

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY

ERMA
New Zealand



NGĀ KAIWHAKATŪPATO WHAKARARU TAIAO

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY

ANNUAL REPORT ON THE AERIAL USE OF 1080

For the year ended 31 December, 2009

TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	3
2	INTRODUCTION	4
	Sectors that use aerial application of 1080 for pest control	4
	Application information	6
3	BEST PRACTICE GUIDANCE	8
	Communication	8
	Management of aerial 1080 operations	8
4	AERIAL PEST CONTROL OPERATIONS	9
	Post-operational reports	9
	Monitoring	13
	Incidents and public concerns	14
5	RESEARCH	18
	Alternatives to the use of 1080	19
	Biocontrol	22
	Research into new methods of trapping	23
	Research into possum vaccines	23
	Improvements in the use of 1080	24
	Other research	28

| 1 EXECUTIVE SUMMARY

This, the third annual report on the aerial use of 1080 in New Zealand, shows that real progress has been made in a number of areas. This is the second report to contain data from aerial operations and, while it is too early to draw firm conclusions, the information we have to date indicates that the rules for aerial operations are largely being followed by operators.

There were 13 fewer incidents and complaints in the 2009 year (17, down from 30 in 2008). All were investigated and instances of breaches of the controls were few with three of the breaches being attributed to operator practices and three breaches by members of the public.

ERMA New Zealand received post-operational reports for 64 aerial operations in the 2009 calendar year, covering approximately 510,000 hectares. The number of operations, area covered, and 1080 application rates were similar to 2008, when there were 74 operations over 600,000 hectares.

There were encouraging signs that the *Communications Guideline for Aerial 1080 Operations*, published in March 2009, is having a positive effect in ensuring better communication. This is evidenced by the quality of the applications for permissions received and processed by Public Health Units, without the need to reject any because of insufficient evidence of prior consultation.

Concerns about poor communication were forwarded to ERMA New Zealand from operators and members of the public for four aerial operations in 2009, compared with 12 in 2008. While this is better, good communication is important to reduce risks in operations. There is still a need for improvement by the agencies and operators involved in the incidents reported to us.

The rate of reported consultation with Māori stakeholders improved markedly. They were consulted on 84 percent of aerial operations in 2009, compared with the 55 percent reported in 2008.

On the other hand, three district councils (Westland, Taupo and Thames-Coromandel) passed resolutions to advocate for the use of different pest control methods in their districts.

Post-operational water monitoring was carried out on 25 of the aerial operations undertaken in 2009, with 113 tests reported. Monitoring in drinking water catchments detected 1080 in four tests (on four different operations), with results between 0.1 and 0.3 micrograms per litre, well below the Tolerable Exposure Limit of 3.5 micrograms per litre.

Research continues into alternatives to 1080, better use of the substance, and related matters such as the effect of aerial operations on native bird populations. This report summarises more than 60 research projects; some of which continue from 2008, and some of which are new.

It was the Environmental Risk Management Authority's intention that all aspects of the management regime be subject to public scrutiny. We believe this scrutiny shows the regime is generally working as intended to realise the benefits of using 1080 for pest control, while minimising the risks. There is room for improvement, which we would hope to see following adoption of the National Possum Control Agencies' industry-wide guidelines that are due to be introduced in 2011.

| 2 INTRODUCTION

The Environmental Risk Management Authority completed a reassessment of 1080 for use in pest control in August 2007. After careful consideration, the Authority concluded that the benefits of using 1080 outweighed the adverse effects, and it released its decision to allow its continued use, with additional controls. It also made recommendations for the development of best practice guidelines, and for further research.

In reaching its decision, the Authority was mindful that the use of 1080 was a polarising issue about which many New Zealanders had deeply held views. It recognised the importance of engagement through better communication and consultation with the public, local communities, Māori and special interest groups. The Authority also implemented a new management regime for 1080 operations to address an urgent need for further improvements in the way 1080 is used.

This is the third annual report since the release of the Authority's decision. It provides information on monitoring of the conduct of operations and on:

- aerial 1080 operations that were carried out in the 2009 calendar year; and
- research that was carried out up until July 2010.

Sectors that use aerial application of 1080 for pest control

Control of animal pests including possums, wallabies, rabbits, rats and stoats is carried out using both ground control and aerial application.

Ground control is where pests are controlled from the ground and may include methods such as trapping, shooting or placement of various toxins in bait stations. The toxins, or vertebrate toxic agents (VTAs), that are used may include 1080.

Aerial application is the use of aircraft to distribute baits. The ability to use aircraft to apply 1080 is considered by users to be a key advantage where pest control is undertaken on rugged or remote land.

Different users carry out pest control operations using aurally applied 1080 for different reasons. The main sector groups that use aerial application of 1080 are:

- the Animal Health Board;
- the Department of Conservation;
- regional councils; and
- other land managers.

The Animal Health Board

The Animal Health Board is responsible for managing and implementing the National Pest Management Strategy for Bovine Tuberculosis (NPMS) in New Zealand.

The NPMS was approved by the Government in 1998 and amended in 2004. It provides for measures to control bovine tuberculosis (TB) in cattle and deer herds, and works in two ways:

- disease control – aims to control and contain the spread of the disease within cattle and deer herds; and
- vector control – aims to control and contain the wild animal species most responsible for spreading the disease to cattle and deer.

The aim of New Zealand's TB control programme is to achieve a TB-free status in this country by 2013. This equates to a 0.2 percent Annual Period Prevalence rate¹ (about 60-70 TB infected herds nationally). Nearly all of New Zealand's major international trading partners have attained this standard, but this country continues to have an undesirable level of infection. The Animal Health Board have reported that there were 131 infected herds at the end of 2009 (down from 142 at the same time in 2008).²

The Animal Health Board uses a combination of ground control methods and aerially applied 1080 in their strategy for containing and controlling possums. The Board's total area under sustained management is about 10.1 million hectares (based on 2009 figures).³ Approximately 3.4 million hectares (34 percent) of this area was reported as having had either ground or aerial operations for possums in 2009.

Approximately 1.5 million hectares (15 percent) of the Board's total area under sustained management is controlled using aerial application of 1080.⁴ In 2009, approximately 309,000 hectares were treated using this method (9 percent of the total area treated by the Board in 2009), less than the area reported for 2006 and 2008 (Table 2).

The Department of Conservation

Possoms and rats eat the eggs of native birds, attack their young and cause significant damage to native trees. In the absence of natural predators, possums and rats (as well as stoats and ferrets) have flourished and caused a great deal of damage to native animals and birds, and to the native forest environment.

The Department of Conservation manages approximately 10.1 million hectares of conservation land. They use a combination of ground control methods and aerial application of 1080 to:

- improve the health of ecosystems by reducing the impact of browsing, competition and predation by possums and rats;
- protect threatened species from predators through direct control and targeted by-kill;⁵ and
- control rabbits.

The Department's total area under sustained management is about 1.4 million hectares (based on 2009 figures).⁶ In 2009, approximately 430,000 hectares (31 percent) of this area was covered by animal pest control operations using both ground control and aerial methods (see Table 1). The Department reported that of the 2009 total area of treatment, approximately 174,000 hectares (40 percent) was treated using aerial application of 1080.

TABLE 1: Department of Conservation Animal Pest Control Treatment Area (all control methods)

AREA UNDER SUSTAINED MANAGEMENT (000 HECTARES)			AREA CONTROLLED 2009 CALENDAR YEAR (000 HECTARES)		
Rabbit control	Possum control	Rodents and mustelids	Rabbit control	Possum control	Rodents and mustelids
473	839	487	14	213	203

1 The Annual Period Prevalence rate is the number of cattle and deer herds classified as infected at the start of the year, plus those found infected during the year, divided by total cattle and deer herds, as a percentage. A 0.2 percent Annual Period Prevalence rate is the international benchmark for a country to be recognised as officially free of bovine TB.

2 Sourced from: <http://tbfree.ahb.org.nz/Default.aspx?tabid=167>

3 Personal communication – Animal Health Board (July 2010).

4 Personal communication – Animal Health Board (July 2010).

5 This is where scavenging pests are being controlled using secondary poisoning.

6 Not including the Chatham Islands and sub-Antarctic islands.

Regional councils

Under the Resource Management Act 1991, regional councils are responsible for maintaining indigenous biological diversity in their regions. They are also required to manage pests under the Biosecurity Act 1993. Regional councils achieve these responsibilities through:

- local regulation (e.g. regional pest management plans);
- incentive and education schemes; and
- direct (regional council-managed) control.

Where regional councils directly control animal pests, they use a combination of ground control methods and aerial application of 1080. This control reduces the impact of browsing, competition and predation by possums, and protects threatened species from other pests.

Regional councils have a combined area under sustained management of approximately 2 million hectares and control pests over about 800,000 hectares annually.⁷ In 2009, these councils reported aerial applications of 1080 that covered approximately 11,000 hectares (1.4 percent) of the estimated annual treatment area.⁸

Other land managers

Farmers and land managers (such as Land Information New Zealand) use a combination of aerial use of 1080 and other rabbit control methods (e.g. shooting, ground-laid poisons) to reduce the effects of rabbits. This is done to meet the requirements of regional pest management plans, or for production purposes.

In some areas, referred to as “rabbit-prone” land, rabbit population increases are not curbed by natural mechanisms and numbers can quickly build to high levels, causing a number of environmental effects including:

- a reduction in plant species diversity;
- an increase in the risk of erosion;
- a reduction in soil quality; and
- adverse effects on indigenous and other fauna when rabbit predators target alternative prey.⁹

There are large areas of the South Island considered rabbit-prone. Approximately 380,000 hectares are considered extremely rabbit-prone, and approximately 630,000 hectares are considered highly rabbit-prone. Most of these areas are in Otago, Canterbury and Marlborough.¹⁰ In 2009, 1080 was aerially applied for rabbit control over approximately 17,000 hectares (4.5 percent of the extremely rabbit-prone land) in areas of Otago and Canterbury.

Land managers (such as foresters) also use a combination of ground control methods and aerial application of 1080 to reduce the impact of browsing by possums in indigenous or production forests.

Application information

The pest management cycle for an area under sustained management spans several years. Every year parts of the area will be controlled with different control methods employed in each part at different times. This means that some parts of an area under sustained management will be treated by aerial application on a 5-7 year cycle, while other areas may only ever be covered by ground control methods.

Table 2 shows a comparison between the data for total treatment areas over three years (2006, 2008 and 2009). This data provides a snapshot of the sizes of the areas within the area under sustained management treated by aerial application in the current year and does not necessarily indicate a trend.

⁷ Data for regional councils as at 2006.

⁸ This does not include work done for control of rabbits on behalf of other land managers.

⁹ See www.ecan.govt.nz/advice/your-land/plant-animal-pests/managing-animal-pests/pages/rabbits.aspx

¹⁰ Lough, RS 2009. *The Current State of Rabbit Management in New Zealand* MAF Biosecurity Contract Report, Wellington.

TABLE 2: Animal Pest Control Treatment Area (000 ha)

	AHB	DOC	REGIONAL COUNCILS	OTHER LAND MANAGERS		TOTAL AREA ¹¹
				RABBIT	POSSUM	
2006 Aerial treatment area (1080)	396	127	61	–	–	580
2008 Aerial treatment area (1080)	435	133	3	16	11	600
2009 Aerial treatment area (1080)	309	174	11	17	–	510
2006 Total treatment area	5,004	136	800	–	–	5900
2008 Total treatment area ¹¹	3,630	260	–	–	–	3900
2009 Total treatment area ¹¹	3,404	430	–	2,431 ¹²	–	6300

A dash (-) signifies that there was no data available.

The Animal Health Board conducts aerial 1080 operations over a considerably larger total area, and aerially applies more 1080 than any other user (nearly twice that of the Department of Conservation). At the same time, the Board used aerial 1080 over a relatively small proportion of their total treatment area (10 percent aerial 1080 versus 40 percent for the Department). This reflects the fact that a significant proportion of the Board's treatment area includes farmland, with aerial 1080 being used in the fringes. On the other hand, the Department controls a significant proportion of pests in more difficult forested terrain.

¹¹ The size of areas treated is reported to the nearest two significant figures.

¹² Estimate based on an assumption that rabbit control takes place in land that has a rabbit-prone classification of "medium", "high" or "extremely high" (data sourced from Lough, 2009).

| 3 BEST PRACTICE GUIDANCE

In considering the use of 1080, the Authority made recommendations that management practices for aerial application be standardised around best practice to ensure national consistency and further improve the way 1080 is used.¹³

Best practice guidelines will help operators meet or exceed the mandatory controls. The guidelines will also help communities and concerned parties identify whether an operator's practices meet the expected standards.

The Authority identified two key areas as priorities for the development of best practice guidance: communication, and management.

Communication

The *Communications Guideline for Aerial 1080 Operations* was published in March 2009 and is available on our website at:

[www.ermanz.govt.nz/hs/1080resources/ERMA 1080 Guidelines.pdf](http://www.ermanz.govt.nz/hs/1080resources/ERMA_1080_Guidelines.pdf)

The guideline outlines processes for: consultation; notification; communication with various groups and individuals; recording; and handling complaints.

Monitoring adherence to these guidelines is undertaken when people apply for permission to undertake an aerial 1080 operation (see the Communication section on page 11).

Management of aerial 1080 operations

The National Possum Control Agencies (NPCA) are leading a project to develop standardised industry-wide guidelines for the management of aerial 1080 operations. A draft guideline was released for public consultation in August 2010. The NPCA expect to have the final guideline published by the end of 2010.

¹³ Environmental Risk Management Authority's Decision on the reassessment of sodium fluoroacetate (1080) and substances containing 1080: August 2007.

| 4 AERIAL PEST CONTROL OPERATIONS

This section is divided into three parts. The first provides a synopsis of the data brought together in the mandatory post-operational reporting of information about the management of an operation, including a communication overview and assessment of outcomes. The second looks at monitoring data collected. The third section provides a synopsis of the reported incidents and public concerns, and how the agencies responded.

The requirements for post-operational reporting were set out in the Authority's decision on 1080 in 2007.

Operational managers are required to submit information after an aerial 1080 operation, including:

- who undertook the operation and why;
- information about the 1080 formulations used and application rates;
- the location and size of the operation;
- monitoring information, including
 - water monitoring, if it was carried out in conjunction with the operation; and
 - species monitoring, if it was carried out in conjunction with the operation;
- an assessment of the outcomes of the operation;
- an overview of the communication activities (consultation and notification), and the outcomes of that communication;
- an overview of any incidents and complaints related to the operation, and the actions that resulted from those incidents and complaints; and
- a map of the operational area.

Individual post-operational reports are available on our website at:

www.ermanz.govt.nz/hs/1080resources/watchlistindex.html

Post-operational reports

Operation management

ERMA New Zealand received reports for 64 operations in the 2009 calendar year, covering approximately 510,000 hectares. The majority of this area was treated by the Animal Health Board (60 percent), and the Department of Conservation (34 percent). The remaining area was treated for rabbit and possum control by regional councils and other land managers.

Of the reported operations:¹⁴

- 28 were funded by the Animal Health Board;
- 18 were funded by the Department of Conservation;
- 2 were funded by regional councils; and
- 16 were funded by other land managers for rabbit control.

ERMA New Zealand also received the report for the 2008 North Waikato 2A aerial 1080 operation in October 2009, two months after the end of the statutory reporting period and outside the time for inclusion of the data in the 2008 report. This information was not included in the 2008 annual report.

There were 11 fewer aerial 1080 operations reported for the 2009 year (with 75 operations reported for 2008),¹⁵ over a treatment area approximately 15 percent smaller (510,000 hectares versus 600,000 hectares for 2008). The Department's number of aerial 1080 operations increased (18 versus 14 in 2008), but the Board's decreased (28 versus 42 for 2008). Both organisations reported a lower percentage of their total treatment areas having been controlled using aerial application of 1080. This should be taken in the context of the total area under sustained management of each organisation, and may indicate where each organisation is in their treatment cycle, rather than a change in treatment methods.

¹⁴ Several operations were reported as jointly funded by either the Animal Health Board and regional councils, or the Department of Conservation and regional councils. These are recorded against the Board and the Department respectively.

¹⁵ Including the 2008 North Waikato 2A aerial 1080 operation, which was not included in the 2008 annual report.

The 1080 formulations applied and application rates

The majority (44) of the aerial possum and/or rodent control operations reported using 1080 laced cereal baits with a concentration of 1.5 grams of 1080 per kilogram of bait. Carrot baits were used on seven possum control operations. Deer repellent was used in 10 of the possum control operations, three of which used cereal baits laced with 1080 and coated with deer repellent. All of the rabbit control operations reported using carrot baits laced with 1080, at the rate of 0.02 grams per kilogram of bait. The difference in the toxic concentration ranges between rabbit and possum baits reflects differences in susceptibility and feeding patterns of rabbits and possums.

Bait application rates for possum control operations varied between 0.25 kilograms of bait per hectare and 5 kilograms of bait per hectare, with rates for rabbit control varying between 8 kilograms of bait per hectare and 35 kilograms of bait per hectare. The difference in application rates of baits reflects differences in pest numbers and feeding patterns between target species.

Despite the differences in toxic concentrations and application rates between possum and rabbit control operations, the average application rate of active ingredient was similar for both. The average active ingredient application rate for possum control operations was approximately 3.5 grams of 1080 per hectare. It was 4 grams per hectare for rabbits. This data is comparable to that reported for 2008 (3 grams of 1080 per hectare for possum control and 5 grams of 1080 per hectare for rabbit control), with both application rates being well within the maximum allowable application rate (30 grams of 1080 per hectare).

Location of operations

The number of aerial 1080 operations in each region, and the sectors using 1080, varies depending on why the operation is being done, topography and land cover (see Table 3).

In 2009, the regions with the largest number of aerial 1080 operations were again the West Coast and Canterbury. However, the reasons for the operations differed. The West Coast has 37 percent coverage of indigenous forest, and aerial application of 1080 for possum control is considered a key tool in possum and rodent control programmes. In Canterbury, indigenous and planted forests only account for about 8 percent of the land cover, and most of the possum control is undertaken with ground control methods on farmed land. The majority of aerial 1080 operations carried out for rabbit control in Canterbury were again small in size of the area covered by each operation.

TABLE 3: Aerial 1080 operations in each region in 2008 and 2009

REGION ¹⁶	ANIMAL HEALTH BOARD		DEPARTMENT OF CONSERVATION		REGIONAL COUNCIL ¹⁷		OTHER LAND MANAGEMENT				TOTAL AERIAL OPERATIONS EACH REGION (NUMBER)		AERIAL APPLICATION EACH REGION (000 HA) ¹⁸	
	08	09	08	09	08	09	RABBIT		POSSUM		08	09	08	09
Bay of Plenty	1	1	–	–	–	–	–	–	1	–	2	1	47	11
Canterbury	1	1	1	1	–	–	9	12	–	–	11	14	26	24
Hawke's Bay	5	5	–	–	–	–	–	–	–	–	5	5	52	79
Manawatu/Wanganui	5	–	3	2	–	–	–	–	–	–	8	2	56	41
Marlborough	3	3	–	1	–	–	–	–	–	–	3	4	59	28
Northland	–	–	–	1	–	–	–	–	–	–	–	1	–	2
Otago	2	3	–	3	–	–	5	4	–	–	7	10	13	38
Southland	–	–	1	–	–	–	–	–	–	–	1	–	8	–
Taranaki	–	–	1	–	1	–	–	–	–	–	2	–	2	–
Tasman	4	2	3	2	–	–	–	–	–	–	7	4	80	64
Waikato	5	2	1	3	2	1	–	–	–	–	8	6	64	30
Wellington	1	2	–	–	–	1	–	–	–	–	1	3	3	19
West Coast	14	9	4	5	–	–	–	–	1	–	19	14	183	175
TOTAL	41	28	14	18	3	2	14	16	2	–	74	64	600	510

A dash (–) signifies no operations reported.

¹⁶ There were no aerial 1080 applications reported for the Auckland region.

¹⁷ Does not include operations co-funded with other land managers.

¹⁸ Figures for each region have been rounded up to the nearest thousand. There were 510,218 hectares treated by aerial application in 2009.

Size of operations

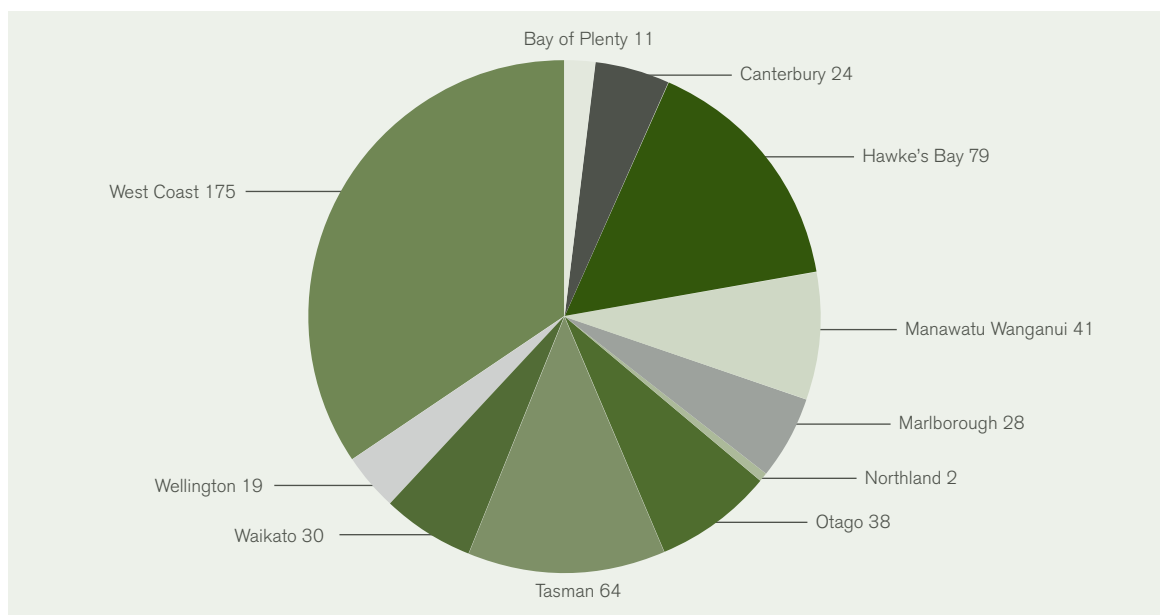
The total area of combined pest control operations carried out in 2009 is estimated to have been more than 6.3 million hectares.¹⁹ Within the 510,218 hectares treated by aerial application, the average size of aerial applications was about 8,000 hectares, with the largest application covering just over 46,000 hectares and the smallest 65 hectares. This is comparable to the sizes reported for 2008.

The size of the operation can depend on the purpose and location of the operation. The Department of Conservation and the Animal Health Board mostly carry out aerial 1080 operations to control possums and other predators over larger tracts of land. Bigger operations can increase the time it takes pest numbers to rebuild since fewer pests migrate into the heart of the treated areas. The average size of aerial 1080 applications was 9,700 hectares for the Department and 11,000 hectares for the Board.

In comparison, the average size of aerial 1080 rabbit control operations undertaken by other land managers was 1,100 hectares.

Although Otago and Canterbury had comparatively large numbers of operations, the majority were small operations for rabbit control, resulting in small total areas treated compared to other regions (Figure 1). This is consistent with the 2008 findings.

FIGURE 1: Total Area of Aerial Application in Each Region – 2009 (000 ha)



Communication

The *Communications Guideline for Aerial 1080 Operations*²⁰ provides guidance on the minimum level of communication expected for aerial 1080 operations. ERMA New Zealand expects that people planning and implementing operations follow the guideline, and that agencies assess evidence of consultation and notification when considering applications for permissions.

Good communication can reduce public concern and result in a reduction in incidents. ERMA New Zealand expects to see a high level of communication (that is consultation and notification) with neighbours, affected groups and communities to an extent that is appropriate for each operation.

Members of the public are able to advise ERMA New Zealand of their dissatisfaction with communication by operators during consultation and notification. Operators report objections as part of post-operational reporting, and agencies that have issued permissions may find non-compliances during auditing of these permissions.

¹⁹ There is an additional unknown total area for privately-funded ground-based animal pest control.

²⁰ See our website: www.ermanz.govt.nz/hs/1080resources/1080bpg.html

Concerns about poor communication were forwarded to ERMA New Zealand from operators and members of the public for four of the 64 aerial 1080 operations carried out in 2009. This is markedly less than the number reported for the 2008 operations (12), which may suggest an improvement in communication as a result of implementing best practice. It may also indicate that the complainants are going directly to other agencies, such as district councils.

A feature of the 2009 operational year was debate at the district council level. We are aware of at least three district councils (Westland, Taupo and Thames-Coromandel) that have passed resolutions to advocate for the use of different pest control methods in their districts.

Consultation with Māori groups

Māori groups should be engaged as early as possible when an aerial 1080 operation is to be carried out on public land where the ongoing management by Māori of their cultural and natural resources may be affected by the operation.

Māori stakeholders were identified as having been consulted on 84 percent (54 out of 64) aerial operations that took place in 2009. This is a marked improvement on the rate of consultation with Māori groups which was reported for 2008 (55 percent of the 2008 reports indicated consultation with them). Changes to operational plans as a result of consultation with Māori groups were not specifically identified for most operations. However, two operations included monitoring of rongoā (medicinal plant) species, and three operation reports noted that wāhi tapu were excluded as a result of consultation with Māori stakeholders.

Consultation with hunting groups

Hunting groups should be engaged as early as possible where an aerial 1080 operation is to be carried out on any public lands where hunting is prevalent and likely to be affected by an application. Early engagement of these groups is especially important in areas that are recreational hunting areas,²¹ and where commercial harvesting of animals for meat is prevalent.

Hunting groups were identified as having been consulted in 58 percent (37 out of 64) of the operations that took place in 2009. This is a marked improvement on the rate of consultation with these groups which was reported for 2008 (31 percent of the 2008 reports indicated consultation with them). Consultation with hunting groups resulted in 10 operations where deer repellent baits were used (three more than 2008), and changes to baiting strategies or timing to reduce the impact on hunting opportunities were reported in other operations.

Changes to operations as a result of consultation

Changes to operations as a result of consultation are considered an indicator of whether the consultation was effective. Fifty-five of the post-operational reports for the 2009 year included comments about changes to the operational plan as a result of consultation,²² including:

- boundary changes as a result of consultation were reported on 23 operations;
- one aerial 1080 operation (Hokitika South) was mostly replaced by treatment using other methods;
- changes as a result of concerns expressed by local iwi were reported on seven operations, including monitoring of species and exclusion of sensitive areas;
- changes to timing to allow for others to manage effects (e.g. changes to stock grazing, granting hunting permits) were reported on six operations;
- the method of pest control was changed from aerial 1080 to ground control for parts of two operations and one entire operation; and
- deer repellent was used in 10 operations.

²¹ The eight recreational hunting areas are Pureora, Kaimanawa, Aorangi, Lake Sumner, Oxford, Whakatipu, Blue Mountain and Kaweka.

²² These were not consistently reported in 2008 to ERMA New Zealand and so were not included in the last annual report.

Implementation of the ERMA New Zealand Communications Guideline for Aerial 1080 Operations

Operators are required to carry out consultation prior to applying for permission to use 1080, and to provide evidence of relevant consultation as part of the application. As of March 2009, consultation has been assessed against the *Communications Guideline for Aerial 1080 Operations* as part of an application for permission from the local Public Health Unit. Results of this assessment of consultation are reported to ERMA New Zealand by the Ministry of Health.

As this assessment process was not implemented until part-way through the 2009 year, the results are not available for all of the aerial 1080 operations carried out. The Ministry of Health reported that 46 applications for aerial 1080 operations were assessed against this guideline in the 2009 year. Of the 46 applications, 45 were assessed as meeting the requirements of the guidelines and one operator was required to undergo further consultation to meet the standard in the guideline. No permission was declined as a result of inadequate consultation in 2009.

Later investigations into complaints found deficiencies in the communication process used on two of the operations that had been assessed against the guideline. This suggests that further consideration during the assessment process may be needed in some instances. It is expected that this will improve as officers assessing permissions become more familiar with the requirements of the guidelines.

Notification issues

Notification takes place after consultation is completed. The purpose of notification is to inform affected parties of the timing, location and other relevant operational details of a 1080 operation.

Breaches of notification requirements may be found through auditing of compliance with permission conditions. Alleged breaches of notification requirements are passed onto enforcement agencies for investigation by ERMA New Zealand.

Increased auditing by the agencies that issued permissions in 2009 (and improved reporting of auditing) has resulted in deficiencies in signage being reported for more operations from 2009 than were reported for the 2008 operational year. It is likely that the increase in signage deficiencies reported is due to a higher level of detection through auditing, rather than increased operator complacency about signage.

In comparison to 2008, there was an improvement in the number of operations that had unresolved problems caused by poor communication in 2009, with no particular pattern of problems being caused by any individual organisation. The lack of clear communication in a small number of operations remains unacceptable, with a need for improvement by the agencies and operators involved. We will continue to monitor the performance of these organisations and expect to see ongoing improvement.

Monitoring

Water monitoring

Where an aerial 1080 operation includes a drinking water supply catchment, the local Public Health Unit may require water monitoring to be carried out before reconnection of water intakes. This is done to ensure that drinking water does not contain 1080 residues that breach the Tolerable Exposure Limit (3.5 micrograms of 1080 per litre of water).

Water monitoring may also be required in other water catchments as part of environmental monitoring for resource consents or research purposes. It may also be used to provide evidence of effects on water where Public Health Units are investigating concerns about alleged water contamination.

Post-operational water monitoring was carried out on 25 of the aerial 1080 operations undertaken in 2009, with 113 tests reported. The tests had a Method Detection Limit of 0.1 micrograms per litre.

Post-operational water monitoring in drinking water catchments detected 1080 on four occasions. The results ranged between 0.1 and 0.3 micrograms per litre, well below the Tolerable Exposure Limit. These areas were retested prior to reconnection of the water intakes, and no 1080 was detected at any of the sites.

There was no 1080 detected in any samples taken as part of environmental monitoring. This differs from the 2008 year, where 1080 was detected in the environmental monitoring samples, but not in the drinking water catchments.

Species monitoring

The monitoring of plant and animal species is carried out to determine the need for pest control operations and their success. Species monitoring is not required, but where monitoring is carried out, operators must report the results to ERMA New Zealand.

Pre-operational monitoring of pest species was carried out on 39 (61 percent) of the aerial 1080 operations undertaken in 2009.²³ All of the rabbit control operations were monitored prior to aerial operations. However, 11 (61 percent) Department of Conservation operations had pre-operational monitoring of pest species, and four (14 percent) Animal Health Board operations were monitored for pest numbers prior to control.

Post-operational monitoring of pest species was carried out on 43 (62 percent) of the aerial 1080 operations in 2009. For 40 operations, the operators reported meeting their stated target results for pest control.²⁴ The monitoring had not been completed on two operations, and one operation did not meet the pest control objective. In this case, weather was reported as adversely affecting the timing of the operation.

Monitoring of non-target species was carried out on 12 operations to determine the effects of 1080 on them. Species monitored included fallow deer, dogs, kea, tomtits, native trees, native snails and native birds in general. This monitoring is often done as part of research into the use of 1080, and is summarised further in the research section of this report.

Incidents and public concerns

The use of 1080 continues to attract significant public concern, and opinion remains deeply divided on its use. This section contains information on the incidents, objections and compliance issues reported to ERMA New Zealand that relate to 1080 use in operations that occurred between 1 January 2009 and 1 January 2010.

ERMA New Zealand is advised of complaints, incidents and activities associated with 1080 use in three ways:

- The public registering their concerns – a member of the public contacts ERMA New Zealand to express concerns about particular 1080 operations or related practices.
- Incident reporting – an operator or agency contacts ERMA New Zealand to express concerns about particular 1080 operations or related practices.
- Media monitoring – we learn through our media monitoring service of incidents or concerns reported in the news.

ERMA New Zealand assesses this information to determine the required response. The matter may be passed on to an enforcement agency to be investigated. When a person asks for a complaint to be noted (rather than for action to be taken) this information is filed against the operation in question for future reference.

Incidents related to specific operations are tracked and are expected to be reported in post-operational reports. The reports for the 2009 operations are available on our website at: www.ermanz.govt.nz/1080find/watchlist.aspx

A summary of the incidents and public concerns notified to ERMA New Zealand is reported in this section in order of region (north to south).

²³ This information was not consistently reported in 2008 and was not included in the last annual report.

²⁴ Target results vary based on methods of monitoring and are included in the post-operation reports available on our website: www.ermanz.govt.nz/hs/1080resources/1080bpg.html

Region: Waikato

Operation: 2009 Turangi 2B

ERMA New Zealand notified: September 2009

A member of the public contacted ERMA New Zealand and alleged that the operator (who was applying 1080 on the day) was in breach of a court injunction that he had applied for to stop the operation occurring. The allegation was followed up with the operator and the district court. The information provided by both the operator and officers of the court was that the areas subject to the proposed injunction had been excluded from the operation. The complainant was informed of this.

Operation: 2009 Turangi 2B

ERMA New Zealand notified: September 2009

ERMA New Zealand was informed that a member of the public had removed baits from an application area and was in possession of 1080 without a Controlled Substances Licence (CSL). The person had previously made threats that, if the operation went ahead, they would remove baits and use them to poison people. The baits were subsequently surrendered to a person authorised to possess the 1080 (a contractor who was a CSL holder). The police investigated the matter, but no further action was taken.

Operation: 2009 Whenuakite

ERMA New Zealand notified: September 2009

A member of the public contacted ERMA New Zealand and expressed concern about the potential for contamination of drinking water. ERMA New Zealand provided the complainant with the requested information on human toxicity and the controls around use. The complainant was also advised to contact the Public Health Unit (the agency responsible for imposing further conditions on the operation to protect public health) if they considered that additional conditions needed to be imposed.

Operation: 2009 Whenuakite

ERMA New Zealand notified: September 2009

Protestors entered a loading site on private land in an attempt to stop the operation. The protestors disrupted the loading from the site, but the operator loaded the aircraft from an alternative site. As a result of the disruption, some of the area had to be treated using alternative methods. Police investigated the actions of the protestors during the incident, but no further action was taken.

Operation: 2009 Turangi 2B

ERMA New Zealand notified: October 2009

A member of the public alleged that, following heavy rain in the catchment, baits were found in a stream which was the source of the public water supply. An enforcement officer of the local Public Health Unit investigated the allegation and took water samples for analysis. No baits were found and water sampling upstream of the intake did not detect 1080. The complainant was notified of the outcome.

Region: Hawke's Bay

Operation: 2009 Kereru – Whakarara

ERMA New Zealand notified: April 2009

A farmer inspected an area that had been treated with 1080 and did not find bait. He then proceeded to restock the area without checking with the operator that the area was safe. On return to the area he discovered one sheep had died and two others looked sick. He removed the two sheep, one of which subsequently died. The contractor subsequently took bait samples from the treatment area to determine when stock could safely graze the forest. When the area was safe, authorisation was given for the stock to re-enter the area. Reports were filed with the appropriate agencies and the matter was settled between the parties.

Region: Tasman

Operation: 2009 Goulard Downs – Kahurangi Point

ERMA New Zealand notified: July 2009

Members of the public objected to a proposed operation on the basis of the potential to contaminate water in the treatment area. They also asked for deer repellent to be used. The operator responded to the complainants, explained the measures put into place to protect public safety, and gave the complainants a copy of the funding agency's deer repellent policy.

Operation: 2009 Goulard Downs – Kahurangi Point

ERMA New Zealand notified: October 2009

A member of the public removed several baits from a walking track in a treated area and took them to a public meeting. The police warned the person that she was not allowed to possess the baits without a Controlled Substances Licence. She subsequently surrendered the baits to the local Department of Conservation office. The person later alleged that the operator was in breach of the permission conditions and that signage was not present. The allegations were investigated by an enforcement officer of the local Public Health Unit who did not find any non-compliance. The officer responded to the complainant.

Region: Nelson

Operation: 2009 Waihopai Spray

ERMA New Zealand notified: July 2009

A farmer contacted ERMA New Zealand and raised concerns that he had not received the muzzles and emetic pills which the operator had agreed to supply prior to the operation to protect the farmer's dogs. ERMA New Zealand contacted the operator, who replied that he had been trying to get hold of the farmer. The contractor subsequently contacted the farmer and the equipment was supplied.

Region: West Coast

Operation: 2009 Reefton

ERMA New Zealand notified: January 2010

ERMA New Zealand received a phone call from a farmer who stated that four of her sheep had died with no clear cause of death, but that she suspected they were poisoned by a 1080 operation in the adjoining block. The allegations were passed to an enforcement officer of the local Public Health Unit for investigation. The investigation concluded that the 400 metre buffer zone between the operational area and the block had been observed, and there was no public health risk and no breach of the permit conditions. The complainant was advised of the outcome of the investigation.

Operation: 2009 Rough River Craigieburn

ERMA New Zealand notified: May 2010

A report from an enforcement officer from a Public Health Unit advised that a member of the public had complained that his leg had sunk into the ground while he was deer hunting. When he pulled his leg out of the hole he discovered that there was cut carrot buried in the ground and he was concerned that it may have been treated with 1080. An investigation by the officer found that the carrots were untreated chaff and did not contain 1080. No non-compliance was found.

Operation: 2009 Upper Ahaura

ERMA New Zealand notified: June 2009

A member of the public who farmed land adjoining an aerial 1080 operation contacted ERMA New Zealand and alleged that two of her cows had died as a result of drinking water from a stream that flowed out of the treatment area. Water tests were conducted which did not detect 1080. An autopsy was carried out on the cows, which found tutu leaves in the stomach and 1080 residues in the meat of one cow. The veterinarian's report concluded that

the most likely cause of the poisoning was bait ingestion and there were signs of cattle having been in the treated area. However, the farmer disputed that her cows would have wandered into the area. The parties did not reach agreement on a mutually satisfactory outcome and the matter remains unresolved.

Operation: 2009 Reefton North and South

ERMA New Zealand notified: August 2009

A member of the public contacted ERMA New Zealand and alleged that an operator was going to be in breach of a resource consent condition which limited the number of aerial applications that could be carried out under that consent. The complainant was advised to address their concerns to the council that issued the consent (the West Coast Regional Council). The Council advised ERMA New Zealand and the complainant that they did not consider the application to be a breach of the conditions of the resource consent.

Region: Otago

Operation: 2009 Mt Allan

ERMA New Zealand notified: June 2009

A member of the public contacted ERMA New Zealand and alleged that the operator was going to apply 1080 onto a private forest (owned by a third party) without the consent of the landowner. The operator responded to ERMA New Zealand and the complainant that they did have the landowner's consent.

Operation: 2009 Dart and Caples

ERMA New Zealand notified: August 2009

A report was received from an operator of an over-flight which resulted in an application outside the intended area. The misapplication was reported to the appropriate agencies and an investigation was carried out. As a result, the operator amended their operating procedures and contracts with pilots to ensure that the actions that caused the over-flights will not be repeated.

Operation: 2009 Awakino Station Kurow Hill

ERMA New Zealand notified: January 2010

ERMA New Zealand received a complaint about a 1080 operational report on the ERMA New Zealand website. The complainant alleged that the information was not correct in that she was an adjoining landowner (to an aerial 1080 operation) and received no notification of the operation. The allegations were passed onto an enforcement officer of the local Public Health Unit for investigation. The investigation concluded that the operator had met the notification requirements, but had not met a condition on the permission concerning provision of information. The enforcement officer gave the operator a written warning for breaching the condition.

Operation: 2009 Mt Allan

ERMA New Zealand notified: February 2010

An enforcement officer of the local Public Health Unit received a request for information from a member of the public concerning the Mt Allan operation. The officer sought further information from the operator in order to answer the person's questions. This information showed that the operator had altered the boundaries of the operational area after the permission was granted and included a significant area for treatment for which no permission had been granted. The operator had not informed the Public Health Unit or sought a change to his permission to include the area. The alleged non-compliances were investigated by the enforcement officer and the operator was found to be in breach of several of the requirements for the operation. The enforcement officer gave the operator a written warning.

| 5 RESEARCH

In its 2007 decision on the reassessment of 1080, the Environmental Risk Management Authority stressed the importance of more research into the adverse effects and alternative methods of pest control. The decision also sought government support to develop a research programme.

This section provides information on research related to 1080 use that occurred prior to July 2010. There are three distinct areas of research:

- alternatives to the use of 1080;
- improvements to the use of 1080; and
- other research related to 1080 use.

Many of research projects are ongoing, as the collection of data over an extended period will be necessary to draw informed conclusions. We have prefaced the title of each research project in the following section with the words "New" or "Update" to indicate whether the project started in the period covered by this report, or a previous one. A summary of the projects is in Table 4 (below).

TABLE 4: Summary of research projects in this section

	NEW PROJECT	PROJECT UPDATE
Alternatives to the use of 1080 (12 new, 23 updates)		
Alternative toxins		
<i>Extending the use of toxins already in use in New Zealand</i>	4	10
<i>Seeking registration in New Zealand for toxins currently used overseas</i>	4	4
<i>Consideration of new toxins</i>	3	4
Biocontrol	1	3
Trapping		1
Vaccines		1
Improvements in the use of 1080 (10 new, 10 updates)		
<i>Reducing amounts of 1080 used</i>	4	2
<i>Effects on non-target species of the use of deer repellent</i>	1	1
<i>Effects of aerially applied 1080 on bird populations</i>	5	2
<i>Effects of possum control on trees</i>		4
<i>Local elimination</i>		1
Other research (6 new, 5 updates)		
<i>Animal welfare</i>	2	1
<i>Small mammal control</i>	1	
<i>1080 related social research</i>	2	
<i>Modelling concentrations of 1080 in water following aerial application</i>		2
<i>Effects on rongoa Māori</i>	1	2

For more information about these research projects, see:

- Animal Health Board: <http://tbfree.ahb.org.nz/Default.aspx?tabid=117>
- Department of Conservation: www.doc.govt.nz/publications/science-and-technical/products/series/doc-research-and-development-series/archive/
- Connovation Ltd: www.connovation.co.nz/
- Landcare Research: www.landcareresearch.co.nz/publications/newsletters/possnews/

Alternatives to the use of 1080

This section includes research into the use of alternative toxins, biocontrol agents, new traps and vaccines.

Research on alternative toxins

This research can be divided into three sections: extending the use of toxins already in use in New Zealand; seeking registration in New Zealand for toxins currently used overseas; and consideration of new toxins.

Extending the use of toxins already in use in New Zealand

Update: Cholecalciferol – an alternative to 1080 for aerial application?

AHB ref: R-50691 and R-50691-01

An outcome of the 2008 Animal Health Board project (R-50691) was that cereal baits containing cholecalciferol ('KOLEE') were considered to be possible suitable alternative to 1080 for aerial application. Then Project R-50961-01 sought to assess efficacy of a new bait containing cholecalciferol in order to gain formal registration for the bait.

A registration application for the bait has been made to the New Zealand Food Safety Authority. ERMA New Zealand has been consulted about the potential for a reassessment of cholecalciferol to allow for aerial application, but no application has yet been made.

New: Optimising the combination of cholecalciferol and aspirin

AHB ref: R-10657-02

Contracted by: Animal Health Board

Carried out by: Landcare Research

The project aims to improve the use of cholecalciferol for possum control by establishing the minimum concentration that, in combination with a synergist and masking additives, is palatable and effective. The efficacy data obtained here and in a previous study suggest that, when delivered in paste bait, minimum doses of 13 milligrams per kilogram of cholecalciferol combined with 1,500 milligrams per kilogram of synergist are required to kill all possums. This combination is potentially cost-effective and is expected to be more humane. It is also deemed likely to have low risks of environmental contamination and non-target poisoning.

New: Completing registration of a new chronic poison

AHB ref: R-60663-01

Contracted by: Animal Health Board

Carried out by: Pest-Tech Ltd

Researchers tested cholecalciferol combined with coumatetralyl (C+C) bait on invertebrates (weta, honeybees and earthworms). Papers have been prepared on the risk of the bait to indigenous flora and fauna and human health, and dossiers submitted to the New Zealand Food Safety Authority for a pre-screen. Once this is finished, application for approval will be submitted to ERMA New Zealand.

New: Low dose cholecalciferol bait for possums and multi-species control

AHB ref: R-80706

Contracted by: Animal Health Board

Carried out by: Connovation Ltd

About demonstrating that a new formulation of Feracol, containing a lesser amount of cholecalciferol, kills possums effectively and humanely. The project will follow New Zealand Food Safety Authority guidelines for establishing efficacy, and includes cage and field trials.

Update: Environmental fate of toxicants used for mouse, rat and possum control

DoC ref: 3863

About determining toxin breakdown of baits containing diphacinone (RatAbate Paste) and coumatetralyl (Racumin Paste) and estimating potential risks to non-target species. A report is now in a draft stage and is expected to be completed in late 2010.

Update: Diphacinone and coumatetralyl persistence in deer

DoC ref: 4128

Information was gathered about effects on deer from residues of sub-lethal doses of diphacinone and coumatetralyl. Three deer were then sub-lethally dosed with diphacinone and three with coumatetralyl. Research is now complete and results are undergoing peer review. A paper will be submitted to a journal before the end of 2010.

Update: Diphacinone persistence in livestock

DoC ref: 4029

Researchers gathered information about the potential residues of diphacinone in non-target species. Ten pigs and five cattle were sub-lethally dosed with diphacinone. Residue analysis has been completed and results are undergoing peer review. A paper will be submitted to a journal before the end of 2010.

Update: Extending the registration of Feratox to include the control of wallabies

DoC ref: DM 211555

This aimed to provide data to support registration of Feratox as an alternative to 1080 for dama wallaby control. Feratox has now been registered for this control.

New: Extending the registration of Feratox to include the control of Bennett's wallabies

Contracted by: Connovation Ltd in association with Ecan

Carried out by: Connovation Ltd and Ecan

Researchers sought to provide data to support registration of Feratox as an alternative to 1080 for Bennett's wallaby control. Field work was completed May-June 2010. Registration documents were to be filed with the New Zealand Food Safety Authority in August-September 2010.

Update: Cyanide pellets for the control of ferrets

AHB ref: R-80690

About providing data to support an application to extend registration of cyanide pellets for control of ferrets. First field trials were completed in June 2010 and additional trials are planned with the new ejector for January-March 2011.

Update: Cyanide pellets for the control of feral pigs

AHB ref: R-80689

About providing data to support an application to extend registration of cyanide pellets for control of pigs. Researchers had limited success in field trials with the baits and a new delivery system will be trialled.

Update: Updated toxicology review paper on 1080

AHB ref: R-80704

A toxicology review paper was submitted to the *NZ Journal of Ecology* 35(1), and a publicly available and accessible short article was to be written.

Update: Low dose cholecalciferol baits for possum control

AHB ref: R-80706

Cage and field trials of low dose cholecalciferol baits were carried out with possums in 2010 to provide safety and efficacy data. High kill rates were achieved with 0.4 percent cholecalciferol. A registration dossier was to be filed with New Zealand Food Safety Authority in July-September 2010.

Update: Establishing baseline concentrations of cholecalciferol in animals

Department of Conservation

About establishing baseline levels of cholecalciferol in animals in order to distinguish between natural concentrations and any raised concentrations in poisoned non-target species. A publication will be submitted to a journal before the end of 2010.

Seeking registration in New Zealand for toxins currently used overseas**Update: Registration of micro-encapsulated zinc phosphide (MZP) for possums**

AHB ref: R-60628

Public notification has occurred and ERMA New Zealand is evaluating the application.

Update: Cereal bait with zinc phosphide for possums

R-60628-02

The aim was to develop cereal baits using MZP and getting them registered for use in New Zealand. A suitable multi-species bait has been identified and tested. "Shatter" tests show bait to be more resilient in a sowing bucket than No.7 cereal (ACP, Wanganui) as an industry standard. Pilot batches of solid bait containing MZP have been formulated. Efficacy is considered to be high for possums, rats and mice.

New: Developing cereal bait containing zinc phosphide for possum control – field efficacy and registration dossiers (Stage 2)

AHB ref: R-60628-03

Contracted by: Animal Health Board

Carried out by: Pest-Tech Ltd

About systematically assessing the efficacy of cereal baits containing zinc phosphide for controlling possums, and finalising registration dossiers. This is a follow-up from Animal Health Board project R-60628-02.

Update: Smart pest control

Foundation for Research Science and Technology

A new solid bait material with improved acceptability to multiple species (possums, rats and mice) has been created. Bait has been trialled with new formulations of the toxicants zinc phosphide, cholecalciferol, and coumatetralyl with cholecalciferol (C+C). A cost-benefit analysis of conventional aerial control versus ground control methods has been completed, which showed that ground control is becoming increasingly cost-effective. This research contract was completed in September 2009. Further research is needed if registration of baits will be considered.

New: Registration of a new chronic poison

Ref: AHB R-60663-02

Contracted by: Animal Health Board

Carried out by: Pest-Tech Ltd

About providing data to support an application for registration of a new chronic poison. Bait stability trials showed the active ingredients in coumatetralyl with cholecalciferol (C+C) bait were stable during six months' shelf-life at room temperature. Risks to birds were determined with chickens, ducks and greenfinches. The bait posed negligible risk to large birds and a low risk to small passerines. The secondary poisoning risk to dogs, evaluated by feeding carcasses of possums poisoned by C+C bait to dogs, was considered to be low.

Consideration of new toxins

This research covers the innovation of new toxins as alternatives to 1080.

Update: PAPP trials – an alternative control toxin for cats and stoats

DoC ref: 3932

Applications for registration of the new red blood cell (RBC) toxin PAPP for control of stoats and feral cats were made to the New Zealand Food Safety Authority and ERMA New Zealand in 2009.

Update: Humane red blood cell toxins for possums

AHB ref: R-80701-01

Caged trials of new toxins that are humane and do not cause secondary poisoning of dogs have been successfully completed and field trials are scheduled for July-September 2010. Research is ongoing, and dossiers for registration with the New Zealand Food Safety Authority and approval by ERMA New Zealand are being prepared.

Update: Humane red blood cell toxins for feral pigs

Regional councils and Connovation Ltd

Pen trials of new toxins for feral pigs that are humane and do not cause secondary poisoning of dogs have been completed and efficacy data was obtained. Pen, enclosure and field trials with radio-collared animals were completed in 2009/10. Registration dossiers were filed for pre-application screening in August 2010.

Update: Humane red blood cell toxins for rodents

Connovation Ltd

The research is ongoing and some candidate rodenticides have been identified.

New: Death by chocolate

AHB ref: R-80707

Contracted by: Animal Health Board

Carried out by: Connovation Ltd

Chocolate, methylxanthines and/or caffeine did not prove humane or effective for possum control. This project was completed in 2010.

New: Natural plant toxin for pest control

AHB ref: R-80728

Contracted by: Animal Health Board

Carried out by: Connovation Ltd

About the feasibility of using a natural plant toxin in New Zealand possum control operations. This project was completed in 2010 and a report provided to the Animal Health Board.

New: Pest control for the 21st century

FRST: LINX 0902

Contracted by: FRST

Carried out by: Lincoln University and collaborators

Research in this programme will enhance stoat and rodent control. It targets a new generation of rodenticides based on methaemoglobinaemia, natural toxins and carbon monoxide releasing molecules; and seeks to extend the utility of PAPP with re-setting tunnel delivery systems for stoats and new baits. Researchers are helping with the registration for PAPP through the New Zealand Food Safety Authority and ERMA New Zealand.

Biocontrol

Two streams of work were being carried out by the National Research Centre for Possum Biocontrol (NRCPB): one focused on agents that affect fertility in possums and the other on the development of possum-specific toxins. The four-year programme finished in October 2009.

More information can be found online at: <http://possumbiocontrol.agresearch.co.nz/>

Update: Susceptibility of South Island possums to W6 virus infection

AHB ref: R-30638-01

Researchers tested the possum enterovirus W6 strain on South Island possums. Further trials were planned, but to date none have been conducted.

Update: New possum-specific toxins

AHB ref: R-30553-04 and R-40553-05

Researchers sought to find a possum-specific toxin that does not affect other species. They are investigating compounds that induce the secretion of water across intestinal tissue in possums, an effective way of killing animals very quickly. Later research included screening more than 90,000 compounds for their ability to switch on one of the transporters involved in secretion in possums. This identified 987 compounds with potential. A secondary dose-response screening identified the 45 best bet compounds, 10 of which have been used in an array of in vitro tests. All show high potential for use as toxins. Programme funding ended 30 September 2010.

Update: Mobile element mediated transgenesis in nematodes

AHB ref: R-80717

About developing a nematode to use as a vector to deliver a biocontrol agent to possums. Further work was planned, but this project is no longer funded.

New: Possum fertility control

FRST ref: C10X0501 OBI 10051-ECOS-AGR

Contracted by: Foundation for Research Science and Technology

Carried out by: Landcare Research

Fertility control vaccines have been developed and trialed, and shown to stimulate antibodies against egg-coat protein antigens in female possums. The results are promising, but not of sufficient efficacy for field use as fertility-control agents in wild possum populations. Further improvements are required.

One option is to use a virus as a non-transmissible vaccine vector. The suitability of a vaccinia-based vaccine as a delivery system for fertility control in possums is being assessed.

Several compounds are being researched as chemosterilants. 4-vinylcyclohexene diepoxide (VCD) is known to be effective without any known side effects in rodents, cats and dogs but its effect on marsupials has not been investigated. Research to determine the effects of VCD and related compounds on egg populations in possum ovaries is now in progress.

The future of the research programmes on possum reproductive control is uncertain as funding for the Possum Biocontrol Outcome Based Investment ceased on 30 September 2010.

Research into new methods of trapping

New traps may reduce the need for aerially applied 1080 to control rats and stoats.

Update: Self-setting stoat and rat trap

Department of Conservation

The trap design is still being developed before undergoing more animal trials.

Research into possum vaccines

Possums are the primary wildlife reservoir of TB in New Zealand. They are controlled on areas of forest that border farmland to prevent transmission of TB to livestock. The following project looked at whether a vaccinated buffer of immunised possums could act as a "social fence" that could prevent the movement of infected possums to farmland.

Update: Vaccinated buffers for managing possums in forest areas

AHB ref: R-10699

A trial carried out to explore using vaccination of possums for creating buffer areas was completed in 2009 and has been published in *Wildlife Research* 37: 283-292. See:

www.landcareresearch.co.nz/publications/newsletters/posnews/kararehekino14.pdf

Improvements in the use of 1080

Reducing amounts of 1080 used

When baits containing 1080 are applied aerially, a broadcast pattern is typically used to spread bait uniformly across the treatment area. Ongoing research and the use of GPS technology have reduced the amount of bait used from 25 kilograms per hectare in the late 1970s to as low as 2 kilograms per hectare using current methods.

Update: Achieving multi-pest control by pre-feeding with non-toxic baits

DoC ref: 3884 and 4914

The first project about studying the effects of pre-feeding on possums and ship rats was completed in June 2009 and replaced by DoC 4914. This showed pre-feeding ensures effective control of ship rats and low rates of pre-feeding (200 pellets per hectare) were equally as effective as high rates (400–1,000 pellets per hectare).

Recovery of rat populations after aerial 1080 in spring 2009 was slow at beech forest sites. Aerial 1080 provided a very high level of mitigation of the rat risk arising from the 2009 beech mast. Post-plague crashes in rat and mouse populations are now beginning to occur, signalling the end of the effect of the 2009 beech mast.

Measurement of rat and mouse population growth rates is ongoing at around 20 sites around New Zealand.

Predator management has occurred at some sites, but not all. Data is being used to build computer models that can be used by site managers to help them design predator management programmes.

Update: Effect of pre-feeding and 1080 concentration on bait acceptance by house mice

DoC ref: 3889

Trials with captive, wild-caught mice found that they can rapidly identify food containing toxic concentrations of 1080 and will then avoid it. Pre-feeding mice on non-toxic food did not increase their subsequent acceptance of toxic bait. The study has been completed and published: Fisher P, Airey A, Brown S 2009. Effect of pre-feeding and sodium fluoroacetate (1080) concentration on bait acceptance by house mice. *Wildlife Research* 36: 627-636.

New: Better aerial baiting systems and strategies

AHB ref: R-10727

Contracted by: Animal Health Board

Carried out by: Landcare Research

A prototype sowing bucket for aerial GPS-controlled baiting at low application rates was designed, manufactured and field tested. It is able to sow small clusters of bait at predetermined intervals along flight paths, allowing precise application at very low rates. Preliminary results from testing at operational scales indicate high possum and rat kills using just 0.25 kilograms per hectare of 1080 cereal bait. Final results will be available in late August 2010. Further trials are planned for later in 2010.

New: Effect of rat interference on possum kill during aerial 1080 poisoning

AHB ref: R-10729

Contracted by: Animal Health Board

Carried out by: Landcare Research

The project aimed to determine whether the presence of high rat numbers reduces the percentage of possums killed when 1080 bait is aerially applied at much lower rates than current practice. In four areas, rat populations were experimentally reduced by 16-75 percent to test whether possum kills would be highest in the area with the fewest remaining rats. However, after aerial 1080 poisoning at just 0.25 kilograms per hectare, no possums were detected in any block. A second replicate is planned for 2011.

New: Can thermogenic compounds mitigate welfare costs in possums poisoned with 1080 by decreasing time to death?

AHB ref: R-10723

Contracted by: Animal Health Board

Carried out by: Landcare Research

Laboratory trials were undertaken to determine whether oral co-administration of thermogenic compounds could improve the welfare of possums during 1080 poisoning by decreasing signs of illness or time to unconsciousness and death. One of three compounds tested produced significant increases in possum metabolic rate within a suitable time, and a significant reduction in the time to death. Trials are ongoing to investigate the palatability and efficacy of this compound as a potential low-cost additive to 1080 baits. Results are expected in April 2011.

New: Mouse behavioural resistance to 1080

Contracted by: Foundation for Research Science and Technology

Carried out by: Landcare Research

Current formulations of 1080 pellets only achieve ~25 percent mortality in lab trials with wild-caught mice. Bait shyness and associated low mortality is due to an early sub-lethal effect of 1080. Trials are being carried out to test whether a micro-encapsulated 1080 formulation will delay absorption so that mice will eat a lethal dose. Data from an initial trial based on a non-toxic micro-encapsulated material confirmed that this material does not impair palatability or affect uptake compared to the RS5 pellets alone. Further trials are planned to confirm whether formulation may offer a way of "hiding" 1080 long enough for mice to ingest a toxic dose. The trials will also test whether pre-feeding with a non-toxic formulation does anything to boost ingestion of 1080 when offered.

Effects on non-target species of the use of deer repellent

The following two studies were used to assess the impact on non-target species of adding EPRO Deer Repellent (EDR) to cereal baits containing 1080. Based on information provided by earlier studies, the Authority approved the use of EDR on cereal baits in April 2009.

Update: Registration of deer repellent baits

AHB ref: R-10697

This project, established to gather data to support an application for the registration of deer repellent, was completed in late 2008 and published in 2009 (*NZ Hunter Magazine* 13: October 2009).

New: Effectiveness of deer repellent in preventing livestock from eating carrot and cereal baits

AHB ref: R-10708

Contracted by: Animal Health Board

Carried out by: Landcare Research

Pen testing was carried out with sheep and cattle to determine the palatability of fresh and weathered non-toxic carrot and cereal possum baits treated with EDR. Cattle were not repelled, but sheep were, so a field trial including toxic bait was carried out with sheep. Seven sheep ate non-repellent carrot bait and died, but no sheep were killed in the block using EDR-coated baits. The conclusion was that deer repellent could be used to reduce the by-kill of sheep. It was recommended that EDR-coated 1080 baits should be used if a significant risk of sheep by-kill exists. Where carrot baits are used for possum control, inclusion of EDR is expected to reduce the likelihood of sheep consuming toxic quantities of carrot bait they encounter. This project has been completed and results reported to the Animal Health Board.

Effects of aerially applied 1080 on bird populations

Research is being done to determine ways of reducing effects on birds and find out long-term effects on populations.

Update: Effects on kea populations

AHB ref: R-80716, DoC ref: 4012

Kea were radio-tagged at different sites throughout the South Island and monitored throughout 1080 operations. Preliminary results showed no mortality of radio-tagged birds after an aerial 1080 operation at Mt Arthur. The Department of Conservation's Pesticides Advisory Group has adopted the recommendation from this study that all 1080 baiting in kea areas should follow the rules used at the research sites where 23 kea survived aerial baiting in 2009. A compulsory performance standard has been issued to this effect.

In July-August 2010, the onset of the kea breeding season, the benefits to kea arising from aerial 1080 predator control will be measured.

The next sample of radio-tagged kea to be tracked through aerial baiting is at Okarito. An aerial operation is likely to go ahead in spring 2011, as rimu masting is predicted for autumn 2011. The operation has been on hold for two years, awaiting an increase in rodent numbers to ensure a good stoat kill and provide benefit to rat-sensitive native species as well as kiwi.

Update: Operation Ark

DoC ref: 3815

This project looked at whether one-off aerial 1080 baiting in past years controls rat and stoat plagues, and improves the nesting success and survival of mohua (the yellowhead) and yellow-crowned parakeets.

In 2009/10 mohua nesting success was monitored during aerial 1080 operations in the Catlins and the Dart Valley in Otago, which were undertaken specifically to control rats for the benefit of mohua. Dramatic reductions in rat abundance and dramatic increases in mohua nesting success were recorded.

Survival of yellow-crowned parakeets was monitored through a 1080 operation near Springs Junction in Westland, undertaken to control rats and possums and protect biodiversity. None of the monitored 48 nesting parakeets died.

New: Safety of use of pre-feed in aerial 1080 possum control for tomtit populations

DoC ref: 4140

Contracted by: Department of Conservation

Carried out by: Department of Conservation

This project, scheduled for spring 2010, will monitor tomtit survival during pre-feed operations. Bird counts will be conducted before and after 1080 operations. Moreporks and kaka will also be fitted with radio transmitters and monitored using fixed-wing aircraft.

New: Ecological outcomes for birds of aerial 1080 baiting for pest control

DoC ref: 4116

Contracted by: Department of Conservation

Carried out by: Department of Conservation

Bird population dynamics will be monitored at three sites where predators are controlled by aerial 1080 application. Bird populations will be measured using song recorders and five minute call counts. Focal species will be rifleman and possibly kaka. This project is scheduled for spring 2010.

New: Protocols for and priority list of data deficient bird species for 1080 mortality studies

DoC ref: 4143

Contracted by: Department of Conservation

Carried out by: Department of Conservation

Department of Conservation staff have developed protocols and priorities for quantifying bird mortality during an aerial 1080 operation.

New: Bird repellents for 1080 baits

AHB ref: R-10719

Contracted by: Animal Health Board

Carried out by: Landcare Research

Anthraquinone and d-pulegone are two compounds that show promise as repellents that can be added to 1080 baits to stop kea from eating them. This project aimed to validate/establish analytical methods for both compounds in bait material. It was completed in February 2010 and a report submitted to the Animal Health Board.

New: Long-term benefits of 1080 operations on South Island tomtits

AHB ref: R-80572-01

Contracted by: Animal Health Board

Carried out by: Ecological Networks Ltd

The aim of this project was to determine the conservation benefit of a 1080 possum control operation on a non-target bird species, the South Island tomtit (*Petroica macrocephala macrocephala*) over several seasons, including a season where poison-based pest control occurs.

Effects of possum control on trees

The Department of Conservation is researching when and where control of possums is most beneficial for the protection of native forests.

Update: Effects on kamahi

DoC ref: 3886

Data analysis showed more heavily possum-browsed trees had lower growth rates and lower foliage cover. They had much higher chance of death than trees with more healthy-looking canopies. Analyses have been incorporated into a draft manuscript to support a model of possum foliage consumption and a paper has been accepted by *Austral Ecology*.

Update: Meta-analysis of the tree canopy

DoC ref: 3811

This long-term project helps the Department make decisions on which possum control regime to use. Results suggest that both proportional foliar cover and the current level of browse by possums are adequate indicators of potential tree mortality. However they should only be used in combination to decide when to control possums, with areas with low foliar cover and high browse levels requiring the most urgent attention. This project was completed in 2009 and is being prepared for submission to a journal in 2010.

Update: Quantifying gains in natural character

DoC ref: 3670

The project compares condition of plants at sites subjected to infrequent possum control (4-7 year frequency), no control, and frequent possum control. Preliminary data from the three study sites (Coromandel, Haast and Northern Urewera) indicate high mortality for some palatable tree species at some sites. Demonstration of 1080 treatment effects, or association with possum abundance, will depend on more detailed analysis. No apparent effects have been seen on the mortality of unpalatable tree species.

Local elimination: tracking and ground control as an alternative to repeat aerial sowing of 1080

Update: Local elimination

AHB ref: R-10669

This project sought to reduce aerial 1080 sowing by researching other ways to check whether possums have been eliminated from an area. It assessed: the effects of pre-feeding; whether more localised baiting regimes could replace repeated 1080 broadcast sowing operations; and the use of long-life cholecalciferol gel baits for perimeter control. Results included:

- Pre-feeding appears effective. Modelling suggests pre-feeding during aerial 1080 poisoning will usually be cost-effective over a 30-year timeframe because fewer repeat operations are likely to be needed.
- Broadcasting can cause fragmentation of bait. Reducing the spinner speed (or removing the spinner altogether) reduces fragmentation, which in turn reduces the risks to non-target species.
- Gaps of up to 120 metres between baited areas pose little risk of not exposing possums to pre-feed or toxic bait, which could reduce the sowing rates required.
- For areas where aerial 1080 cannot be used, and which are accessible on foot, cyanide and cholecalciferol can be used successfully to reduce possum numbers, albeit at a higher cost.

A ground-based detection and mop-up strategy potentially provides an alternative to aerial 1080 poisoning for areas accessible on foot and where possum numbers are already low. This strategy is currently limited by low success in killing possums at detection sites. This four-year study is now complete and results will be reported to the Animal Health Board in 2010.

Other research

Update: Movement behaviour of 1080 poisoned possums

AHB ref: R-10703

1080-poisoned possums moving outside a poison operation are a risk for dogs and other non-target species. The movement of poisoned possums was tracked by fitting them with radio transmitters. Their movements appeared to be more influenced by population density and habitat than by ingestion of poison. This project was completed in July 2009.

New: Welfare of wild deer – where does 1080 poisoning sit on a relative scale of welfare impact?

AHB ref: R-10722

Contracted by: Animal Health Board

Carried out by: Landcare Research

This research aims to help dialogue about the humaneness of 1080 poisoning in deer, and its acceptability relative to other causes of mortality in deer. Observational and physiological data from farmed red deer is being collected and interpreted. A welfare assessment will be made based on the specific nature, extent and duration of poisoning effects.

New: How humane are our pest control tools?

Ref: Agreement 11326

Contracted by: Biosecurity New Zealand

Carried out by: Landcare Research and Massey University

A recently-developed Australian model is being used to rank the relative welfare impact of vertebrate toxic agents (VTAs), including 1080, on targeted pest animals and some non-target mammal species. Relevant data was collated from scientific and technical literature to provide reference material for an assessment panel comprising scientists with expertise in animal welfare, veterinary medicine, pest management and toxicology. They applied the model and produced a ranking assessment of VTAs by species. They also identified gaps in existing knowledge about the welfare impact of pest control tools. A report of the findings was submitted to Biosecurity New Zealand in July 2010.

New: Small mammal control

Contracted by: Foundation for Research Science and Technology

Carried out by: Landcare Research

The objectives of this programme are two-fold: first, to determine what application of bait (amount, frequency and distribution) reliably controls rabbits at least cost; and second, how conventional rabbit control can be integrated with rabbit hemorrhagic disease (RHD) to develop effective integrated pest management. This is part of a six-year Foundation-funded programme started in October 2009, and field work is just starting. A bibliography of all relevant rabbit literature (published and unpublished) was developed and will be publically available at www.landcareresearch.co.nz/ by the end of October 2010.

New: Assessment of submissions to ERMA

DoC ref: 4138

Contracted by: Department of Conservation

Carried out by: Corydon Consultants Ltd

Using submissions to ERMA New Zealand by people opposing use of 1080, researchers identified the risks that cause concern and checked whether they are covered by research and information from agencies using 1080. This project is completed and a manuscript has been submitted to the *Journal of the Royal Society of New Zealand*.

New: Fluoroacetate in tea – a source of human exposure?

AHB ref: R-10724

Contracted by: Animal Health Board

Carried out by: Landcare Research

Researchers will evaluate existing data on fluoroacetate levels in tea and compare them with updated acceptable levels for exposure. They will also measure the concentration of fluoroacetate in commercially available tea products, and interpret the findings in the context of risk assessment of sub-lethal human exposure to fluoroacetate.

Modelling the probable concentrations of 1080 in water following aerial 1080 drops

In its 2007 decision on 1080, the Authority recommended that research be undertaken into water biodegradation. The Animal Health Board considered that any effects of dilution far outweighed any biodegradation effects. It contracted the National Institute of Water and Atmospheric Research (NIWA) to take an alternative approach to the issue, modelling the levels of 1080 that may get into drinking water supplies from aerial application of 1080.

Update: Determining levels of 1080 in drinking water

AHB ref: R-80713

Trials are being conducted to determine the probable 1080 concentration that would be in a stream after an aerial application of 1080. A hydrological-based model was developed to predict 1080 concentrations in surface water. This model has been turned into a graphic user interface tool to allow end-users to enter relevant parameters to show predicted 1080 concentrations in surface waters following aerial application.

A field study was conducted to monitor potential 1080 contamination of surface waters during rainfall after an aerial drop. A small quantity of 1080 was detected in stream water soon after rain started, but none was detected in any subsequent samples. The researchers also monitored soil water in three locations in the catchment directly adjacent to 1080 baits. 1080 did leach into the soil water, but the pattern was highly variable among the three locations, which was thought to reflect differences in topography, soil and rainfall falling on baits. Soil water samples indicated the persistence of 1080 for six days following the rain. Finally, the results suggested that the loss of 1080 from baits is more affected by the duration of rain than the actual amount of rainfall.

Update: OECD test 307: Aerobic transformation of 1080 in soil

AHB ref: R-10695

Using laboratory protocols described by OECD Guideline 307, the rate of degradation and transformation products of 1080 in soil was measured. Three New Zealand soils (podzol, brown and pumice) were tested under different temperatures (5°C, 10°C and 20°C) and soil moisture conditions (35 percent or 60 percent of soil water-holding capacity). Within all three soil types, the major degradation pathway for 1080 was through microbial metabolism with transformation to hydroxyacetic acid. There was no significant difference in the degradation products of 1080 or their rates of formation in the three soil types. Temperature, rather than soil type or moisture content, was the most important influence on the rate of 1080 degradation, with degradation slower but still occurring at 5°C. A draft report was submitted to the Animal Health Board for peer review in July 2010. Following review, publication of the results in a peer-reviewed science journal is planned.

Effects on rongoā Māori**Update: Information database about 1080 and taonga species**

AHB ref: R-80667-02

A database was set up in the 2005/06 year to organise and present information to Māori communities on 1080 non-target impact. This has been updated every year, and has recently been reformatted to be web-based and publicly available at www.lincoln.ac.nz/1080. Māori communities have been informed of this database through hui, Māori media and other established networks. This project is ongoing.

Update: New Zealand-based plant toxins

Nga Pae o Te Maramatanga (Auckland University)

There is a lot of matakāwhiri (indigenous knowledge) around the toxicity of plants, and therefore the potential use of toxic plants for animal pest control. Research was carried out with Ngāi Tahu to identify toxic plants and develop new toxicants in New Zealand plants as potential alternatives to 1080. Many plant species emerged as potential toxicant sources (such as tutu, kowhai, karaka, ngaio, porokaiwhiri and poroporo). This research contract was completed in December 2009.

New: Māori interest in natural occurrence of 1080 in New Zealand plants

AHB ref: R-80725

Contracted by: Animal Health Board

Carried out by: Eco Research Associates Ltd

Following indications of naturally-occurring 1080 in puha in an earlier Animal Health Board study, researchers are surveying other New Zealand plants to see if natural occurrence of 1080 is more widespread. A literature review has been completed and found that there are at least 48 plant species internationally that have been reported to naturally contain 1080. The closest relatives of these plants in this country have been included in a set of 17 plant species that have been sampled, and these will be analysed for 1080 content.

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY



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