environmental Risk Management Authority (ERMA), or via an Institutional Biological Safety Committee (IBSC). Manaaki Whenua has been delegated the authority, by ERMA, to operate a joint IBSC with Crop & Food Research at Lincoln, and a joint IBSC with HortResearch at Mount Albert in Auckland. A Biological Safety Officer at each site is responsible for monitoring the process relating to low-risk genetically modified organisms.

our approach to possum  
fertility control reflects  
public opinion on gm

Kate Littin





## A new humane kill trap for possums

Considerable benefits have been derived from the use of animals in research in terms of the effectiveness and humaneness of pest management, and the conservation of wildlife. For example, this year, a collaborative project between Manaaki Whenua and Lincoln University developed a highly effective and innovative new possum kill-trap—the 'Bulldog' trap. The trap's cover is made of sprung steel which acts as the spring mechanism, the same principle as a bulldog paper clip. The Bulldog trap is very humane and, unlike restraint traps, it does not have to be checked daily, which is a major advantage when possum numbers are being maintained at very low levels. The trap is robust, light and very compact, making it suitable for commercial operations. The Bulldog trap can be easily set in a variety of situations, including above the ground on a fence post or up a tree, making it safe to use in kiwi habitat. The Bulldog trap is a revolutionary design and has been patented.



### DIALOGUE

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Robert Lamberts

A set of standard operating procedures has been developed to guide staff initiating research that comes under the HSNO regulations. These procedures provide an audited checklist ensuring appropriate compliance is obtained in all cases.

Currently Manaaki Whenua has four approvals from ERMA for developing low risk genetically modified bacteria, and two approvals for the importation and use of genetically modified material in specific MAF-approved Transitional and Containment Facilities. Each facility is operated strictly in accordance with the relevant MAF Regulatory Authority Standard under conditions defined by the HSNO approval. Facilities are audited regularly by Manaaki Whenua staff and MAF.

### *Possum fertility control*

Manaaki Whenua, in partnership with the Marsupial Cooperative Research Centre (CRC) based in Australia, is undertaking a substantial body of work related to developing and evaluating fertility control for New Zealand's most serious vertebrate pest, the possum, which is estimated to cost New Zealand \$80–100 million a year.

Our approach to possum-specific biocontrol is to use the possum's own immune system to block fertilisation. In trials to date, possums have shown a strong infertility response when challenged with specific egg or sperm proteins.

We are evaluating two delivery systems for the proteins: edible plant vaccines (genetically modified plants containing specific proteins that elicit an immune response) and bacterial ghosts (the membranes of killed bacteria). These have been developed by leading research organisations overseas. This year, trials with bacterial ghosts containing possum egg proteins elicited a strong immune response in possums. In addition, feeding trials using modified potatoes containing non-possum proteins (imported from the USA with ERMA approval into containment facilities), demonstrated conclusively that the foreign proteins in plant material and bacterial ghosts do cause the desired immune response.

### *Public acceptance of GM possum control*

There is substantial public debate about the potential adverse effects of genetically modified organisms

(GMOs) on the environment, and about pest control involving genetic modification products. Our social research shows that key concerns relate to specificity to the target pest, safety of native species, humaneness, reversibility, ensuring genes cannot transfer between species, and a lack of scientific knowledge about the consequences of genetic modification. The majority of people (even opponents of GMOs) indicated they were happy for research on genetic modification to continue in the laboratory.

There is also significant public concern about who can be trusted to provide unbiased information. Our response has been to make information available openly and as early as possible to the public. We have tried (and will continue) to ascertain, document, and respond to public concerns.

This year, in collaboration with the Parliamentary Commissioner for the Environment, we facilitated several focus groups and conducted a public survey. Almost all of the public opposition to genetic modification that we encountered was directed towards genetically modified foods, not to biological control of pests or to medicines. People also recognised different degrees of genetic manipulation. The recommendations of the Royal Commission on Genetic Modification reflect this.

The focus groups recognised that genetic modification can be put to a range of uses, and discriminated between the acceptability of the various uses. Common determinants of the acceptability of genetic modification for possum control were degree of specificity and humaneness.

In March 2001, we conducted a telephone survey of a random sample of 1002 New Zealanders to determine what form of fertility control would be the most acceptable. The vast majority of respondents believed possums are a problem, and that new control methods are required. Our preliminary analysis indicates that, overall, the public endorses the idea of fertility-based control for possums, but is divided about whether to use genetically modified organisms or products to effect such control. At this time, the pool of likely supporters is about twice as large as the pool of likely opponents.

### *Going forward*

The potential of these genetically modified 'prototype' products for possum fertility control, and the public's responses to them, have encouraged us to continue with this research in our containment facilities and overseas, with due caution and consultation.

In general, we expect our level of genetic modification related work to rise slowly as we increase our focus on describing, understanding and protecting the genetic diversity of New Zealand's flora and fauna, and as the potential grows for genetic modification to provide new products to help improve New Zealand's environmental management in areas such as pest control, biosensors and bioremediation.



#### **INTERNET**

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- results of the public survey of GM possum control
- our submission to the Royal Commission on Genetic Modification ([www.gmcommission.govt.nz](http://www.gmcommission.govt.nz))



#### **DIALOGUE**

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#### **TARGETS**

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- continue research & ensure compliance with HSNO Act