

## ENVIRONMENTAL PERFORMANCE COMMITTEE

Notice is hereby given of a meeting of the Environmental Performance Committee of the Waikato Regional Council to be held in the Council Chamber, Waikato Regional Council office, 401 Grey Street, Hamilton East at 1.00 pm on Tuesday 25 November 2014.

VRJ Payne  
**Chief Executive Officer**

**RECOMMENDATIONS contained in reports are NOT to be construed as COUNCIL DECISIONS. Please refer to Council minutes for RESOLUTIONS.**

**MEMBERS:** Cr CW Graf (Chair), Cr TH Bramley, Cr ST Kneebone, Cr LA Livingston, Cr KA White  
Ex-officio Cr TS Mahuta & Cr PA Southgate

**STAFF:** Director Resource Use (C McLay), Manager Industry and Infrastructure (B Sinclair), Manager Investigations and Incident Response (P Lynch), Manager Maritime Services (N Botherway) and Committee Administrator (J Robertson).

### APOLOGIES:

#### 1 Confirmation of Agenda

#### 2 Disclosures of Interest

*Any disclosures of interest relating to the business at this meeting.*

### SECTION A: (UNDER DELEGATION FOR THE INFORMATION OF COUNCIL)

#### 3 Resolution to Exclude the Public

Recommended that in accordance with the provisions of Standing Orders NZS9202:2003 (incorporating Amendment No. 1) Appendix A & B (P40/42) and Section 48(1) of the Local Government Official Information and Meetings Act 1987, the public be excluded from the following part/s of the proceedings of the meeting.

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter and the specific grounds under Section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

Item No.	Item Name and general subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Ground(s) under Section 48(1) for the passing of this resolution
4	Update on Prosecutions	Conclusive reasons to withhold exist under Section 6 Good reason to withhold exists under Section 7.	S48(1)(a)

This resolution is made in reliance on Section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by Sections 6 and 7 of that Act which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public are as follows:

Item No.	Reason/s for withholding official information	Section/s
4	Maintenance of the law and right to a fair trial	S6(a)
4	Protect the privacy of natural persons, including that of deceased natural persons	S7(a)
4	Legal privilege	S7(g)

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**4      Update on Prosecutions**

**4-7**

**Return to public meeting**

**5      2013/14 Annual Report to Council on the Actions Taken in Response to Significant Non-Compliance**

**8-18**

File: 56 01 01 (Doc # 3102940)

*This report is provided with regard to the 2013/14 Annual Plan resource management implementation performance measure which requires the Resource Use Group to “prepare an annual report to the Council on the actions taken in response to significant non-compliance”.*

**6      Maritime Services Activities in the Waikato Region**

**19-21**

File: 56 50 51 (Doc # 3218366)

*This report provides an overview of Maritime Services’ operational activities and recent innovations and developments in the sector.*

**SECTION B: (FOR RECOMMENDATION TO COUNCIL)**

- 7**      **Waikato Region Aerial 1080 Poison Report**      **22-79**  
 File: 03 04 30 (Doc # 3220577)
- This report provides a paper that raises issues of concern in relation to consents and compliance, water contamination and monitoring, safety data sheets and labelling, signs, human health, and misleading information provided on Assessments of Environmental Effects in consent applications.*
- The attached paper contains information supplied by Councillor C Graf and Councillor K White and does not contain input from staff.
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- 8**      **Goodnature Traps – New Self Re-setting Traps**      **80-84**  
 File: 03 04 30 (Doc # 3220907 and 3220610)
- This report provides an update on a new Goodnature self-resetting trap that humanely kills rats, stoats and possums without use of toxins.*
- The attached paper contains information supplied by Councillor C Graf and Councillor K White and does not contain input from staff.

# Report to Environmental Performance Committee

## November 2014 – To be received

**File No:** 56 01 01

**Date** 10 November 2014

**To:** Chief Executive Officer

**From:** Director – Resource Use

**Subject:** 2013/14 Annual Report to council on the actions taken in response to significant non-compliance

**Section:** A (Committee has delegated authority to receive the Report)

### 1 Purpose

To report on the 2013/14 Annual Plan resource management implementation performance measure which requires the Resource Use Group to "prepare an annual report to the Council on the actions taken in response to significant non-compliance".

### Recommendation:

That the report '2013/14 Annual Report to council on the actions taken in response to significant non-compliance' (Doc #3102940 dated 10 November 2014) be received for information.

### 2 Consented Resource Users

Consented sites continued to be monitored during the 2013/14 year on a prioritised basis, based on the monitoring targets outlined within the Annual Plan. Specifically the Annual Plan states that 100% of P1 sites, 75% of P2 sites and 25% of P3 sites are to be monitored. Priority status assigned to a site is determined by an analysis of activities against a site monitoring prioritisation guideline (detailed in the internal guidance document DOC #1090500). There are four levels of prioritisation given to sites. These are:

#### Priority 1 Important sites/activities

A site that is considered to be of high importance, for example, due to the scale of the activity or it's potential to cause significant adverse environmental effects. Sites that are expected to fall within this category include; active large mines, large industrial processing sites, significant sewage discharges to water.

#### Priority 2 Moderately important sites/activities

These sites exhibit a combination of high and low risk factors. Sites that are expected to fall within this category include; medium sized quarries, timber processing sites and medium to large water takes.



### Priority 3 Low priority sites/activities

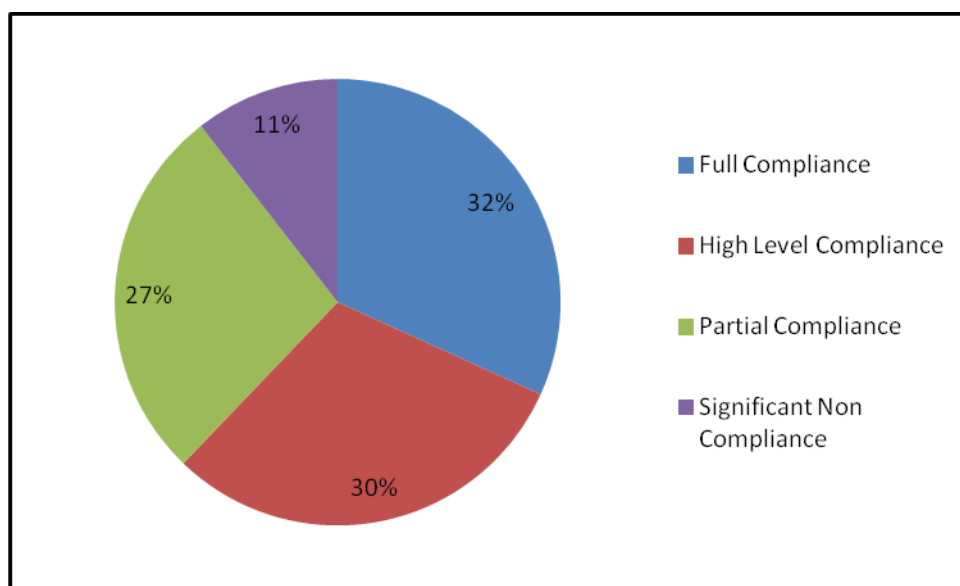
Sites fall into this category where the scale of the activity is limited and where there is less potential risk of adverse environmental effects. Sites that are expected to fall within this category include; small surface water takes, small community wastewater systems, and small onsite domestic wastewater systems.

### Priority 4 Very low priority sites/activities

These sites are not scheduled for proactive monitoring. The risks are considered sufficiently low to require only reactive monitoring if issues of concern come to council's attention.

The frequency of monitoring at any particular site over the course of the year varies depending upon a range of factors, including site priority and past compliance history. Some sites hold just one consent and others can hold tens of consents. Once monitored, each year those sites monitored is assigned an overall site compliance status for the year.

Over the 2013/14 year, a compliance assessment was made in relation to 941 consented sites. For some sites, monitoring would have involved many visits, and for others a single one off assessment. The overall site compliance results for these sites are illustrated in Figure 1.

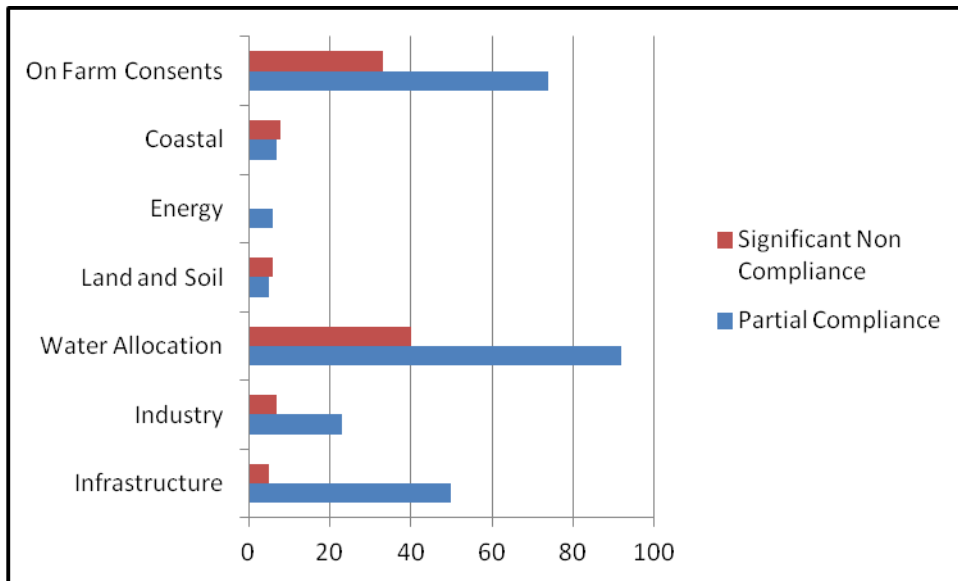


**Figure 1: Overall site compliance results for the 2013/14 financial year**

A comparison of overall site compliance results compared to 2012/2013 is illustrated below:

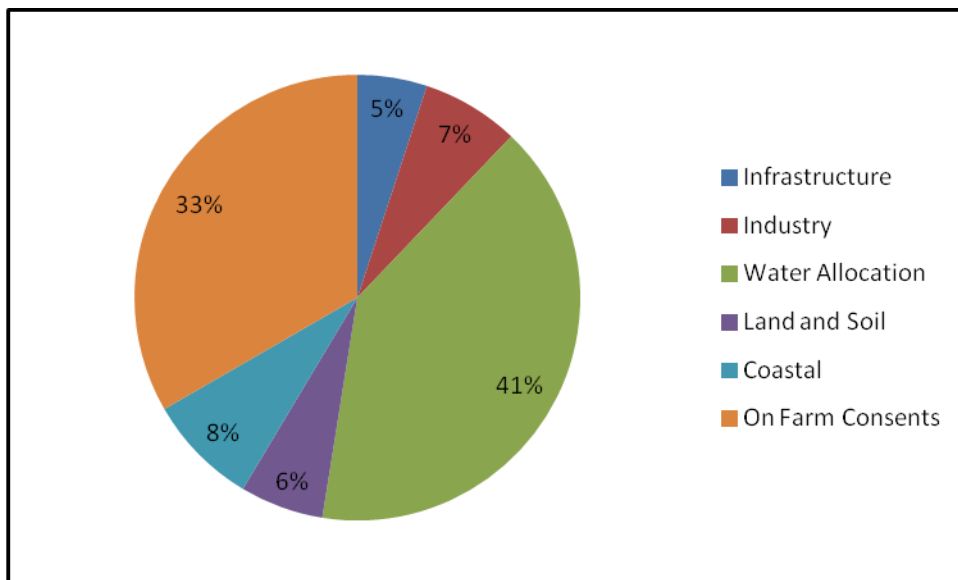
Year	Full Compliance	High Level Compliance	Partial Compliance	Significant Non Compliance
2012/2013	28%	34%	26%	12%
2013/2014	32%	30%	27%	11%

The sites that have been assigned an overall compliance status of “significant non-compliance” or “partial compliance” are considered “non-complying” sites. The number of consented sites that have been assigned this status for the 2013/14 financial year is illustrated in Figure 2 below. This has been broken down to illustrate the sectors where this non compliance has been identified.



**Figure 2: Number of non-complying sites with consents in the 2013/14 year**

Figure 3 illustrates the proportion of significant non compliance (SNC) that has been identified in the different sectors. Council has a performance measure requiring action be taken in relation to all significant non compliance. Some actions are punitive in nature, and others directive. In many instances both a punitive and directive action are appropriate. Details on the types and numbers of actions taken are provided later in this report.



**Figure 3: Number of significant non-complying consented sites for the 2013/14 financial year**

A comparison of the number of identified non-complying sites between the 2013/14 and 2012/2013 years is illustrated in the table below:

Sector	2012/2013 Partial Non Compliance	2013/2014 Partial Non Compliance	2012/2013 Significant Non Compliance	2013/2014 Significant Non Compliance
On Farm Consents	54	74	41	33
Coastal	22	7	22	8
Energy	3	6	1	0
Land and Soil	32	5	11	6
Water Allocation	70	92	18	40
Industry	27	23	7	7
Infrastructure	45	50	19	5

Whilst the figures provide a numerical summary of what non compliance has been identified, the story behind the numbers requires some context. The following provides some commentary on the general compliance trends within the different sectors.

### Energy Sites

Overall, compliance levels across the Energy sector have been maintained at a generally high level. Monitoring effort in relation to this sector has principally targeted the larger Energy sites, though a greater level of effort with respect to the smaller sites has occurred in comparison with previous years. Amongst those smaller sites that have been assessed, compliance has been found to be generally good, though with the heightened focus by WRC after a period of reduced contact, three sites achieved a partial compliance rating. Letters of direction have been sent to the relevant consent holders advising them of the required actions and staff are currently working through the various issues with the sites.

Compliance continues to be high amongst the large Energy generation sites. By and large, the large energy generators have been very conscientious about ensuring compliance and have assigned considerable resources towards doing so. Any breaches of consent conditions have been minor and infrequent and unlikely to result in any adverse environmental effects. Examples included minor exceedences of contaminant levels and some due dates for the provision of information and reports being missed.

The nature of the activities at the larger sites frequently necessitates staff being actively involved and engaged with site personnel; hence staff have a high level of familiarity with day to day operations and events. This has resulted in good working relationships and a high level of trust when it comes to compliance matters.

### Industry Sites

Industry sites cover a broad range of businesses. However, many of these have issues in common, one in particular being odour which is the most common matter about which complaints are received about industrial sites. The following provides a summary of odour issues reported in relation to the various industries.

#### *Chicken Meat Farms*

There were 27 complaints, 21 relating to one farm, the majority of which were received in May and June. A response and investigation plan has been put in place for this farm and a contractor is being used to respond to some complaints. Once sufficient data has been captured this will be evaluated and appropriate next steps determined.

*Piggeries*

There were 6 complaints spread over 3 sites. This is a low level of complaint considering the potential odour from these sites.

*Dairy Processing Industry*

There were 33 complaints, 32 relating to one site - Open Country Dairy. This site was the subject of a prosecution and fined \$35,625.

*Greenwaste Composting*

There were 41 complaints, 40 relating to the Envirofert Ltd site near Tuakau. This is a reduction from 81 complaints the previous year. Of this year's complaints, 30 were from two people and the remainder from 4 others. To date, odour assessments by our staff and an external contractor have not found the odour to be objectionable at the time of their visits, however further assessments are taking place. An analysis of the data and further investigative work will take place during the 2014/15 year to determine the compliance status and appropriate actions should non compliance be confirmed.

*Mushroom Composting*

There were 25 complaints relating to the one site - Cresta Assets Limited. The site was the subject of 17 complaints the previous year following many years of no complaint. An abatement notice and community meeting process resulted in the company undertaking substantial upgrades to its odour treatment system. However, the expected reduction in complaints did not eventuate. It is possible that the problem has simply shifted to other neighbours. The company is actively searching for another site for its operations and has a location it is discussing with staff.

*Other Industrial sites*

There were 42 complaints relating to a range of other industrial sites including: meat processing, rendering, landfill and others. Twelve of these related to the Envirowaste landfill that is actively upgrading its odour control. Staff will be keeping a close eye on this site to ensure it improves sufficiently. Thirteen relate to Farm Meats; a small petfood processor in Waihi. A contractor was engaged to enable a timely response and collection of evidence to enable compliance to be determined and appropriately responded to. Since engaging the contractor his services have not been required as there have been no further complaints. There have been staff changes on site that may have resulted in better operation however equally there may have been a change in the circumstances of the complainant.

The following provides a summary of other compliance matters at industrial sites.

Dairy processing sites

Dairy processing and the associated effluent disposal activities generally operate well although there has been a decrease in the level of compliance in recent times, notably the prosecution of Orion Haulage for a factory effluent pond over flow. The Court recently fined the company \$32,400 in relation to the offence.

There have also been stormwater and irrigation compliance issues at the Miraka site. The non compliance was dealt with by way of formal warning. Actions have been taken to minimise future risk, including the addition of further storage.

Meat processing sites

Staff keep in close contact with these sites and they generally achieve high compliance. Some minor non compliances have been identified that staff are working on with the relevant companies. Waikato By-Products has had non compliance with its discharge to river consent. This has resulted in a number of Infringement Notices being issued.

### Timber Treatment sites

Compliance is variable in this sector. A small number of sites have been in non compliance with conditions of their stormwater discharge consents. Liaison with site staff, coupled with ongoing monitoring and enforcement has seen improvements occur. Further improvements are required and will be a focus for the coming year.

### Closed Landfills

Thames Coromandel District Council (TCDC) and the Hamilton City Council (HCC) have experienced some relatively minor non compliances that staff are working through with these Councils. No enforcement action has been considered necessary. There are also minor non compliances with some other sites due to lack of sampling and reporting which staff are following up.

### Operating Landfill sites

The Tokoroa landfill has had some minor non compliances. SWDC has taken action to resolve these. The two commercial landfills (Envirowaste at Hampton Downs and HG Leach at Tirohia) are highly compliant, with the possible exception of odour as mentioned above.

## **Infrastructure Sites (predominantly Territorial Authorities)**

### Stormwater

Compliance with Comprehensive Storm Water Discharge Consents continues to improve with local Councils now applying more attention to their reporting requirements. There remain some compliance issues, particularly in relation to the provision of stormwater management plans and annual reports. Staff continue to work with the respective Councils where this is an issue.

### Wastewater

There were a number of compliance issues with WWTP across the region. A spill at the Raglan WWTP resulted in Waikato District Council being prosecuted. The Court fined the Council \$56,250. A positive outcome of that process has been the development by Waikato DC of better systems to track its own compliance, and the work it needs to undertake to ensure compliance is achieved. Several extreme weather events this winter also caused wastewater overflows and spills in the Waikato District and Hamilton City. Where enforcement action, i.e. formal warning, infringement notices etc, was found to be warranted those actions were implemented.

Scheduled compliance monitoring has maintained its focus on those sites that require improvement across the region. Two of Taupo DC's WWTPs (Turangi & Waitahanui) were found to be significantly non compliant when audited, resulting in a letter of direction and a Formal Warning. Further dialogue has been held with Taupo DC and compliance has improved at both these WWTPs.

Compliance has improved with a number of TCDC WWTPs, with improvements to reporting and provision of management & monitoring plans. TCDC is also putting in place new systems to track its performance, including actions that need to be taken to achieve compliance. Regular liaison occurs in relation to these matters. The Coromandel town WWTP is currently undergoing an upgrade which should improve its wastewater treatment capabilities.

Cambridge WWTP (Waipa DC) has been non-compliant with some discharge parameters for several years, however funding has been secured for an upgrade, and a NIWA trial is currently underway to assess the potential use of high rate pond technology for treatment at the site. Waipa DC has identified that this has the potential to reduce upgrade costs significantly.

The new Te Kuiti WWTP (Waitomo DC) was commissioned in August 2013 and is just finishing its commissioning phase, which has resulted in significant improvement to wastewater treatment for the community.

#### Municipal Water Supplies

Compliance has been generally good in this area, with improvements made in meeting recording and reporting requirements. This has been coupled with good levels of compliance with the National Measurement and Recording of Water Takes Regulations.

The 2013/2014 dry summer has again caused supply issues for the Morrinsville and Te Awamutu communities. Morrinsville again had to seek supplementary groundwater supplies. Waipa DC was non compliant with its Te Tahi water take consents in April 2014 at the end of the dry summer period.

TCDC has continued to investigate additional sources of water for its Coromandel communities, particularly during the summer holiday period. However, in general good communication was maintained with TAs as they exercised the water saving provisions of their water demand management plans.

#### **Water Allocation**

Where Industrial, Energy or Infrastructural sites hold water consents, those are monitored by the sector based programmes, which have been discussed previously. Compliance with consents held by other water users is undertaken by the Water Allocation Programme. A similar approach to key compliance matters has been encouraged, and generally applies across all programmes.

#### Surface water takes

Emphasis on improving compliance with recording and reporting conditions across all water take sectors has continued. While compliance with timely provision of take records is increasing, there are still a number of sites in significant non-compliance with both recording and reporting requirements. Many of these sites were issued with formal warnings during the year. Balancing this, there has been good acceptance of and compliance with the national Measurement and Recording of Water Takes Regulations, and particularly the measuring system calibration requirement; these regulations have been in effect for all takes of 20 litres per second or more since November 2012.

Consent holders with Variation 6 era consents containing water shortage conditions requiring reduction or cessation of take during the water shortage conditions which affected various parts of the Region from late January through April 2014 were largely compliant with those conditions. Compliance monitoring staff made considerable effort to advise and communicate with the consent holders regarding the onset and status of such water shortage events.

#### Ground water takes

Compliance focus this year has been as for surface water above. Exceedence of daily take volume conditions was more common, but again such exceedence was generally of a very minor nature, and non-compliance with seasonal or annual volume limits was very rare. Where maintenance and provision of records has not been compliant, formal warnings and more regular requests for take data have been reasonably effective in improving compliance.

As a result of requirements of Variation 6 on new take consents, the National Recording and Reporting Regulations, and the continued emphasis of compliance monitoring of the same, the number of consent holders who have voluntarily moved to electronic recording and reporting via telemetry has continued to grow; at the time of writing there were 163 sites reporting over 200 separate data streams for water takes.

## **Land and Soil**

### Land Disturbance Activities

The largest sites (e.g. SH1 roading, coal mines, large quarries, RCS activities) continue to be highly compliant and have very good systems and processes in place to undertake self auditing and reporting to the WRC.

Many medium sized quarries are progressively upgrading treatment systems and improving compliance levels while there are currently a growing number of smaller sites obtaining consents to authorise 'farm' scale quarries. The rural awareness regarding the requirements for consents seems to be growing and we are getting significantly more contact from farmers wanting to undertake earthworks associated with dairy conversions, tracking and small quarries.

A number of infringement notices have been issued in relation to significantly non-compliant earthworks sites, typically associated with small scale roading and urban subdivision projects where basic controls to prevent sediment laden runoff from sites have not been implemented to the required standards.

Outside of the large corporate forest sites, activity within the forestry sector is quite cyclical/reactive to rapid changes in economic returns. Although rapid increases in woodlot harvesting can be accompanied by poor practices, there have been relatively few forestry related compliance issues recently.

### Permitted Activity Earthworks Sites

The Land and Soil programme also undertakes monitoring of many permitted activity earthworks sites on a regular and ongoing basis. The monitoring of these sites is often carried out as a result of staff being made aware of non-compliances on these sites. Similar to the consented earthworks sites, the non-compliances are typically associated with small scale roading and urban subdivision projects where basic controls to prevent sediment laden runoff from sites have not been implemented to the required standards.

A major new initiative has been implemented this year, working with the HCC to improve erosion and sediment controls on individual building lots within the Hamilton City area coinciding with the major upswing in residential building activity. Information material has been developed and widely distributed, monitoring has been increased and a number of formal warnings, infringement notices and abatement notices have been issued to non-responsive parties

## **Coastal**

### Mooring

Implementation of a strategy aimed at improving compliance of mooring consent holders has continued. The strategy uses an escalation of enforcement consequences every three months from formal warning to letter of direction to abatement to infringement. The strategy has proven successful in increasing the level of compliance in this sector.

### Marine Farming

Follow up of non-compliant mussel and oyster farms on the east coast was the focus for marine farm monitoring. Repeated follow up of non-compliances resulted in most compliances being resolved. All consent holders whose farms were previously assessed as significant or partially non-compliant undertook actions to resolve their non-compliances.

### Coastal Erosion Protection Structures

Much of the non-compliance detected was associated with coastal erosion protection structures (primarily seawalls). There will be increased focus on compliance in this area as these structures by their very nature cause adverse environmental effects – in particular end effect erosion on neighbouring properties.

### Tairua Marina

The development of the Tairua marina was a significant project, and required significant resource. A number of compliance issues have arisen during the construction of the marina. During the project, three abatement notices were issued to Tairua Marine Limited. While one of the major issues has since been resolved, staff continue to work through the remaining issues with the consent holder, TCDC and a community group to seek resolution. There remain concerns from some members of the community regarding the implementation of the consents. The marina is now open and operational, although the land-based part of the development has not yet commenced.

## **On Farm Consents**

### Discharge of treated dairy effluent to water

The monitoring strategy put in place is continuing with more frequent monitoring of dairy effluent systems. The number of sites monitored this year has increased with staff visiting 74% of sites. While there has been a decrease in significant non-compliance this year (13% of sites) and an increase in the number of compliant sites, overall compliance is still poor with an increase in the number of sites receiving partial compliance (30% of sites). Poor discharge quality, lack of pond maintenance (de-sludging), lack of storm water diversion are still the common breaches of consent.

All significantly non-compliant sites were directed to resolve their specific non-compliance breaches and formal warnings were also issued to some sites. All significantly non-complaint sites are scheduled to be revisited within 3-6 months. Sites with partial compliance are also directed to resolve their specific non-compliance breaches.

It is appropriate to note that the number of consented discharges of dairy effluent to water continues to decrease (now just 248 sites) as farmers continue to move to land based effluent systems.

### On farm structures – dams, fords, bridges and culverts

Priority has been placed on monitoring of resource consents authorising stream crossing structures on farms. All new and 1-2 year old structures have been monitored against their resource consent conditions this year with 77% having full or high compliance. One on farm structure consent had significant non-compliance identified and a formal warning was issued.

### Taupo

All Taupo farms (43) that have had their resource consent in place for a sufficient period of time to allow a full year audit of their operation against their consent conditions and nitrogen allocation (cap).

An excellent level of compliance has been achieved with 98% of farms receiving full or high compliance. One farm received a significant non-compliance for a breach of nitrogen cap by 2kg. This farm has since sold nitrogen and surrendered its consent.

All farms provided records to verify their farm plan and therefore compliance with their nitrogen cap, unlike the 2012/2013 year when a number of formal warnings were issued for failing to provide records.



### 3 Proactive Monitoring

In the 2013/14 year, the proactive monitoring was focussed in areas where the soils were classified as being at high risk for non-compliance. Of the farms inspected, 9.1% were recorded as being in significant non-compliance. This level of non-compliance cannot easily be compared to previous years as the monitoring was targeted to areas where non-compliance was considered most likely to occur, rather than being undertaken on a random basis.

All farms in the target areas were inspected on the ground after the helicopter assessment. This has resulted in the identification of an increased number of farms that, whilst compliant on the day, we considered unlikely to be able to achieve compliance 365 days of the year. An example of this might be a farm with limited storage which, when visited on a dry day, was compliant, but due to the high risk nature of the soils would be not able to be compliant during a period of wet weather.

For the farms in this category a farm effluent plan was requested with timeframes for improvement required.

Improvement plans were formally requested from 212 farms with the expectation that improvement is to be completed within a two year timeframe. The two year timeframe is to allow for the staging of the upgrades as the investment on farm can be significant. To date 95 of these plans have been received. With an additional 79 farms we have received a response such as that they are still working on a plan and need more time.

The farms which have supplied these plans will be visited in two years time to check that upgrades have been completed. A further 38 farms that have not returned plans or asked for extensions to develop a plan. These will be visited this spring.

### 4 Incident Response

The 2013/2014 year continued to see the Incident Response team build on its capability and capacity. The team has been staffed with a manager plus four Incident Response officers (IRO's). A fifth IRO was recruited in July 2014.

Prioritisation and triaging of reported incidents is a core focus of the team to ensure that limited resources are deployed as expediently as possible. Water quality continues to be at the forefront of triage considerations.

In the 12 months July 2013 to June 2014, 1314 reports of possible RMA non compliance were received by WRC. This is very slightly down on the previous year (1353). Almost 86% of complaints related to unlawful discharges to air, land or water. Of all calls 45% related to odour, dust or smoke. Other complaints received (182) were concerned with infractions of the rules that govern the regions coastal areas, land use, water takes/use, and/or rivers and lakes.

Overall, 64 formal sanctions (infringement notices, abatement notices and/or formal warnings) were issued by the IR team. A further nine incidents were escalated to the Investigations team for formal investigation. A further two were also considered to need further investigation but there was no capacity for this to be done. .

The team continues to be challenged around timeliness to attend incidents. That challenge is borne from region size, the distance to travel to incidents and the complexity of resolution required.

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Brent Sinclair  
**Manager**  
Industry and Infrastructure

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Chris McLay  
**Director**  
Resource Use

# Report to Environmental Performance Committee

## November 2014 – To be received

**File No:** 56 50 51

**Date:** 10 November 2014

**To:** Chief Executive Officer

**From:** Director – Resource Use

**Subject:** Maritime Services' activities in the Waikato Region

**Section:** A (Committee has delegated authority to receive the Report)

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### Purpose

The purpose of this report is to provide an overview of Maritime Services' operational activities and recent innovations and developments in the sector.

### Recommendation:

That the report "Maritime Services' activities in the Waikato Region" (Doc #3218366 dated 10 November 2014) be received for information.

### Background

Maritime Services (formerly known as Navigation Safety) has been going through a series of changes in the past few years. This report briefly outlines key implementation activities.

The presentation to council will also outline the implementation of maritime services activities in the past and future directions, including recent technology developments to make implementation easier for users of Waikato water ways.

The maritime services team works towards maintaining safe and navigable waterways in the Waikato region. This is undertaken through a number of activities including policy, education, enforcement, debris removal, and other operational activities.

A number of boaties use the Waikato's beautiful waterways, 80% of recreational boaties in New Zealand are found Taupo north.

Boaties are a transient community, with large numbers of boaties coming from outside of the region to use our magnificent waterways. Regionally we have 30% of our boaties coming from outside the Waikato and more than 60% on the Coromandel. This coupled with the low regulations surrounding boating requires high levels of collaborative work within the team, working extensively with national agencies and neighbouring harbourmaster offices.

Maritime Services is predominantly funded (2014/2015) through a Uniform Annual General Charge (UAGC) of \$1,744,022. The section also generates another \$170,000 in revenue through temporary event permits, fines, mooring fees, jet ski registrations and grants.

## Safe environment

The platform for use of the region's waterways for navigation purposes is set through Council's Navigation Safety Bylaw which is implemented predominately by Harbourmasters. The physical environment is managed using a variety of navigation safety aids including buoys and beacons, channel markers, and signage. Harbourmasters are present at boat ramps talking to the public and performing patrols to encourage water users to do the right things. Out of the busy summer peaks, maintenance of aids and talking to relevant public and sporting organisations is an important aspect of the role.

## Implementation activities

### *Navigation aids*

Grade 1 Navigation aids are gazetted and listed in the Nautical Almanac. The annual plan measure is for these to be operational within 24 hours of failure. A traditional system relies on the Harbourmaster doing a visual inspection and the community to help keep him informed of any outages. This is labour intensive and can be subject to human error.

Maritime Services will trial a system widely used overseas where the lights are fitted with telecommunication devices. These will send a message to a phone if the aid fails, is hit or out of position. Installation of this new technology begins in November/December 2014.

### *Debris removal*

Debris in the water is a common occurrence and potentially very dangerous for high speed craft. There is often more debris to be removed than budget available to remove it. Annual Plan measures is that debris must be removed or marked for removal and made safe within 48 hours of notification

Contractors are often expensive and annual costs of up to \$16k to dispose of wood have been encountered. The Harbourmasters and deputies have been put through chainsaw qualifications and now all debris is cut into manageable sizes for locals to take away. In the Coromandel, Thames-Coromandel District Council has provided areas on their land for this to be done.

## Capital investment

The vessels used by Maritime Services represent a significant investment. Rationalisation has seen the fleet replacement schedule consolidated with excess vessels sold off.

Improvements to the fleet have ensured all vessels are now fit for purpose and with improved visibility on the water.

## Education and enforcement

Education is a strong feature in the compliance strategy for Maritime Services. We produce education material in a variety of formats and have won awards for our innovation in this field. Recent innovations have had significant external funding contributions through Maritime NZ and Water Safety NZ, including:

- Bar crossing film series
- Marine Mate
- Bylaw cards.

These will be demonstrated to the Committee.

The enforcement strategy has a tiered approach. Depending on the level of offending, options available are: formal warnings, infringements and prosecution. See Table 1 for a list of recent enforcement actions.

Prosecutions have only been taken when significant injuries have occurred or there has been significant risk to lives.

**Table 1. Enforcement actions taken under the Navigation Safety bylaw or the Maritime Transport Act 1994 (MTA) by Waikato Regional Council over the last three years**

<b>Year</b>	<b>Formal Warnings</b>	<b>Infringements</b>	<b>Section 65 of Formal warnings and prosecutions</b>
01/07/2011 – 30/06/2012	64	57	2
01/07/2012 – 30/06/2013	44	69	5
01/07/2013 – 30/06/2014	32	40	2

### **National change**

The Manager of Maritime Services represents the North Island regional councils on the National Boating Safety Forum. This forum is an influential group of representatives across all facets of water safety including Coastguard, Yachting NZ, ACC, Maritime Police, Rescue Co-ordination Centre NZ and surf lifesaving.

This forum is driving change in the national legislation around the compulsory wearing of life jackets in small vessels. This group started Safer Boating week which was launched for the first time in October 2014.

### **Focus for 2014/15**

As a team we will focus on the following four areas of risk in the region in the upcoming summer which is the busiest period for Maritime Services staff:

1. People not wearing lifejackets
2. Vessels not displaying navigation lights at night
3. Towing without an observer
4. Speed in proximity to structures, people in the water and other vessels

These behaviours are the most likely to affect the safety of water users. They are the common causes of collision and lifejackets, if worn, can help save lives.

### **Conclusion**

Maritime Services delivers functions which directly benefit users of waterways in the region and water safety. The team has gone significant change in the last 3 years to improve effectiveness and efficiency, and is working with others to make a difference throughout the Waikato and nationally. Recent innovations in implementing Council's Navigation Safety Bylaw have been recognised nationally.

There is a strong education focus to achieve behaviour change and where necessary enforcement action will be taken when safety is at risk.

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Nicole Botherway  
**Manager**  
**Maritime Services**

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Chris McLay  
**Director**  
**Resource Use**

# Report to Environmental Performance Committee November 2014 – Decision Required

**File No:** 03 04 30  
**Date** 18 November 2014  
**To:** Chief Executive Officer  
**From:** Director – Resource Use  
**Subject:** Waikato Region Aerial 1080 Poison Report  
**Section:** B (For recommendation to Council)

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## 1 Purpose

To present a paper provided by Councillor Clyde Graf and Councillor Kathy White with regard to Waikato Region Aerial 1080 Poison Report.

The attached paper contains information supplied by the two Councillors and does not contain input from staff.

## Recommendations:

Cr Graf and Cr White's recommendations are contained on Pages 23, 35 and 37.

## 2 Background

The attached paper raises issues of concern in relation to consents and compliance, water contamination and monitoring, safety data sheets and labelling, signs, human health, and misleading information provided on Assessments of Environmental Effects in consent applications.

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Chris McLay  
**Director**  
**Resource Use**

17 November 2014

## **Report – and Recommendations**

From – Clyde Graf and Kathy White

To – Council

Subject - Waikato Region Aerial 1080 Poison Report – and Recommendations

### **Purpose**

To provide a report that focuses on resource consents and applications, risks to human health and aquatic life, risks identified with the application of 1080 poison from aircraft, consent monitoring and compliance, labelling and signage. This is not a comprehensive report of all issues relating to 1080 poison. It addresses some aspects of its current use.

### **Recommendation:**

1. That the *Waikato Region Aerial 1080 Poison Report – and Recommendations* be received.

### **Introduction**

The Waikato Region has many areas of significant biodiversity; it is also a leading producer and exporter of world-class consumer products, as well as being a popular tourist destination. Increasingly, international customers expect that products will be grown, manufactured and delivered in a sustainable, animal welfare-friendly way.

The Council needs to ensure that its activities do not impact negatively on rate-payers' right to provide products and services that can withstand international scrutiny. Produce leaving New Zealand enjoys the national branding of being clean, green and sustainable. The expectation, increasingly, is that where there's a story behind a brand, that story needs to be genuine.

### **About 1080**

1080 poison is used widely across the Waikato Region to kill possums and rats. The poison is aerially spread across forests and streams in the form of cereal food. The majority of forested areas in the Waikato Region have been aerially poisoned, and those areas are increasing.

1080 (Monofluoroacetate) was originally developed and marketed as an insecticide. It functions primarily by interfering with the citrate step in the Krebs cycle<sup>1</sup>. The Krebs cycle is the mechanism by which all air-breathing creatures utilise food to produce energy. 1080 is therefore universally toxic to all animals (and some plants), but toxicity varies in degree among species.

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<sup>1</sup> Eisler R. Sodium monofluoroacetate (monofluoroacetate) hazards to fish, wildlife, and invertebrates: a synoptic review. Contaminant Hazard Reviews, Report No. 30, Biological Report 27, February (1995). <21>

It is categorised by the World Health Organization (WHO) as 1A - their highest rating – meaning it is "extremely toxic"<sup>2</sup>. The PAN pesticide database classifies 1080 as one of the few "PAN Bad Actor Chemicals," by which it means "highly acutely toxic."<sup>3</sup> One hundred milligrams is sufficient to kill an adult human. In theory, one could kill at least 20 million people with the amount being dropped into New Zealand forests every year.<sup>4</sup> The use of this toxin has been banned or restricted in a large number of countries. New Zealand currently uses approximately 90% of the world supply of 1080<sup>5</sup>.

### **Consents for recent aerial 1080 drops – Discharge of 1080 poison into water**

This report focuses on three recent aerial drops in the Waikato Region: Whareorino, Mt Pirongia, and the Rangitoto Range (Pureora Forest Park). These three aerial poison drops covered a total combined area of 46,000 hectares. The application rate of poison for these aerial drops was 2kg of bait per hectare. This equates to 166, 12 gram baits per ha.

Vector Control Services (the Department of Conservation's chosen contractor for the Mt Pirongia Aerial operation), Eco FX (the WRC contractor for the Whareorino operation), and Epro (the contractor selected by TBfree) all were granted resource consents by the Waikato Regional Council to discharge 1080 poison directly into water.<sup>6</sup>

The "toxic flight-lines" logging where the poison was spread shows that Mt Pirongia (16,000 ha), undertaken by the Department of Conservation, had just one stream excluded (buffered) from the toxin<sup>7</sup> – the Te Awamutu water catchment area. The remaining poisoned area (16,000 ha) included at least eight other known water abstraction points, which were not buffered, and all streams within the 16,000 hectare boundary were applied with the poison at the same rate as the land areas (2kg/bait/ha).

The Whareorino aerial drop (2000 ha), undertaken by Waikato Regional Council, had no stream buffers within the aerial boundaries. The Rangitoto Range (Northern Pureora) aerial drop (30,000 ha) had no stream buffers (See maps in Appendices).

Despite some of the information included in the applications being misleading, the effects were deemed by Council to be "no more than minor," and all three applicants were granted consents on a non-notified basis.

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<sup>2</sup> WHO. Data sheets on Pesticides No. 16 - Sodium Fluoroacetate. World Health Organization, Data Sheets on Pesticide No. 16 (1975). <112>

<sup>3</sup> PAN Pesticide Database

[http://www.pesticideinfo.org/Detail\\_Chemical.jsp?Rec\\_Id=PC35155#ChemID](http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC35155#ChemID)

<sup>4</sup> <http://1080poison.co.nz/wp-content/uploads/2014/05/testimony.pdf>

<sup>5</sup> <http://1080poison.co.nz/wp-content/uploads/2014/05/testimony.pdf>

<sup>6</sup> See resource consents and applications. (Available from WRC)

<sup>7</sup> See resource consents and applications. (Available from WRC)



### Non-notified Resource Consents

All resource consents issued for the aerial application of 1080 poison to land and water, across the Waikato Region, are issued on a non-notified basis.

In 2000, Environment Waikato (now called Waikato Regional Council) acted as Consultant/Agent for two of the three resource consent holders included in this report – Namely Epro & EcoFX. The Council was also listed in the applications as the nominee to pay the application fees for both applications, and also chose to issue the 10 year consents on a non-notified basis.

Some of the misleading statements in the Assessment of Environmental Effects include:

- “In relation to the proposed activity described in the application, section 15(1)(a) relates to the possible incidental direct discharge of a small portion of baits into water and section 15(1)(b) relates to the discharge of baits onto land in a position where they may leach, roll or percolate into water. ...
- “There will be no risk to human health posed by drinking water in operational areas.”
- “It is unlikely that any indirect contamination of water will occur as a result of the application of 1080 baits to land due to the breakdown of the contaminant by natural processes before it reaches water.”
- “It is extremely unlikely that there will be any detectable change in aquatic ecology as a result of the aerial application of 1080 bait.”
- “It is not proposed to discharge to water and a number of precautions are imposed by the Pesticides (Vertebrate Pest Control) regulations 1983 and are also incorporated.”
- In the applications, Clause 13, it is stated: “The controlled pesticide must be used according to the manufacturer’s instructions (Reg.22).” [Note: the manufacturer’s label advises to keep 1080 away from water and to bury or burn toxic carcasses. Neither of these is done].
- “... there is an unfounded fear and perception that 1080 can cause an adverse effect. To counter this, Epro and EcoFx Ltd will continue the current educational programmes in place.”
- “A single bait pellet is unlikely to have any effect on a human ...”<sup>8</sup> [Note: In their application, VCS reference a six gram bait, but we do not use 6 gram baits. We use 12 gram baits. A single bait may be enough to kill a small child].
- “... the poison is rapidly broken down in water (within a matter of days) by microscopic plants and animals, and as a substance 1080 is highly soluble.
- “The poison works by breaking down the respiration process by the energy pathway in the body, causing possums to die from rapid cardiac or respiratory failure. It is highly effective and humane.”<sup>9</sup> (See Humaneness below)

<sup>8</sup> (AEE, Consent application VCS Pirongia, 2014, page 5, Effects on humans).

<sup>9</sup> (AEE, Consent application VCS Pirongia, 2014 page 7, Overview of 1080 poison)

One AEE also stated a very important point that “Health authorities consider that, of all the possible ways people can be exposed to 1080, contaminated water is the most significant.”<sup>10</sup>

**1080 baits are dropped directly into streams and waterways in the Waikato region.**

With regard to the Mt Pirongia aerial drop, WRC issued the following consent type - Discharge permit (Land – Other) to the Department of Conservation to discharge 1080 to land – Pirongia Forest Park and Te Kauri Scenic Reserve. DoC’s contractor, Vector Control Services’ consent application for the permit states the following in the Assessment of Environmental Effects<sup>11</sup>:

11. What is the distance to the nearest surface waterway?

Answer: The operational area includes multiple surface waterways that will be included in the discharge area. Bait will be applied evenly across the control area; therefore some bait will fall directly into water on the day of bait application.

12. What is the distance separating the base of the waste material from the underlying groundwater?

Answer: Bait will be applied to water.

13. How are you proposing to manage the site stormwater?

Answer: No attempt will be made to manage stormwater. The control area is a functioning ecosystem that will not be affected by the application of 1080 cereal bait.

14. Please describe the actual and potential effects of your activity on water quality of nearby streams/rivers/lakes?

Answer: No demonstrable impact on water quality has been detected by 1080 use to date.

Many people believe that streams and watercourses are avoided in 1080 poison drops. They are not. As recently as October 2014, in reply to a question about buffers around waterways, Dr Popay of AgResearch indicated that 1080 is not dropped directly into waterways in aerial operations. This was part of a presentation to councillors about the challenges of pest management.

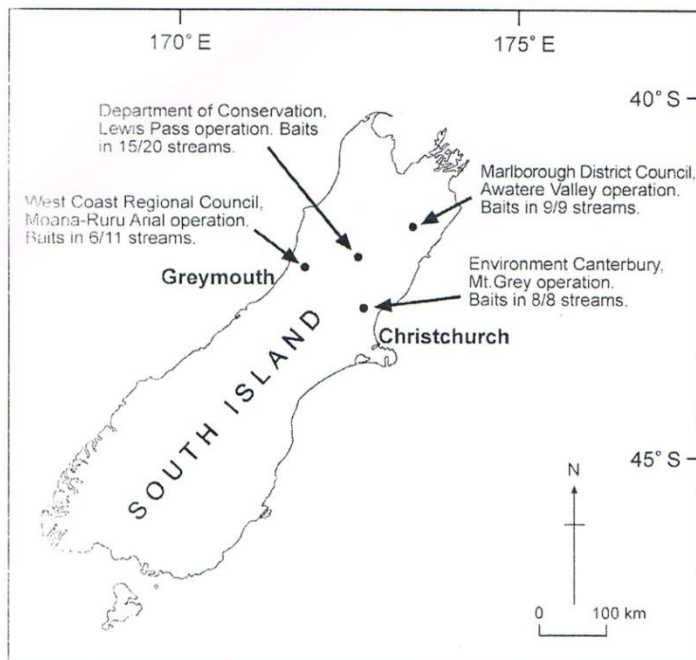
NIWA scientist, Alistair Suren, confirmed that baits regularly enter waterways during aerial drops, and attempted to quantify the number of baits contaminating our streams. He included a survey of 48 streams in four aerial operations. (Some of these streams may have had buffers). Thirty-eight baits were found in one stream, but the number varied widely across streams. The bait distribution was random, making it impossible to calculate the potential number of baits that will end up in a stream based on the bait application rate and the stream size.<sup>12</sup> The only thing that was certain was that baits are regularly dropped into waterways.

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<sup>10</sup> (ibid, page 8)

<sup>11</sup> (AEE, Consent application VCS Pirongia, 2014)

<sup>12</sup> Suren, A.M. Quantifying Contamination of Streams by 1080 Baits and their Fate in Water, 2006. [http://www.1080facts.co.nz/uploads/2/9/5/8/29588301/\\_quantifying\\_contamination\\_of\\_streams\\_by\\_1080\\_baits\\_and\\_their\\_fate\\_in\\_water.pdf](http://www.1080facts.co.nz/uploads/2/9/5/8/29588301/_quantifying_contamination_of_streams_by_1080_baits_and_their_fate_in_water.pdf)



**Fig. 1** Map showing the location of the four aerial 1080 operations, the authority responsible for the operation, the number of streams surveyed, and the number of streams with 1080 baits.

### Buffer zones around waterways

Suren's 2006 report on baits contaminating waterways<sup>13</sup> identified Waikato Regional Council as one of two out of 11 regional councils that imposed no buffer zones around waterways as part of RMA consent conditions, unless a territorial authority required that a 50m buffer zone around specific drinking water intakes be applied as part of the consent. This is currently the case in 2014.

**Table 1** Summary of the size of waterway buffer, application rate, and preferred bait type used by selected regional councils throughout New Zealand for possum control operations. Data courtesy of Animal Health Board. (RMA, Resource Management Act; TLA, Territorial Local Authority; w/w, weight per weight.)

Region	Waterway buffer	Average application rate (kg ha <sup>-1</sup> )	Type of bait
Waikato	No buffers for RMA resource consents. Some TLAs require 50-m buffers	5, range 2–15	Wanganui No. 7 baits in 2–3 g; 5–7 g and 7–9 g bait sizes up to 0.15% w/w
Bay of Plenty	60-m buffers irrespective of width	5–8	RS 5 or Wanganui No. 7 (0.15% w/w)
Hawkes Bay	20 m irrespective of width	Initial operations: 10 Other operations: 3 and 5	Wanganui No. 7 baits (5–7 g) preferred. Toxic loadings of 0.08% and 0.15% w/w
Manawatu/ Wanganui	20 m for waterways >3 m	3 for pre-feed, 5 for toxic	Wanganui No. 7 (0.15% w/w)
Wellington	If not for drinking, no buffers. If waterways used for drinking water a 20-m buffer required	2	Wanganui No. 7 or 12 g baits (0.15% w/w)
Marlborough	20 m for waterways >3 m	2.5 for 6–8 g and 12 g baits 3–4 for 2–3 g baits	RS 5 (0.15% w/w)
Tasman	20 m for waterways >6 m but 100 m over water supplies and intakes	3	RS5 (0.15% w/w)
Canterbury	50 m for waterways >3 m	3	RS5 (0.15% w/w)
West Coast	20 m for waterways >3 m	3	Wanganui No. 7 or 12 g baits (0.15% w/w)
Otago	20 m irrespective of width <sup>1</sup> but 100 m over water supplies and intakes	3	RS5 or Wanganui No. 7 (0.15% w/w)
Southland	50 m for waterways >3 m	3	RS5 or Wanganui No. 7 (0.15% w/w)

<sup>1</sup>Buffers used only for flowing water.

<sup>13</sup> Ibid

### **Increased chances of contaminated water and secondary poisoning**

Baits, poisoned animals and carcasses, will enter water when there are no buffers around waterways.<sup>14</sup> Poisoned animals often seek water and die in or next to waterways, causing secondary poisoning for those that scavenge the carcasses. Carcasses remain toxic for many months, and can remain toxic for extensive periods of time in dry, cool conditions.

High rainfall can cause more poison to enter waterways. Flowing water can move poisoned carcasses down waterways, and out of the boundaries of the consented poisoned area. This creates hazards for people other than immediate landowners and adjacent properties. For example, warnings about toxic possums are issued at least once a year in the Hutt Valley to dog owners who walk their dogs on beaches.<sup>15</sup>

Carcasses in rivers also increase the risk of ecoli contamination, creating additional risk for walkers and trampers who drink the water. There is currently no mention on 1080 signs to warn people about drinking the water in areas that have been aerially poisoned. The Healthy Rivers plan for change project aims to reduce the level of bacterial contamination in the Waikato and Waipa rivers. It would be useful to include poisoned carcasses within their scope of discussion.

In the standard conditions applied by the Ministry of Health to permissions issues for use of vertebrate toxic agents (under the HSNO Act controls), condition number 8 states “Vertebrate toxic agents shall not be laid/applied within 20 metres of waterways including intakes and feeder water sources. Waterways include springs, streams, rivers, lakes, ponds and reservoirs.”<sup>16</sup>

ERMA also noted in its reassessment in 2007, that “large water bodies (more than 3m wide) including flowing streams, should be avoided to mitigate potential risk to public health.”<sup>17</sup>

Regional Councils are able to place conditions on resource consents with respect to discharges to water on a site-specific basis. It is also their decision as to whether adverse effects are more than minor and whether the wider public needs to be notified. This is an especially important consideration where the impacts of an aerial 1080 drop are felt outside of the poisoned area.

**“Health authorities consider that of all the possible ways people can be exposed to 1080, contaminated water is the most significant.”<sup>18</sup>**

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<sup>14</sup> Suren, 2006, page 159.

<sup>15</sup> <http://hutt.nz.co.nz/2009/09/09/hutt-valley-1080-warning-after-dog-dies-eating-possum-carcass-on-hutt-river/>

<sup>16</sup> Table 4. Page 631. <http://www.epa.govt.nz/search-databases/HSNO%20Application%20Register%20Documents/HRE05002-045.pdf>

<sup>17</sup> Environmental Risk Management Authority Decision, HRE05002-065, clause 10.3.24

<sup>18</sup> Assessment of Environmental Effects, VCS on behalf of DoC (Mt Pirongia), 2014.

### 1080 in Water Samples

2639 water samples were taken between 1990 and 2012. Most of these samples have been below the level at which 1080 can be detected and measured. Traces of 1080 were found in 88 (3.34%) of the samples, ranging from 0.1 to 9ppb.<sup>19</sup> Some of these breached the “safe human exposure level” that has been set by the Ministry of Health at 2ppb (parts per billion). The highest 1080 contamination in a water sample was 9ppb and was measured in a stream at Te Kopia Scenic Reserve.

Previous monitoring data suggest that most water samples with detectable concentrations of 1080, and certainly the ones that have been above 1 part per billion were collected within 48 hours of aerial bait application. Suren (NIWA) said that the following has important implications for those designing water monitoring programmes. He said that as 50% of 1080 has shown to leach out within 5 hours of being in water, “samples should be collected within 4-8 hours of potential contamination to detect presence of 1080.”<sup>20</sup>

He also commented that past monitoring of waterways throughout the country after poison drops have highlighted a number of things:

1. Water samples that test positive for 1080 are often where baits are seen in streams. Absence of positive water samples during monitoring operations can be because bait didn't fall into a particular stream. However an alternative explanation could be that
2. The majority of water sampling programmes collect samples 24 hours after a drop (not within 8 hours), by which stage 1080 has been uptaken by aquatic wildlife (including koura) and plants, and has been diluted in the water column.

In the recent Pureora Forest aerial drop undertaken in June, TBfree was asked who set the time-requirement for water samples to be collected by a NIWA hydrologist at 24 hours following the drop.

TBfree's reply stated: “The 24 hour timeline is an MoH requirement, but in this case, the only MoH requirement is that in clause 25 that requires to test for no VTA contamination. TBfree chose to request the 24hr sample. It could have been left for 48hrs if wanted but the objective is to get the domestic supply connected again ASAP.”<sup>21</sup>

### Inadequate methodology for water sampling and testing

Landcare Research is the agency that has primary responsibility for scientific research into 1080 use and monitoring of its effects. Its **protocol for sampling and testing water for 1080**<sup>22</sup> states the following about when and how to take water samples:

<sup>19</sup> Numerous sources, including personal correspondence with Landcare Research. See appendices.

<sup>20</sup> Suren, 2006.

<sup>21</sup> See Landcare Research letter in Appendices.

<sup>22</sup> Protocol for water sampling and testing water for 1080

<http://www.landcareresearch.co.nz/resources/laboratories/toxicology-laboratory/services/advice-and-protocols/protocol-for-sampling-and-testing-water-for-1080>

- It is important to ensure that sampling is undertaken during the most likely time period for occurrence of 1080 in waterways.
- Water samples taken within 8 hours of bait application are expected to provide the greatest likelihood of detecting any residual 1080.
- More than 90% leaches within 24 hours (from baits in small streams), and
- Ideally sampling from the same point on a waterway at 8 hours and again at 24 hours after bait application is useful to confirm whether 1080 is present in detectable concentrations, and
- Samples should be frozen as soon as possible if they are not to be tested within 24 hours.

A recent Official Information Act request to Landcare Research<sup>23</sup> asked the following:

1. “Of all the water samples taken, how many were taken within 8 hours of the 1080 drop?” The answer: “This information is not provided when water samples are submitted to our laboratory for testing, such data rests with the agencies undertaking the field sampling or the clients who pay for the samples to be tested.”
2. “How many of the positive results were taken within 8 hours of the aerial drop?” Answer: “This is not information that we hold.”

Landcare Research says that ideally samples will be taken at 8 and 24 hours, but they do not provide a space on their water sample form for the time that the sample was collected, nor do they ask for the date of the sample. Without this information, Landcare Research is unable to check that best practice is being followed. Some data is not being gathered, data sets from different times are mixed, and data is not analysed according to time and place.

When agencies don’t follow the recommended protocol, we get:

- (1) water sampling done outside of the recommended timeframe, causing fewer positive results;
- (2) water sampling being done in the buffer zones, where you would expect to get a negative result; and
- (3) water sampling rarely being done in the unbuffered areas, where there is a greater likelihood of getting a positive result.
- (4) Spurious results are reported in a way that lulls the public into a false sense of security, and complacency.

The optimum chance of detecting 1080 poison in water (before it is subsequently up-taken by aquatic-life, plant-life, and dispersed) is at between 4 – 8 hours following the aerial drop. Suren states that at 24hrs, the chance of detecting 1080 in water is unlikely. So knowing what is in the Landcare Research protocol, it opens up an important question. Why would DoC, TBfree and Regional Councils, knowing that they are likely to get a positive result at 8 hours, ignore what has been stated is ‘best practice’ and test ‘only’ at 24hrs or later when there is little chance of getting a positive result? To then use that date to claim there was no detectable 1080 found in streams gives the public a false sense of security about the use of 1080 near water.

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<sup>23</sup> See Landcare Research letter in Appendices.

### **What do other agencies say about the time that water should be sampled?**

The Ministry of Health is the government agency that is ultimately responsible for ensuring that human health is protected in a 1080 drop. It issues permits for the use of vertebrate toxic agents in a water catchment area or in an area where there is public risk. The Medical Officer of Health issues a consent for 1080 to be used in a specific area. In its document called *Issuing Permissions for the Use of Vertebrate Toxic Agents (VTAs): Guidelines for Public Health Units*<sup>24</sup>, the MoH says that consent conditions **must conform to the current Landcare Research Protocol for Environmental Water Sampling and Testing Associated with 1080 Pest Control Operations**.

Standard conditions applied by the Ministry of Health to permissions issued for use of vertebrate toxic agents are included in the ERMA reassessment 2007. Condition number 38 states that **“Water sampling shall be undertaken within 5-8 hours after a poison operation.”**

In the ERMA reassessment of 1080, the following statement was made: “Water test results were not derived from a standard international test method and provide limited information on the rate of degradation under expected New Zealand conditions of aerial 1080 use.”

Section 7 of the HSNO Act (1996) states that ... “All persons exercising functions, powers and duties under this Act ... shall take into account the need for caution in managing adverse effects, where there is scientific and technical uncertainty about those effects.”

Decision-makers need reliable information about 1080 in water in order to assess when and where water is safe for consumption by people and wildlife. Inconsistently gathered and analysed information on water is currently being used to argue for consent changes. The same data is being used to create reports, and new regulations and legislation. This has created uncertainty in relation to the consistency of water testing and the reliability of the information for decision-makers to assess risk.

### **ERMA classification 9.1A – 1080 is highly toxic to the aquatic environment**

In its reassessment in 2007, ERMA classified 1080 as 9.1A, meaning it is highly toxic to the aquatic environment. It also noted that (1) The available set of high quality acute data is small. (2) No chronic studies have been undertaken on aquatic organisms; (3) ERMA was unable to locate data on the metabolite fluorocitrate in water or soil.<sup>25</sup> This has created uncertainty around the classification, because baits regularly end up in streams where there are a wide variety of aquatic organisms, including koura and eels.

<sup>24</sup> <http://www.health.govt.nz/publication/issuing-permissions-vertebrate-toxic-agents-vtas-guidelines-public-health-units>

<sup>25</sup> ERMA reassessment, Appendix C - Toxicity of 1080 to aquatic organisms, 2007.

“Concerns about 1080 partially reflect the lack of research addressing the effects of 1080 on freshwater ecosystems within New Zealand.”<sup>26</sup> There is little known of the toxicity of 1080 to native New Zealand fish and freshwater invertebrates, although it is known that 1080 is toxic to some terrestrial invertebrates.<sup>27</sup> As a result of these concerns, regional councils impose consent conditions on aerial 1080 operations and consider placing buffer zones around waterways to prevent accidental contamination.<sup>28</sup>

NIWA is about to release a report for the Waikato River Authority investigating the “precipitous decline in the koura population in the main stem of the Upper Waikato River.” Koura also appear to be in decline around Mt Pirongia<sup>29</sup> Apparently the NIWA investigation includes contamination of water.

The Department of Conservation, Waikato Regional Council, TBFree and poison contractors all reference NIWA scientist and freshwater ecologist, Dr Alistair Suren’s research for the AHB, when justifying dropping 1080 poison into waterways.

Dr Suren claims that freshwater crayfish, fish, and other aquatic wildlife are not affected when exposed to 1080 poison.<sup>30</sup> However, when studying freshwater fish, Dr Suren did not allow the fish to get close to or eat the baits, or eat the animals feeding on the baits. Dr Suren claimed that 1080 poison does not harm fish, based on this research.

In a real situation, when 1080 poison cereal baits are dropped into stream water, native crayfish (koura) consume the bait they encounter. Other aquatic invertebrates also uptake the poison.<sup>31</sup> In Dr Suren’s study he fed each of the koura a single, six gram bait. The aerial poison drops across the Waikato deliver baits twice the weight/size (12 grams) of what Suren fed to his koura.

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<sup>26</sup> Suren, Quantifying Contamination of Streams by 1080 Baits, and their Fate in Water, 2006.

<sup>27</sup> Suren, 2006.

<sup>28</sup> Suren, 2006.

<sup>29</sup> Observations.

<sup>30</sup> Suren, 2006.

<sup>31</sup> Suren, A.M., 2006. Quantifying contamination of streams by 1080 baits, and their fate in water. New Zealand Journal of Marine and Freshwater Research 40: 159-167.

Suren, A.M., Bonnett, M.L., 2006. Consumption of baits containing sodium fluoroacetate (1080) by the New Zealand freshwater crayfish (*Paranephrops planifrons*). New Zealand Journal of Marine and Freshwater Research 40: 169-178

Suren, A.M., Lambert, P., 2006. Do toxic baits containing sodium fluoroacetate (1080) affect fish and invertebrate communities when they fall into streams? New Zealand Journal of Marine and Freshwater Research 40: 531-546



After completing his research Dr Suren claimed that 1080 does not kill koura, even though he killed his experimental koura before they may have died of 1080 poisoning if left for a longer period. Some animals take an extensive time to die from 1080 poison. Lizards take up to 21 days<sup>32</sup>.

There are many inaccuracies and flaws in the research that is referenced to justify the dropping of 1080 poison directly into forest streams. ERMA, in their reassessment of 1080 raised concerns that there were “Data Gaps – Biodegradation (of 1080) in aquatic systems.” When 1080 poison is metabolised, it produces the highly toxic isomer fluorocitrate. ERMA stated that “The applicants did not provide, and the Agency was not able to locate, any data on the aquatic toxicity of the metabolite fluorocitrate in water or soil.”<sup>33</sup>

### **MoH consents**

Vector Control Services states in their resource consent application to WRC for the Mt Pirongia poisoning operation (undertaken in August) that “To minimise any risks to water quality and human water supplies, the Ministry of Health imposes strict conditions for aerial 1080 operations. Flight paths are planned to avoid flying above water supply reservoirs and feeder-streams, as well as open water bodies. The use of airborne navigation systems (GPS technology) greatly assists in applying buffer zones.”

The opposite appears to be true. Apart from the requirement that all people sourcing their water from the treatment area, or within 3 km of the treatment area, must be notified, the MoH makes no recommendations about dropping into feeder streams, or any other streams or rivers, apart from a 50m buffer around intakes.

The MoH states in Condition 25 that “No 1080 shall be applied within 50 metres of the water supply intakes. For flowing surface waterways, the 50 m extension shall extend for a length of 200m upstream from the point of intake.”

The Mt Pirongia aerial drop had one buffer zone around a public water supply; eight other known abstraction points had no buffers in place. GPS technology (revealed in poison flight lines) ensures 1080 poison is directly dropped into the Waikato’s streams and waterways. Very few streams are buffered. In some aerial drops, there are no buffers around water.

When referring to the Pureora Forest aerial drop undertaken in June, TBfree was asked who set the time-requirement for water samples to be collected by a Niwa hydrologist at 24 hours following the drop. TBfree replied: “The 24 hour timeline is an MoH requirement, but in this case, the only MoH requirement is that in clause 25 that requires to test for no VTA contamination. TBFree chose to request the 24hr sample. It could have been left for 48hrs if wanted but the objective is to get the domestic supply connected again ASAP.”

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<sup>32</sup> Environmental Risk Management Authority Decision on the Application for the Reassessment of 1080, 2007. Appendix F. <http://www.epa.govt.nz/search-databases/HSNO%20Application%20Register%20Documents/HRE05002-051.pdf>

<sup>33</sup> ERMA reassessment, Appendix C - Toxicity of 1080 to aquatic organisms, 2007.

### Human health

Dr Sean Weaver PhD (Environmental Studies, School of Earth Sciences, Victoria University) has written two papers<sup>34</sup> investigating chronic poisoning. In his first paper released in 2003, Weaver stated ... “Key areas of concern revealed in the literature include evidence that 1080 could have endocrine disrupting capabilities ...” and “In terms of research there is a need to:

- 1/ Conduct experiments to determine whether 1080 is an endocrine disrupter, and determine the endocrine disrupting effects (if any) on a variety of aquatic and terrestrial organisms.
- 2/ Conduct experiments to determine the rates of 1080 degradation at temperatures equal to those experienced in the winter months in forested mountain areas in New Zealand.”

In 2007 over 200 medical experts gathered at the Faroes Islands for an international conference called Foetal Programing and Developmental Toxicity<sup>35</sup>. It concluded that regulatory bodies needed to take notice, and action, with regard to chemical and environmental exposures – to those most vulnerable - namely, foetal development.

The Health Protection Officer’s (MoH) Permission Conditions: Schedule 2, 25 references the PMAV and adds, “The provisional Maximum Accepted Value represents the concentration of sodium fluoroacetate (1080) in water that, on the basis of present knowledge, is not considered to cause any significant risk to the health of the consumer over their lifetime of consumption of that water. Fifty percent of the PMVA is a 1080 concentration of two parts per billion.”

When investigating 1080 poison, ERMA stated at its hearings ... “The ADE (Acceptable Daily Exposure) is derived to protect the general population from chronic exposures, and ... should normally be derived from a chronic toxicity/carcinogenicity study ... There are no chronic toxicity studies for 1080.”

Requirements for drinking water in the UK are now set to test for some pesticides and herbicides at parts per trillion, with limit detection now reaching 20 parts per trillion.

Given that 5 years have passed since ERMA gave its recommendations, and that WRC is issuing non-notified consents to drop 1080 poison directly into Waikato streams, and has been doing so for many years, and that the Waikato region is a large producer of products for human consumption, the following recommendation is presented.

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<sup>34</sup> Journal of Rural and Remote Environmental Health 2(2): 46-58 (2003) © 2003 Warwick Educational Publishing Inc. 46 - Policy Implications of 1080 Toxicology in New Zealand - Sean Weaver Ph.D. Environmental Studies, School of Earth Sciences, Victoria University of Wellington, New Zealand

Dr Sean Weaver - CHRONIC TOXICITY OF 1080 AND ITS IMPLICATIONS FOR CONSERVATION MANAGEMENT: A NEW ZEALAND CASE STUDY (Accepted in revised form November 20, 2005)

<sup>35</sup> Faroes Islands Foetal Developmental Toxicity  
[http://www.precaution.org/lib/faroes\\_statement\\_pub.070801.pdf](http://www.precaution.org/lib/faroes_statement_pub.070801.pdf)

Waikato Regional Council recently (2014) commissioned a report into “Analysis of Waikato river water samples for selected endocrine disrupting chemicals and hormonal activity.” The Council is therefore aware of issues pertaining to chronic poisoning.

**Recommendation** That the WRC Science team review any current research focusing on 1080 poison and its ability to have endocrine disrupting, and negative hormonal activity on people, wildlife, and aquatic life, and to form a report to be presented to the 1080 Working Group, within one month.

### **Toxic carcasses left to decompose in watercourses**

The Department of Conservation’s hunting permits state – Standard conditions and notes: Clause 11 – Carcasses and offal must not be left near or in visitor facilities or waterways. (See copy of hunting permit in Appendices)

When aerial operations take place across the Waikato Region, poisoned animals inadvertently end up dying and decomposing in streams and watercourses. The Waikato Regional Council, DoC, and TBFree do not require streams to be inspected for decomposing, toxic carcasses. (1080 poison causes secondary poisoning)

Erma, in its reassessment of 1080 poison identified “poisoned carcasses as an on-going risk” ... “1080 residues are persistent in animal carcasses for prolonged periods in winter conditions” ... “The Agency understands that carcasses can reach waterways particularly after significant rain events and agrees there are some aspects which make this a higher risk in relation to drinking water contamination. In particular: a single carcass could [contain] a number of baits [and] the drinking water source may have already been declared free of contamination.”<sup>36</sup>

### **Humaneness**

VCS on behalf of DoC in its consent application to aerially drop 1080 on Mt Pirongia, made the following statement: “The poison works by breaking down the respiration process by the energy pathway in the body, causing possums to die from rapid cardiac or respiratory failure. It is highly effective and **humane**.”

DoC Science Advisor James Reardon said in a newspaper article “From a moral and ethical standpoint I absolutely acknowledge it’s not humane, but I have a professional responsibility to prevent extinctions.”<sup>37</sup>

A short video clip similar to this one will be presented ...  
<http://youtu.be/wcF53Ojc3n4>

### **Labelling**

Animal Control Products (ACP) is the SOE that imports 1080 poison into NZ, in its pure form. ACP then manufactures various poison products, including “0.15% 1080 Pellets.”

<sup>36</sup> ERMA reassessment decision.

<sup>37</sup> “Dissent at 1080 drop”, Fiordland Advocate, 28 Aug 2014. See appendix.

The ACP Safety Data sheet (see Appendices) states under Hazard Identifiers that 1080 is “Harmful to aquatic organisms”, and “Ecotoxic.”<sup>38</sup>

16. Other Information – This product is toxic to wildlife. Birds and mammals feeding on carcasses may be fatally poisoned. Take measures to minimise any chance of baits accidentally entering any body of water. Where practicable, the exposed bodies of all poisoned animals should be collected and destroyed by complete burning or deep burial at a landfill approved for hazardous substances.”

“Apply the product only as specified by label directions.”

The poison label that is attached to packaging states (among other directions) ...

“Very toxic to terrestrial animals and phytotoxic to many plants ...”

“Very toxic to aquatic wildlife: Manage bait application rates carefully and comply with any restrictions imposed on placing baits over or near waterways. ...

“Avoid the pollution of any water supply with the substance or used container ... “

“This product must only be used as specified in the label.”

"The pesticide user is legally responsible to follow all label directions."

Regardless of whether it's produced by NZ's bait manufacturer Animal Control Products, or Tull Chemicals in Alabama, every single product label, and safety data sheet says basically the same thing.

1. Keep 1080 products away from water.
2. Bury or burn poisoned carcasses, to prevent secondary poisoning and contaminating water supplies.

The RNZSPCA commented that all VTAs need to be used in accordance with the label, and that this is governed by the Agricultural Compounds and Veterinary Medicines Act 1997, which is administered by the ACVM group at MPI.<sup>39</sup>

The Ministry of Health says in its Public Health Unit (PHU) guidelines, that there is potential for 1080 "to pollute drinking water supplies through rain leaching the poison into the waterways from bait that is lying on the ground or from poisoned carcasses lying on the ground and/or through poisoned carcasses falling into the waterways."<sup>40</sup>

Tull Chemicals (the American manufacturer of 1080 poison) says on their label that: "The exposed bodies of all poisoned animals must be collected and destroyed by complete burning or deep burial at approved sites for hazardous waste where there will be little danger of contaminating water supplies."

This requirement to remove poisoned carcasses is on manufacturers' labels, safety data sheets and on the World Health Organization's Toxicity Report.

<sup>38</sup> Manufacturer label <http://pestoff.co.nz/images/stories/sds/sds1080pellets.pdf>

<sup>39</sup> Councillor correspondence.

<sup>40</sup> <http://www.health.govt.nz/publication/issuing-permissions-vertebrate-toxic-agents-vtas-guidelines-public-health-units>

WRC is an organisation committed to protecting biodiversity, and to following the rules, so it's essential that the instructions on the label and safety data sheet are followed in order to (1) minimise bykill of non-target wildlife, and (2) minimise the chance of baits and carcasses from contaminating ALL water supplies, not just the ones that are negotiated with landowners.

Additional risk is created in the form of liability if stock, pets or protected wildlife die unintentionally. Failure to follow the instructions on the label and SDS and to require others to do so through the consenting process, potentially leaves the council open to a legal challenge.

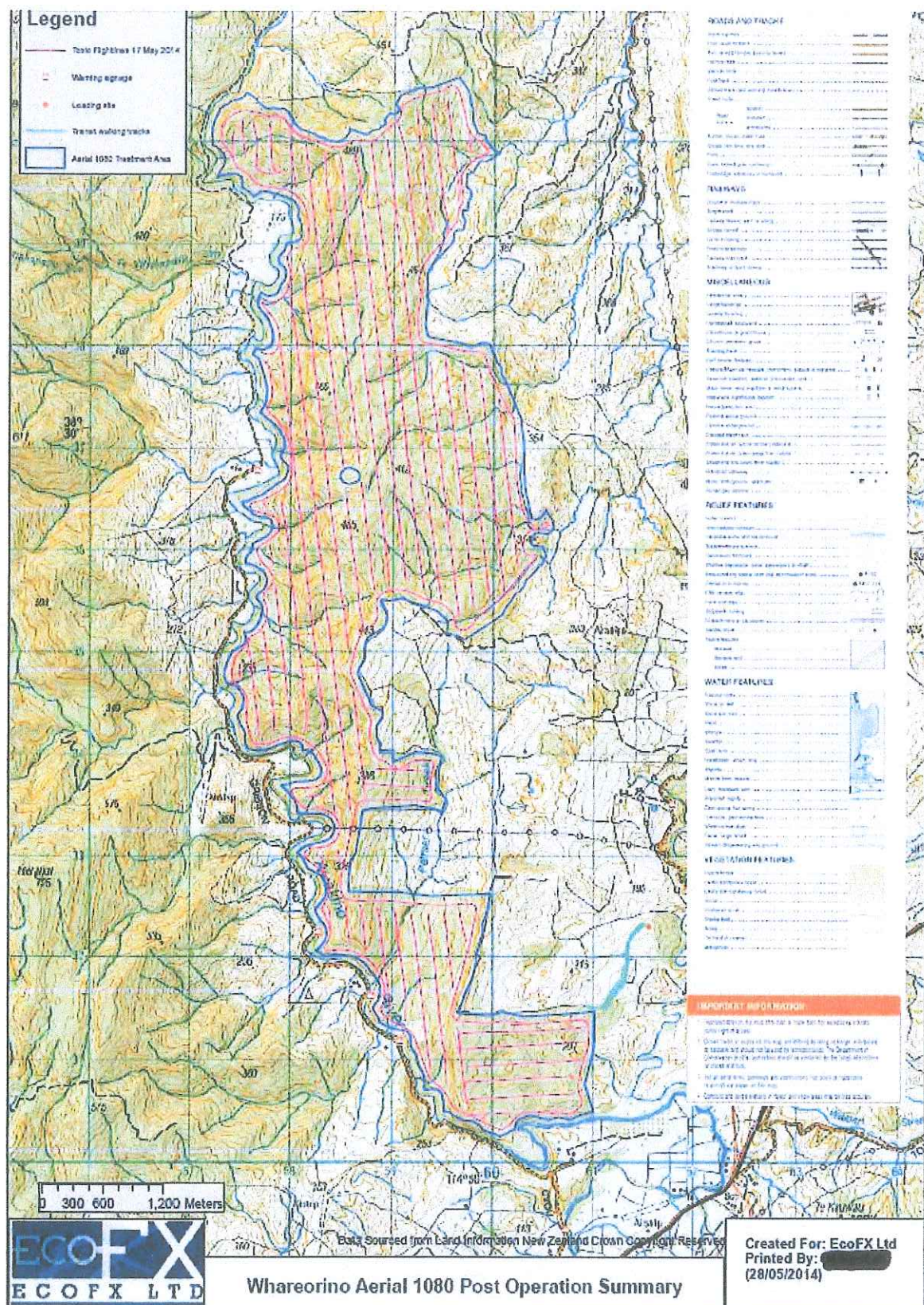
### **Summary**

Governors and decision-makers are asked to make a statement when they adopt the Regional Pest Management Plan, that they understand that there may be increased use of herbicides and pesticides, and that they are satisfied that the benefits outweigh the risks. They need to fully understand those risks and be satisfied with the science behind use of hazardous toxins, in order to accept that statement. There are numerous gaps and safety risks in relation to 1080 in water, water sampling and analysis. Those gaps need to be filled in order to make this data reliable for decision-making. Otherwise it is impossible to guarantee that vertebrate toxic agents such as 1080 are being used safely.

**Recommendation** That a 1080 working group be formed, that includes all councillors who wish to be included, to investigate and review the information in this report, and any other information the working group chooses to review, and report back to Council with a report and recommendations.

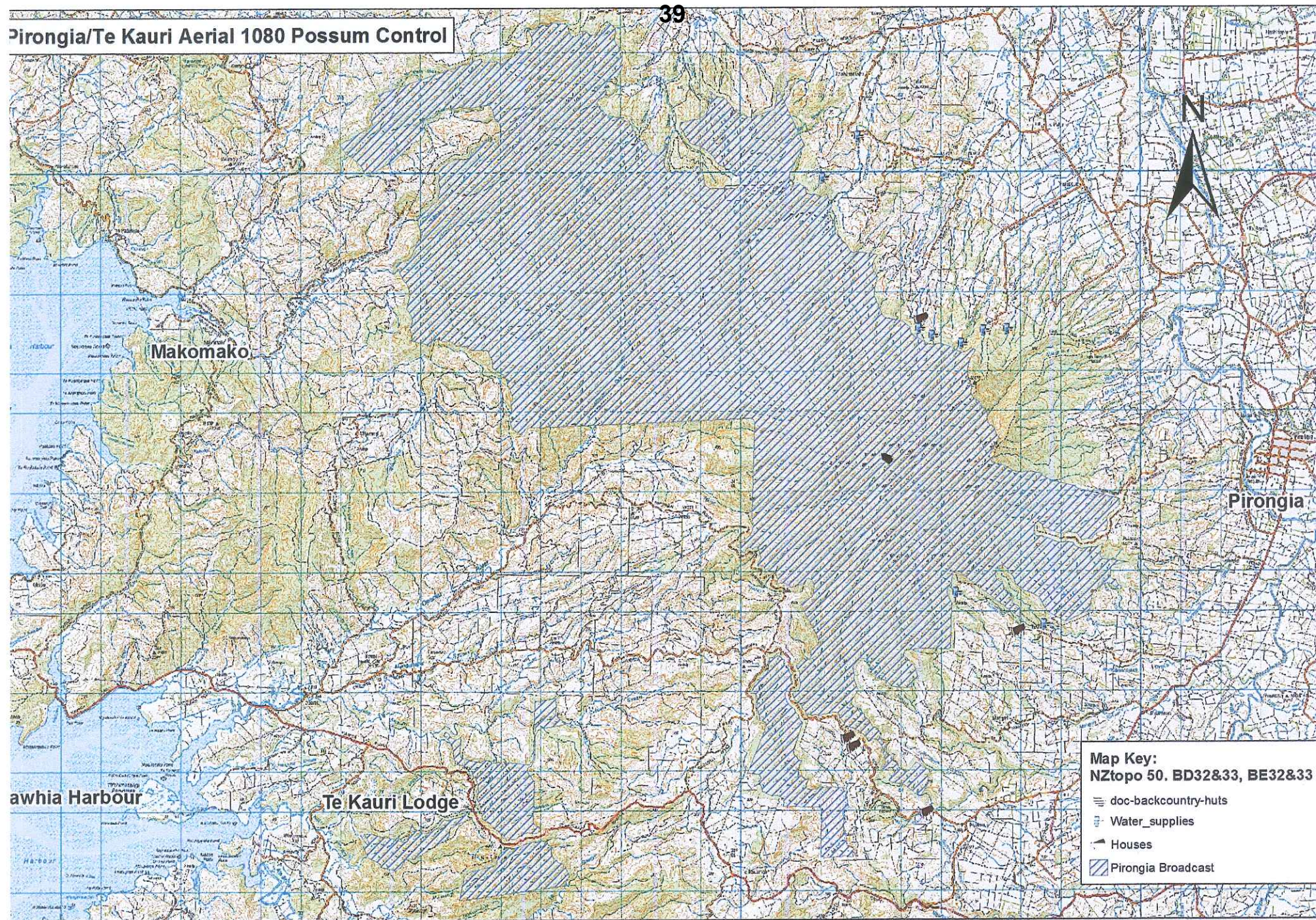
### **Appendices**







# Pirongia/Te Kauri Aerial 1080 Possum Control



awhia Harbour

Te Kauri Lodge

Pirongia

Map Key:  
NZtopo 50. BD32&33, BE32&33

- doc-backcountry-huts
- Water\_supplies
- Houses
- Pirongia Broadcast

Scale: 1:85,000

0 0.5 1 2  
Kilometres

This map was produced by VCS on behalf of The Department of Conservation for possum and rat control

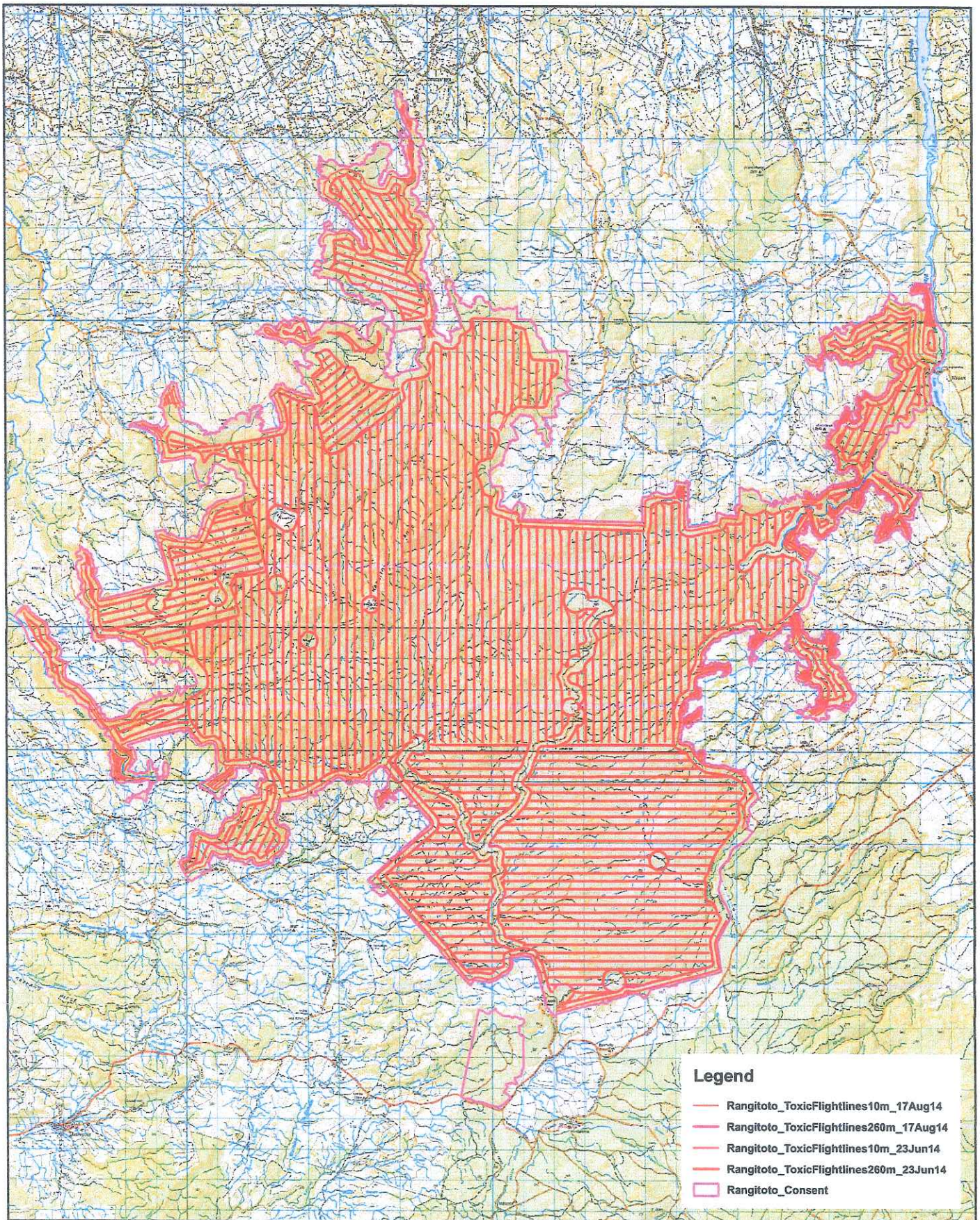
Imagery sourced from New Zealand Aerial Mapping Ltd and is the property of NZAM and the Waikato Regional Council 2012. Copyright Reserved

Projection: NZTM





## Rangitoto Range



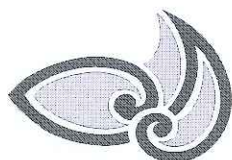
### TB Vector Control 13/14 and 14/15 - Toxic Flightlines



Map drawn 21 Aug 2014. FINAL. NZ Topo250-05, 09. SCALE: 1:113,698

**Epro**





Manaaki Whenua  
Landcare Research

## TOXICOLOGY LABORATORY

PO Box 40  
Lincoln 7640  
Ph: +61 3 321 9999  
Fax: +61 3 321 9998

### 1080 WATER SAMPLE DETAILS

#### Client details

Organisation: .....  
Contact name: .....  
Phone: ..... Fax: .....  
Date: .....

#### Operation details

Definitive name for treatment area: .....  
Map reference: NZMS 260: ..... Grid reference: .....  
Date of operation: .....

#### Poisoning

Bait type (e.g. 0.15% cereal) : .....  
Sowing rate (kg/ha) : .....

#### Sampling

Number of samples taken before operation: .....  
Number of samples taken from the treatment area after poisoning: .....  
Number of samples taken from the treatment area after a significant amount of rainfall, e.g. 25 mm: .....  
Number of samples taken from drinking water supplies: .....

Please return to:

Lynn Booth  
Landcare Research  
P.O.Box 40  
Lincoln 7640  
Fax: 03 321 9998

Sample results will be included in the 1080 water monitoring database.



20 October 2014

Clyde Graf  
Chair, Environmental Performance Committee  
Waikato Regional Council  
Private Bag 3038, Waikato Mail Centre  
Hamilton 3210

Dear Councillor Graf

I am responding to your Official Information Act request, sent by email on 7<sup>th</sup> October to Penny Fisher.

In this request you refer to an Environment Southland consent hearing for TbFree in 2013, in which the following was stated *"Samples results from 1080 aerial applications conclude that between 1990 and 2012, 2,639 water samples were taken and tested by Landcare Research after the aerial application of 1080. Traces of 1080 were found in only 3.34% (88) samples ranging from 0.1 to 9 ppb. Monitoring of waterways after the 1080 application will ensure stock drinking water does not breach the Ministry of Health acceptable value of 3.5 ppb."*

This appears to be quoted from page 5 of the 'Staff Report for Hearing' (document reference 13/CC/118, dated 12 December 2013). Please note that contrary to this statement, Landcare Research is not involved in 'taking' water samples after the aerial application of 1080, only in testing such samples that are sent to our toxicology laboratory by a range of clients.

With regards to your specific numbered questions, shown below in bold;

**1/ How many water samples did Landcare Research test in the time period stated above (in case the above is not accurate)?**

The stated number of samples tested within the stated time period is accurate.

**2/ Of all the samples Landcare Research tested within the time frame stated above (1990 - 2012) how many tested positive for 1080 poison?**

The number of samples that tested positive is as stated in the paragraph above.

**3/ Of all the samples Landcare Research tested, how many were taken within 8 hours of the aerial drop?**

This information is not provided when water samples are submitted to our laboratory for testing, such data rests with the agencies undertaking the field sampling or the clients who pay for the samples to be tested.

**4/ How many of the positive results were taken within 8 hours of the aerial drop?**

As per the above response, this is not information that we hold.

Yours sincerely

Richard Gordon  
Chief Executive

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**Subject:** RE: Question

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**From:** Sara Russell-Muti (Sara.Russell-Muti@tbfree.org.nz)

---

**To:** thegrafboys@xtra.co.nz;

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**Date:** Friday, 14 November 2014 4:37 PM

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Hi Clyde,

Sorry for delay on my reply – I thought I had replied already but with your question this week I noticed I hadn't. Very remiss of me.

Answers to your 15/10 email are here and 3/11 are below – thanks Sara

Please answer the following questions ...

1/ The hydrology technician was directed to collect the samples to be tested for 1080 poison residues at 24hours after the aerial drop. In this case, who gave that directive? Was it a Niwa set time-frame, OSPRI, or Medical Officer of Health to decide that sampling should be taken at 24hrs following the drop?

The 24 hour timeline is an MOH requirement , but in this case, the only MOH requirement is that in clause 25 that requires TBfree to test for no VTA contamination. TBfree chose to request the 24 hour sample. It could have been left for 48 hours if wanted but the objective is to get the domestic supply connected again ASAP.

2/ Of all the samples taken for this drop (performed at two different dates) what were the results of the samples? No 1080 was present.

**Sara Russell-Muti**  
Relationship Manager  
DDI 07 849 8910 • M 022 183 1426

---

OSPRI New Zealand | Operational Solutions for Primary Industries  
50 Church Road, Pukete  
PO Box 10522, Te Rapa, Hamilton 3241  
T 07 849 8913 • W [ospri.co.nz](http://ospri.co.nz)  

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**From:** clyde graf [mailto:thegrafboys@xtra.co.nz]  
**Sent:** Monday, 3 November 2014 9:02 a.m.  
**To:** Sara Russell-Muti  
**Cc:** Clyde.Graf@waikatoregion.govt.nz  
**Subject:** Question

Hi, Sara.

Can you answer the following question please? ...

1/ Does TBFree - OSPRI - keep records of the times when they take water samples following aerial drops? I know Landcare Research



## C2.5 Toxicity of 1080 to aquatic organisms

The aquatic toxicity data for 1080 are summarised in Table C6. The available set of high quality acute data is small. No chronic studies have been undertaken on aquatic organisms.

The applicants did not provide, and the Agency was not able to locate, any data on the aquatic toxicity of the metabolite fluorocitrate in water or soil.

On the basis of the information available, some algae are more significantly more sensitive to 1080 than fish or invertebrates. The small data set does not provide much indication of the sensitivities of different aquatic species, in particular, the screening result for mosquito larvae suggests that some species and/or life stages may be much more sensitive to 1080, but this cannot be confirmed.

The Agency notes that there is significant uncertainty regarding the aquatic classification of 1080 due to the quality of the data available. None of the aquatic plant studies has been conducted to current international standards. The level of uncertainty could be reduced if high quality data were available on the toxicity of 1080 to algae (eg, OECD test guideline 201; OECD 2006).

In the absence of high quality data, the Agency has classified 1080 as 9.1A highly toxic to the aquatic environment due to the toxicity to aquatic plants at <1 mg/L.

Table C6: Summary of aquatic toxicity laboratory data for 1080

Test species	Test type and duration	Test results <sup>1,2</sup>	Test method <sup>3</sup> (reference)
<b>Fish</b>			
Rainbow trout, <i>Oncorhynchus mykiss</i>	96-hour static	LC <sub>50</sub> 54 mg/L (95% CI 39–74 mg/L) 10% mortality at 23 mg/L LOEC 23 mg/L sub-lethal effects on survivors—not specified NOEC 13 mg/L	Stated as conducted to USEPA Guideline 72-1; no indication whether GLP compliant or not.  The applicants cited Fagerstone et al 1994 (a conference paper) as the reference for this study. The study is also summarised in USEPA 1995, which cites the original study as Collins 1993a. The USEPA document provided less detail than Fagerstone et al, only stating the LC <sub>50</sub> . Without access to the full text of the original study, the Agency is not able to fully verify the summary information available.  (Collins, 1993a, cited in Fagerstone et al 1994 and in USEPA 1995)
Rainbow trout	24 hours	No 'ill effects' at 580 mg/L	No further information available. (Bentley et al, 1958 cited in Batcheler 1978)
Bluegill sunfish, <i>Lepomis macrochirus</i>	96-hour static renewal	LC <sub>50</sub> >970 mg/L NOEC 970 mg/L (highest test concentration)	Stated as conducted to USEPA Guideline 72-1; no indication whether GLP compliant or not.  Comments as for Collins 1993a (above) (Collins, 1993b, cited in Fagerstone et al 1994 and in USEPA 1995)

Much of the older data are of poor quality, with insufficient information presented in the literature to allow full evaluation of the results reported. Some of the more recent studies, as presented in the published literature, also lack details which could be expected in a full regulatory report.

Wherever possible, the Agency has sourced and reviewed the primary data sources in an attempt to reduce some uncertainties inherent in relying on secondary or tertiary sources.

Collectively, the information available allows for a weight of evidence approach to assessing the ecotoxicity and environmental fate of 1080, despite some of the limitations noted in the relevant summary tables below. Where relevant, the Agency has identified where significant uncertainty has arisen because of the lack of data from high quality studies.

### C1.3 Relevant physico-chemical properties of 1080

Physical and chemical properties of 1080 relevant to the interpretation of ecotoxicity tests, environmental fate and exposure assessment are summarised in Table C3.

**Table C3:** Physical and chemical properties of 1080

Property	1080	Test method (reference)
Water solubility	1110 g/L	Unknown
Log Kow	-0.06	Estimated using CLOGP (Ellington and Stancil 1988)
pH	10.3	Unknown (USEPA 1995)
pKa	2.72 at 25°C	Unknown (Serjeant and Dempsey 1979)

## C2 Sub-class 9.1: Aquatic ecotoxicity, fate and degradation of 1080

Classification under this sub-class requires consideration of the acute and chronic aquatic toxicity and the properties of bioaccumulation and persistence of the substance (or in the case of mixtures, for components of the substance).

### C2.1 Aquatic fate and degradation of 1080

No standard guideline studies were submitted by the applicants on the aquatic fate and degradation of 1080 and none were located by the Agency other than on the hydrolysis of 1080 under United States Environmental Protection Agency (USEPA) test conditions.

A summary of the information available is in Table C4.

#### C2.1.1 Abiotic degradation of 1080

As noted in Table C4, 1080 is stable to hydrolysis in the absence of micro-organisms. There are no data on photolytic degradation of 1080 in water.



## Toxin Fact Sheet

### Sodium Fluoroacetate (1080)

#### Bait

- Bait comes in the form of carrot, cereal pellets, gel or paste.
- Distribution methods include aerial based (helicopter or fixed wing) and ground based methods.
- Ground methods include bait in bait stations, bait bags or applied on biodegradable cards, directly on the ground or placed in trees.
- Feed baits, used to familiarise animals with the bait type, are not toxic and are not dyed.
- Toxic baits are dyed green.
- There are no harmful effects from the smell of baits, which are often deliberately scented to attract possums.

#### Amount of Bait to Kill

Species	Grams of Bait	Number of Baits
Possum	1 to 4	1
Dog	3 to 9	1
Man	48 to 132 84 to 249	4 to 11 (pellets at 0.15%) 7 to 20 (carrot at 0.08%)

#### Poisoning Symptoms in Humans

- Nausea, vomiting, tingling and numbness in hands and face, stomach pains and anxiety.
- Muscular twitching, blurred vision and mental confusion.
- Coma, convulsions.

#### First Aid Treatment

- Call a doctor immediately.
- Give water, induce vomiting until vomit fluid is clear.

#### Dog Safety

- Do not take dogs into the operational area as dogs can be killed by eating 1080 baits.
- Carcasses remain toxic until completely decomposed; poison is found in the flesh and stomach content of the carcass.
- The biggest risk to dogs is...



The failure of members of the public to supervise dogs at all times on adjoining properties or to comply with warning sign advice are directly attributable to the majority of accidental dog poisonings.

## **5 Effects on Humans**

Susceptibility to 1080 poison varies between mammal species. 1080 is toxic to humans, if consumed in sufficient quantities. A single bait pellet is unlikely to have any effect on a human. A 50kg person would need to eat 10-16 6 gram baits to receive fatal dose, depending on their susceptibility and the concentration of poison in the baits. A small child's life could be endangered by eating 3-4 baits (calculated using 6 gram baits at the standard 0.15% 'weight for weight' toxin loading).

To avoid any accidental consumption of 1080 baits by people, the baits are coloured green, being the international colour for poisonous substances.

Public notification of the aerial discharge operation is an important component of the operation, specifically to protect human health. Public notification includes notices in local newspapers, warning signs at entry points to the operational area, and public information published by the Department of Conservation and the Waikato Regional Council. 4 advertorials will be undertaken advising the public of the aerial operation and the supporting ground control on the adjoining land surrounding the control area, as well as the nature and potential dangers of 1080 poison and the proposed timing of the application of bait.

## **6 Effects on Ecosystems**

### **6.1 Forest Health**

Possum populations have modified most New Zealand native forests, though the rate and extent of these changes varies widely between





Department of  
Conservation  
*Te Papa Atawhai*

## Hunting Permit

Permit number: [REDACTED]

Permit Validity Period: 13/09/14 - 12/01/15

Email: [REDACTED]

The permit authorises the above person to enter with a hunting weapon upon the specified permit area for the purpose of hunting or killing wild animals subject to the conditions printed on this permit and s38 of the Conservation Act 1987, s50 of the Reserves Act 1977 and s8 of the Wild Animal Control Act 1977.

### Special Conditions for areas covered by this hunting permit:

Region	Permit Area	Special Conditions
Central North Island	Kaimanawa Forest Park	1 dog per hunter allowed. A separate permit is required from the Taupo nui-a-Tia Area Office to use more than 1 dog. Kaimanawa Forest Park Permit Area Map (small)(JPG, 495K) (large)(JPG, 2072K)
Central North Island	Pureora Forest Park and surrounds	Up to 2 dogs allowed on this permit - max. 3 per party. No dogs are permitted in the Cowan or Meyer Block Wildlife Refuge or Mapara Wildlife Management Area. Pureora Forest Park and surrounds Permit Area Map (small)(JPG, 548K) (large)(JPG, 1654K)
Central North Island	Ruapehu Conservation Areas and Reserves	Dogs are prohibited, unless by separate permit issued by Ruapehu or Taupo nui-a-Tia Area Office. Use of dogs requires avian aversion training. Ruapehu Conservation Areas and Reserves Permit Area Map (small)(JPG, 525K) (large)(JPG, 2151K)
Central North Island	Tauranga Area	Use of dogs requires a permit issued by Tauranga Area Office. Kiwi aversion certificate needs to be sighted if taking hunting dogs into the Kaimai Mamaku Conservation Park south of State Highway 29. No dogs allowed in Otanewainuku Conservation Area or Ottawa Scenic Reserve. Tauranga Area Permit Area Map (small)(JPG, 543K) (large)(JPG, 2288K)
Central North Island	Te Urewera	Use of dogs requires a permit issued by Te Urewera Area Office or related Field Centres, kiwi aversion certificate & branding/tattoos needs to be sighted. Dog restrictions and temporary closures may exist in some areas, please contact your local Area Office or Field Centre for more information. Te Urewera Permit Area Map (small)(JPG, 477K) (large)(JPG, 2458K)
Central North Island	Tongariro National Park	Hunting is prohibited in the Ohakune water catchment. Dogs are prohibited, unless by separate permit issued by Taupo nui-a-Tia Area Office for specific areas within the park. Tongariro National Park Permit Area Map (small)(JPG, 466K) (large)(JPG, 1866K)

### Standard conditions and notes:

#### Standard conditions

1. This permit only allows ground based non-commercial hunting of deer, pigs, goats, wallabies, chamois or tahr within the timeframe specified as "permit validity period", unless otherwise stated in the Special Conditions.
2. The permit is only valid for the "open zone" area specified as green in the map associated with the permit area



(maps are available in the permit application system when an area is selected).

3. This permit does not entitle the holder to enter any area held under lease or where access is restricted by the Department. For details about land held under lease or restricted areas, contact the nearest Department of Conservation office.
4. This permit does not confer a right of access over any private land except by way of defined legal roads or rights of way. Permission to cross any private land must be obtained from the owner.
5. The permit does not confer the right to take vehicles or dogs onto Public Conservation Lands, unless otherwise stated in the Special Conditions above.
6. Only centre fire rifles of calibre .222 Remington or larger may be used for hunting, or crossbows and bows that meet the minimum standard specified by DOC (available at [www.doc.govt.nz/hunting](http://www.doc.govt.nz/hunting)). Shotguns, rimfire rifles, and .22 hornet are excluded.
7. Hunters wishing to use a firearm must abide by the conditions of the Arms Act.
8. No firearm is to be discharged in the vicinity of huts, tracks, campsites, roadends or any other public place in a manner that endangers property or endangers, frightens or annoys members of the public. No firearm shall be discharged or loaded within 500m of a Great Walk Hut.
9. Absolutely no spotlighting. Hunting wild animals during the hours of darkness (1/2 hour after sunset to 1/2 hour before sunrise) is prohibited.
10. This permit is not transferable and must be produced on demand to any authorised person and may at any time be cancelled by public notice or by e-mail or letter.
11. Carcasses and offal must not be left near or in visitor facilities or waterways.
12. Breach of any of the standard or special conditions renders this permit null and void and may result in prosecution.

#### Standard notes

- Be a responsible hunter. Follow the responsible hunting code ([www.doc.govt.nz/hunting](http://www.doc.govt.nz/hunting)).
- If you wish to hunt in a manner that isn't covered by this permit, contact the nearest Department of Conservation Office for information on how to apply for a permit for your intended activity.
- Information on pesticide use and other activities that may affect your hunting can be found at [www.doc.govt.nz/hunting](http://www.doc.govt.nz/hunting)

# HuttNZ

Local News, Current Affairs and Events for the Hutt Valley Wellington New Zealand

## Hutt Valley: 1080 warning after dog dies eating possum carcass on Hutt River

with one comment

### 1080 warning after dog dies

By COLIN WILLIAMS – Upper Hutt Leader

The death of a family dog from 1080 poisoning after eating a possum carcass on the Hutt River near Totara Park has highlighted that owners need to treat the river trail – one of the city's popular recreational spots – as a "no go area" for up to two months.

The two-year-old cross-breed dog endured a painful death early last Wednesday after it partially ate a possum the previous morning.

The possum would have been brought down the river after heavy rain following the recent massive 1080 poison aerial drop north of the city three weeks earlier.

The dog, which soon developed obvious neurological symptoms, was taken to an Upper Hutt veterinary clinic on

Tuesday and treated before a transfer to the Wellington 24-hour vet clinic where it died the next morning.

The dog's poisoning came the morning after the high risk of the poisoned carcasses was announced by the Wellington Regional Council and 250 warning signs at access points to the river and beaches from Te Marua to south of Eastbourne were put up.

Regional council workers went into emergency response in starting a search of the banks of the Hutt River, and the beaches, for carcasses (which present no risk, through handling, to humans).

"While the river was too high to search we concentrated on the beaches and then re-checked them daily after the high tide," regional council senior biosecurity officer Ray Clarey says.

"On September 1 the river had receded so we had three teams working, one from Totara Park north, one from Totara Park south and one from Petone north.





## 1080 possum carcasses risk to dogs

HANNAH MCKEE Last updated 11:28 19/09/2013

After a recent 1080 scare, Hutt Valley residents are being advised to keep man's best friend on a tight leash along the Hutt River and Wellington Harbour beaches.

Greater Wellington Regional Council warned last week that dog owners should stay away from these areas until staff had checked for possum carcasses poisoned with 1080, after heavy rain may have washed them down from Akatarawa Forest.

Council staff had been checking and placing warning signs along Petone, Eastbourne and Pencarrow beaches and the Hutt River from Te Marua to Petone

Greater Wellington spokesman Jim Flack said as of Monday morning, no possum carcasses had been found but they were still monitoring the situation.

"We are taking a very precautionary approach here, most of the debris went straight out to Cook Strait but a lot of branches and sticks came ashore to Pencarrow.

"The risk is if there is a possum tangled in branches or covered in sand, it's not obvious to humans but dogs can sniff it out."

Mr Flack said dog owners should keep their pet on a leash and not let it scavenge.

"If it doesn't eat a possum, it won't get harmed."

If a dog has contact with a possum carcass in the threatened areas, the Council advises owners to get their dog to vomit and take it to a vet urgently.

Mr Flack advised that dog owners should take these precautions until further notice from the council, which could take up to four months.

### - Hutt News

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"The river took two days to search and we rechecked it daily as the water level fell," Mr Clarey says.

One carcass found opposite Trentham Memorial Park, on the highway side of the river on Tuesday, had been partially eaten and is thought to be the remains of the possum partially eaten, further up the river, by the now dead dog.

Four possum bodies were found on the beaches between Petone and Eastbourne and four on the riverbed including two in Upper Hutt near Moonshine Bridge.

Tissue samples from all the possums will be sent away for testing, Mr Clarey says.

The council will continue their organised searches until water levels return to normal, council spokesman Jim Flack says.

"It is common for feral animals and livestock to wash down rivers during heavy rain," Mr Clarey says.

"With the recent 1080 possum control operation north of Upper Hutt, people should treat all possum carcasses as potentially poisonous, particularly dog owners.

"Please keep your dogs on a lead when using these areas, until the warning signs have been taken down," Mr Clarey says.

"A decaying possum is a tasty morsel for a dog, no matter how well fed it is. If that possum has been poisoned by 1080, it will poison the dog."

If dogs have contact with any possum carcasses they should be induced to vomit and immediately taken to a vet, he says.

[via Stuff/co.nz](http://via.Stuff.co.nz)

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Well being a dog owner this makes me sad, very sad.

But like last weeks message around pets being poisoned due to possum control, the city councils are in an invidious situation. They need to control this pest for the TB problem it presents to farm stock as well as for forest conservation. Possum numbers are huge in NZ, and especially around the Hutt Valley given its dedicated areas of forestry belts.

For years we have cried out for a alternative to 1080 and its consequences, in fact I think NZ is one of only a few countries still using it. But the problem lies in how to find something that is just as effective. I even think there is research been undertaken in labs to find some form of regressive gene or something I remember to stifle population growth. Unfortunately the knock on effect of posionings is still unpalatable to large numbers of Nzers, given the results of the above, and the impact on bird numbers too.



## 1 Overview of 1080 Poison

Sodium fluoroacetate, or compound 1080<sup>1</sup>, is the only permitted aerial means of possum control currently available to official control agencies in New Zealand. It is an odourless, non-volatile and virtually tasteless fine white powder. 1080 poison in cereal baits biodegrades rapidly in the normal conditions. The toxin is broken down by soil micro-organisms and water into its harmless chemical constituent parts.

1080 occurs naturally as a toxin called *fluoroacetate* found in plants in South Africa, South America and Australia, and it is thought to have evolved as a deterrent to browsing animals. The concentration of fluoroacetate in the leaves and seeds from some plants in the wild is greater than the concentrations used in baits for possums. 1080 is found in low concentrations in tea, and guar gum (used as a binding agent in food such as chewing gum and ice cream).

A synthetically manufactured version of the poison, sodium fluoroacetate or 1080, was first tested in New Zealand in 1954 and since then has been used extensively to control both rabbits and possums. It has been the key means of controlling mammal pests in New Zealand since the late 1950s.

The poison works by breaking down the respiration process, or the energy pathway in the body, causing possums to die from rapid cardiac or respiratory failure. It is highly effective and humane. Some impacts on non-target species are also likely, particularly by-kill of stoats and rodents from eating baits or poisoned animal possum carcasses. Birds can also be susceptible to 1080 bait but impacts on bird populations are minimised by ensuring quality control of baits and reducing sowing rates to a minimum.

<sup>1</sup> Generally referred to simply as '1080'.



and that's plenty for kids that are five and six."

but especially Te Anau. I don't know what they were doing

Running the competition **54s** always a combined effort from all

next year, because it worked really well, Mr White said.

out of their vehicles when stopped in an avalanche area," he said.

## Dissent at 1080 drop

**FIORDLAND ADVOCATE**  
28 AUG 2014

(Continued from Page 1)

If you look around here, the only skill seems to be leaning on a car with their hands in their pockets," Mr Wilson said.

The SPCA was dead against the use of 1080, which killed everything that ingested it including the birds it sought to protect, and was often a slow and agonising death, Mr Wilson said.

Is it ethical? No. Is it humane? No," he said. "It's cheap and it's quick to poison our country."

DOC science adviser James Reardon said there was simply no viable alternative, and he was happy to wear the controversy.

From a moral and ethical standpoint, I absolutely acknowledge it's not humane," he said. "But I have a professional responsibility to prevent extinctions."

The sites targeted in the Battle for our Birds poisoning operation amounted to less than 10 percent of the National Park, Mr Reardon said. The focus was on those places where the last remnants of the most critically endangered species were.

Combating the pest plague with trap lines would require a trap



Manapouri and Te Anau residents Bruce Parsons and Dave Wilson protest at the Iris Burn 1080 poison loading site on Monday.

every 50 metres, and they would likely need resetting daily, Mr Reardon said.

"Plus it's mostly forest on slopes steeper than 60 degrees."

DOC's historical policy of not officially responding to protesters had allowed hearsay and misinformation to spread unabated, Mr Reardon said.

DOC has in the past put a moratorium on certain methods of trapping, such as glueboards, but a 2011 report from the Parliamentary Commissioner for the Environment concludes that there should be no such moratorium placed on the use of aerial 1080.

"High influxes of rats are impossible to keep at bay with traps," the report says. "Ground control methods, no matter how sophisticated, simply cannot cover large areas of rugged terrain or prevent the devastation of past years."

"1080 is the only poison currently available for aerial pest control on the mainland that can do this job."

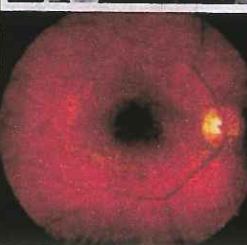
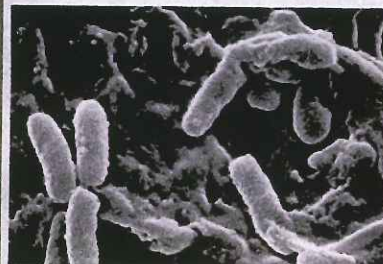
Warning signs advising the public about the dangers of the pesticide are in place at the main entrance points to the Kepler Track and boundary of the operation area.



## EYEBALL WORLD

Eyes are covered in bacteria. Eyelashes, eyelids, glands. Covered. Mostly in Gram positive 'good bacteria'. They rarely cause visual loss. With antibiotic resistance, and the need to 'keep our powder dry' for bad cases, mild cases of 'good' bacterial conjunctivitis therefore don't warrant antibiotics, because the eye will generally sort itself out anyway. But if 'bad' Gram negative bacteria get involved (like in chlamydial or gonorrhoeal conjunctivitis – truly, it happens!), then an antibiotic is used to prevent vision loss from these virulent types of bacteria. The patient must use the antibiotic as directed to get a "therapeutic dose". If you don't, bacteria get a 'sub-optimal dose', adapt, and become further resistant. Likewise, if you use an antibiotic too long, the bacteria will again adapt and gain resistance.

*Pseudomonas* sp (picture left) are tough, antibiotic resistant, gram negative bacteria that live in soil. It can apparently destroy the front of your eye in 48hrs given the right conditions (picture right). It's also one reason DOC can claim 1080, an unbelievably potent toxin with a 'variable lethal dose' (as it kills everything), biodegrades. Every living thing in the forest that breathes oxygen (insect, mammal, bird) converts 1080 to the 2R, 3R (-) erythrofluorocitric acid metabolite, and this metabolite stops their ability to make energy, and they die. Except *Pseudomonas*. It doesn't need oxygen, and after everything else has died their horrible death, it can 'de-fluorinate/de-toxify' the remaining 1080. Silent, lifeless NZ forest inhabited by potentially virulent bacteria. 1080 – another successful human intervention in the natural world.



### FIORDLAND EYECARE

OPTOMETRIST - DARYL PARKES

Fiordland Health Centre, 25 Luxmore Drive, Te Anau

OPEN MONDAY, TUESDAY AND WEDNESDAY. PHONE 249 8946. MOB 021 211 4533. EMAIL [fiordlandeyecare@clear.net.nz](mailto:fiordlandeyecare@clear.net.nz)



# DANGER - DEADLY POISON

KEEP OUT OF REACH OF CHILDREN. ECOTOXIC.

HSNO CLASSES: 6.1A, 6.3B, 6.4A, 6.8A, 6.9A, 9.1A, 9.3A, 9.4B



## 1080 SOLUTION



To be incorporated into baits for poisoning of rabbits, possums, deer or wallabies.

Soluble concentrate containing 200g/litre sodium fluoroacetate.

**Acutely toxic:** May be fatal if swallowed, inhaled or absorbed through the skin. Repeated exposure may damage fertility, the unborn child, and internal organs. When handling open containers or baits, wear full protective equipment as shown in precautions box below in order to avoid all skin and eye contact.

**Very toxic to terrestrial animals and phytotoxic to many plants:** Take measures to reduce the risk to non-target animals which may either eat baits treated with the substance or which may scavenge the carcasses of poisoned animals.

**Very toxic to aquatic life:** Manage bait application rates carefully and comply with any restrictions imposed on placing baits over or near waterways. Avoid pollution of any water supply with the substance or used container.

**Symptoms of poisoning:** Early Symptoms: Nausea, vomiting, tingling and numbness in face and hands, stomach pains, apprehension and anxiety. Later Symptoms: Muscular twitching, blurred vision, mental confusion. Severe Symptoms: Coma, convulsions, death.

**First Aid:** Act immediately if poisoning is suspected. DO NOT induce vomiting. Call a doctor or emergency physician at your nearest hospital immediately. For further advice contact National Poisons Centre 0800 POISONS (Phone 0800 764 765).

**Precautions:** When handling open containers, mixing the concentrate or applying it to baits, wear full face and eye protection, a full length waterproof apron, overalls worn outside rubber boots, and impervious rubber or PVC gloves. Do not eat, drink or smoke when using the product or when handling open containers or baits. Wash protective clothing and equipment daily after work. Remove protective clothing and wash hands and exposed skin thoroughly before meals and after any contact. Thoroughly wash implements, mixing and spreading equipment, aircraft and other contaminated items before removing them from the operational area.

**Storage:** Store in original container, lightly closed, under lock and key and away from feed or food-stuffs. Keep out of reach of children. This product must always be under the control of an approved handler who holds a current test certificate endorsed for Class 6 and Class 9 substances.

**Tracking:** It is a legal requirement that this product is tracked using the unique pack identifiers for its full lifecycle, including date, location of its use or means of disposal.



**Spillage:** In the event of a spill, inform the Fire Service immediately, and then local health protection officers at your District Health Board or hospital. Isolate the spill area and exclude all bystanders. Use absorbent material to soak up the spilled concentrate. Recover the absorbent material when absorption is complete and place in suitable, marked containers for disposal. Take all practicable steps to manage any harmful effects of a spillage including preventing the concentrate from entering streams or waterways. Wash down the spill area with copious water only after all absorbent material has been removed. If necessary, place a barrier and warning signs around the spill area to prevent entry until the area is safe.

**Shelf life:** When stored appropriately, this product should show no significant degradation up to the expiry date shown on the container. Contact your supplier for further information about the use of any product after the expiry date.

**Livestock:** It is extremely important to prevent access to baits by domestic livestock and pets. Stock must be kept off the treatment area until baits have been washed out by rain, removed or destroyed. Dogs and cats are particularly at risk from eating poisoned animal carcasses and pet owners in the immediate vicinity must be notified of this risk. Collect poisoned animal carcasses where practicable for burning or burying below 500mm deep, or limit access to the treatment area until carcasses are unlikely to be eaten or to contain residues.

**Transport information:** UN 2802. Pesticides, liquid, toxic, nos. Packing Group I. Toxic 6.1A, Hazchem: 2XE

**Conditions of sale:** As no control can be exercised over the methods or conditions under which this product is used, no responsibility or claim, other than those required by statute, will be accepted for any damage or injury whatsoever arising from the storage, handling, application, use or disposal of this product.

**Legal Obligations:** This product must be sold only to or used by a person holding a Controlled Substances Licence issued by a test certifier who has been approved. If the product is applied to baits for aerial application, public notification is required. Additional permissions may be required depending on the method of use and location of use. Signs must be erected at every normal point of entry to the place where bait incorporating this substance is to be applied. Signs must remain in place until baits are retrieved or are no longer toxic, or until any other legal requirement affecting signage has been complied with. This product must only be used as specified in the label.

**NET CONTENTS: 5 LITRES**

### DIRECTIONS FOR USE:

#### SHAKE WELL BEFORE USING

#### DILUTION OF CONCENTRATED SOLUTION

1:8 Dilution	1 part concentrate to 8 parts water containing dye and lure
2:8 Dilution	2 parts concentrate to 8 parts water containing dye and lure
4:8 Dilution	4 parts concentrate to 5 parts water containing dye and lure
5:5 Dilution	5 parts concentrate to 5 parts water containing dye and lure
7.5:2.5 Dilution	7.5 parts concentrate to 2.5 parts water containing dye and lure

#### CARROT BAIT

**RABBIT** 0.2 g/kg (0.02%) To one tonne of chopped carrots add 10 litres of 1:9 dilution. After a period of 3-4 days pre-feeding, apply bait at up to 40 kg per hectare for heavy infestations, up to 20 kg/ha for medium infestations and up to 10 kg for low to moderate infestations.

**POSSUM** 0.8 g/kg (0.08%) To one tonne of chopped carrots add 10 litres of 4:8 dilution

1.0 g/kg (0.1%) To one tonne of chopped carrots add 10 litres of 5:5 dilution

1.5 g/kg (0.15%) To one tonne of chopped carrots add 10 litres of 7.5:2.5 dilution

Apply bait in bait stations spaced 50 meters to 200 meters apart or broadcast baits by hand, mechanical spreader or by aircraft at rates up to 20 kg per hectare. Pre-feeding with non-toxic bait is recommended for best results.

**DEER** 1.5 g/kg (0.15%) To one tonne of chopped carrots add 10 litres of 7.5:2.5 dilution. Deer repellent: When possum control is to be undertaken in areas where feral deer may be at risk from eating baits, EDR™ deer repellent, applied to the surface of prepared carrot baits at a rate of 12 kg per tonne in accordance with the manufacturer's label instructions, may be used to reduce or eliminate the uptake of baits by deer.

**WALLABY** 1.5 g/kg (0.15%) To one tonne of chopped carrots add 10 litres of 7.5:2.5 dilution. Use in bait stations spaced 50 meters to 200 meters apart or broadcast baits by hand, mechanical spreader or by aircraft at rates up to 20 kg per hectare. Pre-feeding with non-toxic bait is recommended.

#### OAT BAIT

**RABBIT** 0.4 g/kg (0.04%) To one tonne of boiled oats add 10 litres of 2:8 dilution. Sow oats in lines at a rate of 20-25 kg per km using a vehicle fitted with a scratch plough to turn soil and attract rabbits. Alternatively, spot lay small piles of oats on tinned soda (approx 200 g per spot) around warrens, near buck heaps or adjacent to cover. Aerial broadcast at rates of up to 30-40 kg per hectare where very high rabbit densities occur. Pre-feeding with non-toxic oats is recommended for best results.

#### APPLE BAIT

**POSSUM** 0.8 g/kg (0.08%) To one tonne of cut apple add 10 litres of 4:5 dilution

1.5 g/kg (0.15%) To one tonne of cut apple add 10 litres of 7.5:2.5 dilution

Use only in bait stations spaced 50 meters to 200 meters apart. Pre-feeding with non-toxic cut apple bait for 4-5 days before laying toxic will improve the uptake of toxic bait.

Registered pursuant to the ACVM Act 1997, No. V2189

See <http://www.nzfsa.govt.nz/acvm> for conditions of registration.

Registered to and Manufactured by Animal Control Products Ltd  
406 Heads Road, Wanganui, New Zealand, Ph 64 6 344 5302 and  
18 Hayes Street, Waimate, New Zealand, Ph 64 3 689 8367  
For safety data sheet go to <http://www.pestoff.co.nz/msdpage.htm>



4G/X24/S/04  
NZ/ACP Ltd

## ANIMAL CONTROL PRODUCTS LTD



## SAFETY DATA SHEET

## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

<b>Product Name:</b>	(a) 0.04% 1080 PELLETS (b) 0.08% 1080 RODENT PELLETS (c) 0.08% 1080 PELLETS (d) 0.10% 1080 FERAL CAT BAIT (e) 0.15% 1080 PELLETS (f) 0.2% 1080 PELLETS
<b>Synonyms:</b>	1080 pellets
<b>Supplier:</b>	Animal Control Products Ltd
<b>Street address:</b>	Physical address: 408 Heads Road, Whanganui 4501, New Zealand.
<b>Postal address:</b>	Postal address: Private Bag 3018, Whanganui 4540, New Zealand.
<b>Telephone:</b>	64 (0) 6 344 5302
<b>Facsimile:</b>	64 (0) 6 344 2260
<b>After hours telephone numbers:</b>	0274798 318 or 0274798 319
<b>ACCIDENTAL HUMAN POISONING</b>	Dial 111 and be ready to provide information from the product label to medical personnel. Free phone 0800 764 766
<b>National Poisons Centre: Emergency phone number for spills, transport emergencies and risk mitigation:</b>	Dial 111

## 2. COMPOSITION / INFORMATION ON INGREDIENTS

<b>Product Name:</b>	(a) .04% 1080 PELLETS (b) 0.08% 1080 RODENT PELLETS (c) 0.08% 1080 PELLETS (d) 0.10% 1080 FERAL CAT BAIT (e) 0.15% 1080 PELLETS (f) .2% 1080 PELLETS
<b>Synonyms:</b>	1080 pellets
<b>Active Ingredient:</b>	Sodium fluoroacetate 0.04% - 0.2%
<b>Other Ingredients:</b>	(a, b, c, e, f) Cereals, sugars and binders (d) Fishmeal, fish oil and binders
<b>Molecular Weight of Active:</b>	100.02
<b>Molecular Formula of Active:</b>	F C H <sub>2</sub> CO <sub>2</sub> Na
<b>Recommended Use:</b>	Pelletised bait for the control of rabbits, possums, rodents, wallabies or feral cats.
<b>Appearance:</b>	Cylindrical green pellets.

## 3. HAZARDS IDENTIFICATION

**STATEMENT OF HAZARDOUS NATURE:** This product contains a DEADLY POISON.

**HSNO Approval Codes:** HSR002422 (0.04%-0.08%), HSR002423 (0.1%), HSR002424 (0.15%-0.2%)

<b>HAZARD CLASSES:</b>	<b>0.04% &amp; 0.08% 1080 pellets:</b> 6.1C, 9.3B <b>0.1% 1080 pellets:</b> 6.1C, 6.8A, 9.1D, 9.3B <b>0.15% - 0.2% 1080 pellets:</b> 6.1B, 6.8A, 9.1D, 9.3A
<b>HAZARD IDENTIFIERS:</b>	<b>Priority Identifiers</b> - Danger. Deadly Poison. Keep out of reach of children. Ecotoxic.



<b>HAZARD IDENTIFIERS continued:</b>	<b>Secondary Identifiers</b> - Acutely toxic. May be fatal if swallowed, inhaled or absorbed through the skin. Repeated oral exposure may cause reproductive or developmental damage. When handling open containers or baits, wear protective equipment as indicated below. Toxic to terrestrial vertebrates. Take measures to reduce the risk of non-target animals being exposed to the toxin either through eating baits or by scavenging the carcasses of poisoned animals. Harmful to aquatic organisms. Manage bait application rates carefully and comply with any restrictions imposed on placing baits over or near waterways. Avoid pollution of any water supply with pellets or used container.
<b>DANGEROUS GOODS CLASS:</b>	<b>0.04% - 0.1%</b> 6.1C (Packing Group 3) <b>0.15% - 0.2%</b> 6.1B (Packing Group 2)
<b>GENERAL REQUIREMENTS:</b>	Deadly Poison. Subject to tracking requirements for individual packs. Available for purchase and use only by holders of Controlled Substances Licenses. This substance must be under the control of an Approved Handler for Class 6 and Class 9 Hazardous substances at all times unless being transported by a transport operator with a Dangerous Goods License endorsement.

**SYMPTOMS OF POISONING:**

**Early Symptoms:** Nausea, vomiting, tingling and numbness in face and hands, stomach pains, apprehension and anxiety.

**Later Symptoms:** Muscular twitching, blurred vision, mental confusion.

**Severe Symptoms:** Coma, convulsions.

**4. FIRST AID MEASURES**

**Ingestion:** **Seek immediate medical assistance in all cases where poisoning is suspected.** National Poisons Centre recommends against inducing vomiting in most cases but in particular, never use any chemical means of inducing vomiting. In areas remote from medical assistance, there may be benefit in inducing vomiting by placing a finger down the throat. Giving the patient ½ glass of whiskey with a tablespoon of sugar added may be of possible benefit if carried out immediately after poisoning has occurred.

**Eye Contact:** Wash eyes with copious amounts of water.

**Skin Contact:** Wash exposed area twice with soap and water.

**Contaminated Clothing:** Remove contaminated clothing and wash before re-use. Wear rubber gloves, overalls and secure footwear when handling 1080 pellets. Check pockets of protective clothing for dust, fragments and pellets. Do not eat, drink or smoke. Clothing and gloves must be decontaminated by washing in hot soapy water. Ensure pellets are not trampled off site.

**Do NOT induce vomiting or give anything by mouth if patient is unconscious or convulsing.**

**PROMPT TREATMENT IS ESSENTIAL. CALL FOR MEDICAL ATTENTION IMMEDIATELY.**

**5. FIRE FIGHTING MEASURES**

Low flammability risk. 1080 pellets have no toxic emissions as either vapours, gases or odours. In pellet form, hazards arise through prolonged direct contact with skin, or by ingestion.

## 6. ACCIDENTAL RELEASE MEASURES

In the event of major spills, inform the Fire Service immediately via the 111 emergency phone service, and then local health protection officers at your District Health Board or hospital.

Isolate the spill area and exclude all bystanders. Take all practicable steps to manage any harmful effects of a spillage including preventing baits from entering streams or waterways. Scoop spilled baits into secure containers. Recover any undamaged bait for later use by placing in appropriately labeled containers and dispose of spoiled bait as directed below. Use a broom to collect fine material and wash down the spill area with copious water only after all spilled bait has been removed. Give consideration to possible hazards arising from washing down and ensure people, pets, livestock, wildlife and fish will not be exposed to the dilute toxic run-off.

## 7. HANDLING AND STORAGE

When handling open containers or baits, wear overalls worn outside rubber boots, and impervious rubber or PVC gloves. When loading aircraft or working in windy conditions, wear goggles and a dust mask as protection against dust entering the eyes or mouth. Do not eat, drink or smoke when using the product or handling open containers. Wash protective clothing and equipment daily after work. Remove protective clothing and wash hands and exposed skin thoroughly before meals and after any contact.

Store in original container, tightly closed, under lock and key and away from feed or foodstuffs. Keep out of reach of children. This product must always be under the control of an approved handler who holds a current test certificate endorsed for Class 6 and Class 9 substances.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Occupational Exposure Limits:** Ministry of Health exposure limit set February 2002 is 0.015 micrograms of 1080 per ml in urine.

**Tolerable Exposure Limits (TEL) :** ERMA NZ has prescribed the TEL<sub>water</sub> for sodium fluoroacetate, expressed as the amount of sodium fluoroacetate per volume of water as 0.0035 milligrams per litre of water (0.00000035%).

**Engineering Measures:** Decontaminants are water (dilution), heat > 120°C (denaturing) and microbial decomposition (degradation).

**Personal Protection Equipment:** Operators using or handling the product in open containers must wear gloves, overalls and waterproof boots. Do not smoke, drink or eat while handling the product. Wash hands, face and any exposed areas after use. Wash protective equipment immediately after use or otherwise isolate and containerise for return to a washing facility. When working around aircraft, wear a suitable dust mask to prevent inhalation of airborne particles.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Form / Colour / Odour:** 1080 pellets in have a cylindrical form, are dyed green and may have an odour of cinnamon, fruit flavouring or fish.

<b>Solubility in Water (g/L)</b>	Pellets will eventually lose their form and disintegrate if immersed in water for several hours or more.
<b>Decomposition Point (°C)</b>	The active ingredient 1080 decomposes at 200 degrees Celsius and becomes unstable at 110 degrees Celsius.

## 10. STABILITY AND REACTIVITY

1080 pellets are stable and non-reactive under normal storage and use conditions.



## 11. TOXICOLOGICAL INFORMATION

Exposure must be kept to absolute minimum. Sodium fluoroacetate may be absorbed through the eyes, broken skin or via the mouth.

### TOXICITY DATA FOR THE ACTIVE INGREDIENT - VARIOUS SPECIES\*

White laboratory rat (oral) LD <sub>50</sub>	0.2 mg/kg B/W (Body Weight)
Brush-tailed possum (oral) LD <sub>50</sub>	0.3 – 1.0 mg/kg B/W
Dog (oral) LD <sub>50</sub>	0.1 – 0.35 mg/kg B/W
Cat (oral) LD <sub>50</sub>	0.35 mg/kg B/W
Bennett's wallaby (oral) LD <sub>50</sub>	0.2 mg/kg B/W
Mule deer (oral) LD <sub>50</sub>	1.0 mg/kg B/W
Mouse (oral) LD <sub>50</sub>	5.0 – 19.3 mg/kg B/W
Human (oral) LD <sub>50</sub> (estimated)	0.7 – 2.1 mg/kg B/W

\* Data from US Department of the Interior, Biological Report No. 27 (1995); Ronald Eisler "Sodium monofluoroacetate (1080) Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review"

## 12. ECOLOGICAL INFORMATION

Use the pellets only for the purpose indicated and in the manner prescribed by the label. Sodium fluoroacetate may be present for many months in the carcasses of poisoned animals; thus presenting a secondary poisoning danger to carnivorous birds and mammals. Take steps to mitigate any potential non-target exposure by wildlife or domestic animals. Studies have shown that 1080 concentrations will decline within rotting carcasses through the microbial degradation of 1080.

1080 wastes are ecotoxic. Improper disposal of excess pesticide is unlawful. If wastes can not be disposed of by use according to label instructions, contact local Regional Council or a hazardous waste advisor for guidance.

## 13. DISPOSAL CONSIDERATIONS

The active ingredient sodium fluoroacetate is degraded through microbial activity and will decompose at temperatures above 200 degrees Celsius. It dilutes readily in water. Product which is surplus or spoiled should be disposed of by burying with other organic material on the active tip face of an appropriately managed landfill or buried within the biologically active layer of soil elsewhere within a secure area. Ensure that a good covering of earth is applied over the bait immediately to prevent access by scavenging birds. Avoid deep disposal or burying where groundwater contamination may occur. Alternatively, burn unwanted bait material in a suitably constructed and appropriately located incinerator and bury any residues as above. Treating the baits through a sewage oxidation facility or other chemical treatment facility is also an acceptable means of disposing of unwanted bait material where this is allowed by local by-laws and regulations.

Burn empty bags or bury in a suitable location at a landfill at a depth of at least 60 cm. Do not use the empty container for any other purpose.

## 14. TRANSPORT INFORMATION

<b>Proper Shipping Name:</b>	Pesticide, solid, toxic, n.o.s. [contains Sodium fluoroacetate]
<b>U.N. NO:</b>	2588
<b>Class:</b>	6.1
<b>Packing Group:</b>	III (0.04% - 0.1%) and II (0.15% - 0.2%)
<b>Maximum transport quantity as tools of trade:</b>	0.04% - 0.1% = 250 kilograms 0.15% - 0.2% = 50 kilograms (Placarding and DG documents not required but this Safety Data Sheet must be carried.)

## 15. REGULATORY INFORMATION

**Deadly poison:** Available only to holders of Controlled Substances Licenses or persons licensed to transport dangerous goods. Label directions are mandatory. Registered Pesticides:

- (a) .04% 1080 PELLETS – V003785. HSNO Approval HSR002422
- (b) 0.08% 1080 RODENT PELLETS - V009015. HSNO Approval HSR002422
- (c) 0.08% 1080 PELLETS – V002829. HSNO Approval HSR002422
- (d) 0.10% 1080 FERAL CAT BAIT – V004107. HSNO Approval HSR002423
- (e) 0.15% 1080 PELLETS – V002848. HSNO Approval HSR002424
- (f) .2% 1080 PELLETS – V002538. HSNO Approval HSR002424

**Packaging approvals:** The packaging for these products has been tested and complies with the UN convention for transportation of dangerous goods and with the ERMA NZ HSNO controls and variations stipulated under the 1080 re-assessment decision arising from application HRE05002 and released on 10 August 2007.

## 16. OTHER INFORMATION

### SPECIAL PRECAUTIONS & OTHER COMMENTS:

**It is strongly recommended that approved handlers carry an operable telephone, radio telephone or other means of obtaining urgent medical assistance as a precaution when using 1080 poison. Test communication systems and coverage before commencing operations.**

May be fatal if swallowed. Wear waterproof gloves when using 1080. Wash hands after handling pellets or animals that have been contaminated with 1080. Do not use poisoned or contaminated animals for food or feed.

This product is toxic to wildlife. Birds and mammals feeding on carcasses of contaminated animals may be fatally poisoned. Take measures to minimise the chance of baits accidentally entering any body of water. Apply the product only as specified by label directions.

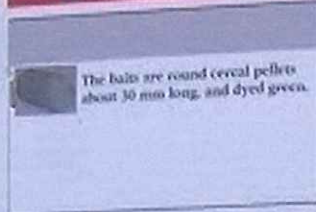
Where practicable, the exposed bodies of all poisoned animals should be collected and destroyed by complete burning or deep burial at a landfill approved for hazardous wastes. Dehydrated carcasses may remain dangerous to dogs or cats for an indefinite period. A single mouse poisoned by 1080 may contain enough poison to kill an adult dog.

### CONSULT NEAREST POISON CONTROL CENTER FOR CURRENT INFORMATION.

**All information contained in this Data Sheet is as accurate and up-to-date as possible. Since Animal Control Products Ltd cannot anticipate or control the conditions under which this information may be used, each user should review the information in the specific context of the intended application.**

**Revised by: WJ Simmons  
Date of Revision: 6 May 2011**





The baits are round cereal pellets about 30 mm long, and dyed green.



# Warning 1080 Poison Sodium fluoroacetate

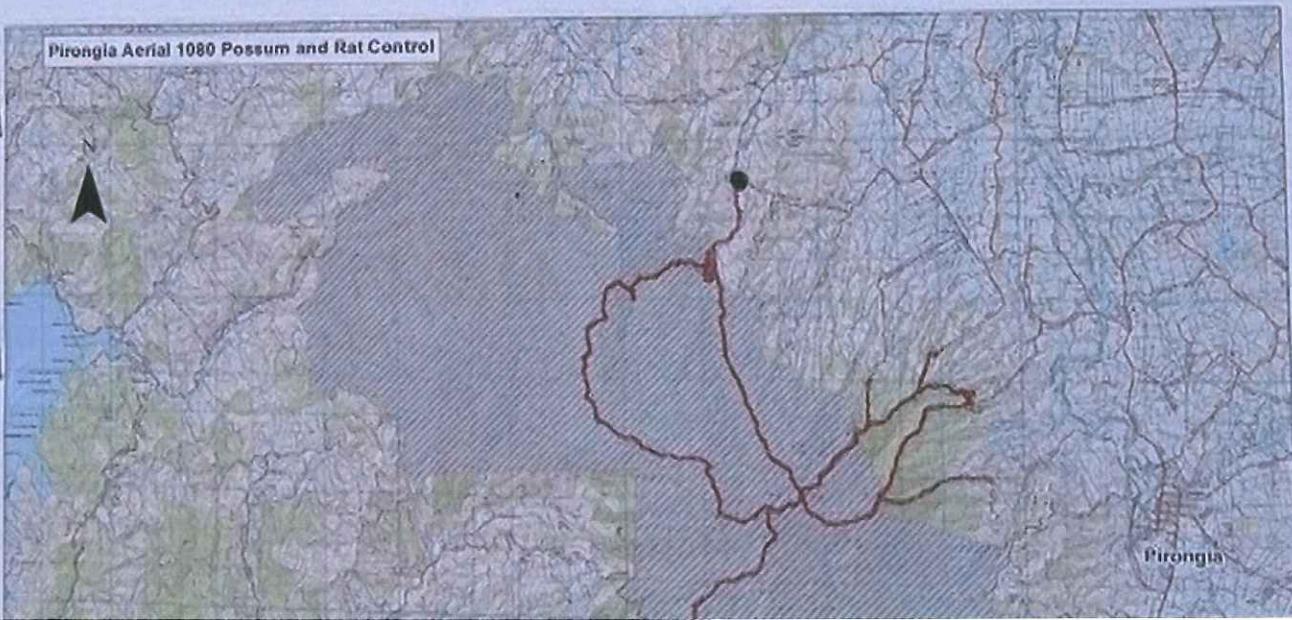
will be present on the ground from: **22/08/14**

- DO NOT touch bait
- WATCH CHILDREN at all times
- DO NOT EAT animals from this area
- Poison baits or carcasses are **DEADLY to DOGS**

For more information contact:

**Operation Controller 03 768 9674**

*Unauthorised removal of signs or baits is an offence*





# Detection of pesticides at 20 parts per trillion in drinking water by LC/MS/MS using direct injection with no sample pretreatment.

S. J. Lock & P. Wiebkin, Applied Biosystems, UK.

## Introduction

Pesticides are well known potential contaminants of drinking water supplies. As such water companies are required to screen water for contamination of pesticide classes such as organophosphate, organonitrogen, triazines, carbamates, acid herbicides and phenol urea pesticides. The required lower limit of quantitation for these pesticides is usually 100 ppt with a detection limit of 20 ppt and a CV of analysis of ideally 12% or below at the limit of detection.

Traditional methods usually use different sample pretreatments, e.g. solid phase extraction procedures, for each class of pesticide due to their differing polarities. This means that a multiple pesticide screen of one water sample is time consuming. This poster investigates the use of LC/MS/MS with high volume injections as a method to detect multiple classes of pesticides at the required limits of detection with no sample pretreatment.

## Materials and Methods

A method was setup to screen for 50 pesticides from a selection of different classes in one period. For testing purposes standards from a selection of several different classes of pesticides were initially made up in methanol and then diluted into water. All mass spectrometry analysis was performed in positive electrospray mode

The pesticides included the urons isoproturon & MTBA, organonitrogen pesticides trietazin, propachlor & tebuconazole, triazine pesticides tebutylazine, atrazine, propazine, the organophosphate pesticide coumaphos, Chlorpyrifos-methyl & the carbamate carbendazim. All the 50 transitions were screened in one period using resolution settings of unit for Q1 and Q3 quadrupoles and dwell times of 60ms with a source temperature of 600 °C.

Compound	Q1 (amu)	Q3 (amu)
Propachlor	212	170
Tebuconazole	308	70
Tebutylazine	230	174
Atrazine	216	174
Propazine	230	146
Chlorpyrifos-methyl	322	125
Coumaphos	363	227
Isoproturon	207	72
MTBA	222	165
Carbendazim	192	160

Chromatographic separation was performed on a ACE C18 column 4.6 x 50 mm, 5µm using a gradient of water and methanol both containing 5mM ammonium acetate, 0.1% formic acid and a column temperature of 30 °C. Unless stated the injection volume was 500µl and the flow rate 1.5 ml/min directly into the TurboV™ source of an API 4000™ LC/MS/MS system. The Mobile phase was supplied by two LC-10ADvp™ pumps from Shimadzu, and samples were injected using a SIL-HTc™ autosampler from Shimadzu fitted with a 2 mL sample loop. Data analysis was carried out using Applied Biosystems/MDS Sciex Analyst® 1.4.1 software.

## Results

Calibration curves for all 10 test pesticides were obtained over the range 20 – 5,000 parts per trillion. The r value for these lines varied between > 0.98 using a Linear fit with 1/x weighting. An example of one such line is shown below in Figure 1 and an example of a typical chromatogram from a 100ppt standard is shown in Figure 2.

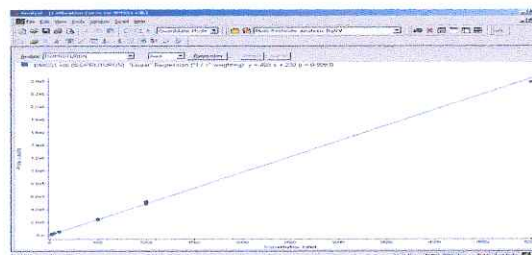


Figure 1. Calibration line for Isoproturon 20 – 5,000 ppt.

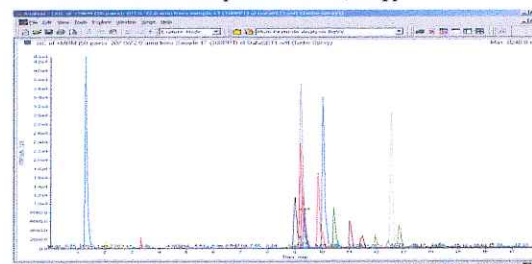


Figure 2. Chromatogram obtained from a 100ppt standard of 10 pesticides.

In order to gauge the effect of injection volume a comparison of a 50 and 500 µl injection of a 100ppt standard were compared. It can be seen in Figure 3 that by injecting 10 times the volume an increase by a factor of 10 is seen in intensity. 5 replicate 500 µl injections at 20, 50 and 1000 ppt gave CVs often below 12% as shown for Propachlor in Figure 4, even when an internal standard was not used.

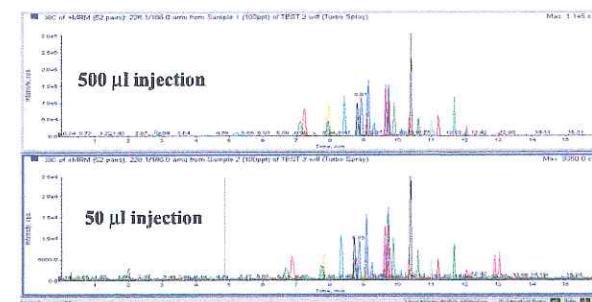


Figure 3. Comparison of a 50 and 500 µl injection of a 100 ppt standard containing 50 pesticides.

Propachlor Standards	20PPT	50PPT	1000PPT
Number Of Values Used	5 of 5	5 of 5	5 of 5
Data Point #1	19.335025	93.572137	1005.1902
Data Point #2	20.135460	49.867155	1031.625
Data Point #3	21.360955	48.45889	1011.3702
Data Point #4	18.35466	50.480545	1026.5099
Data Point #5	17.305650	49.805195	1064.9717
Mean	19.400352	50.432804	1026.9774
Low	17.305650	48.45889	1005.1902
High	21.360955	53.572137	1064.9717
Standard Dev.	1.505268	1.901734	21.040488
%CV	7.758977	3.770828	2.048978
Accuracy	97.001761	100.86561	102.68774

Figure 4. Comparison of CVs obtained from 500 µl injections of a 20, 50 & 1,000 ppt Propachlor standards.

## Conclusions

From these results it can be concluded that pesticides are detectable & quantifiable in drinking water at the required limits by large volume injections on an API 4000 LC/MS/MS system, giving CVs of often <12% without internal standards. This methodology has been applied successfully to over 50 acid herbicides and organo-nitrogen, organo-phosphorus, triazines and uron pesticides routinely screened for in UK drinking water. With further development work ongoing, this method is currently being expanded to an increasing group of pesticides. With this approach separate sample preparation for each compound class has been eliminated greatly improving throughput in pesticide residue analysis of water

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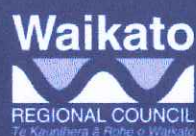
## Resource Management Act

**128Circumstances when consent conditions can be reviewed**

- (1) A consent authority may, in accordance with [section 129](#), serve notice on a consent holder of its intention to review the conditions of a resource consent—
    - (a) at any time or times specified for that purpose in the consent for any of the following purposes:
      - (i) to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; or
      - (ii) to require a holder of a discharge permit or a coastal permit to do something that would otherwise contravene [section 15](#) or [15B](#) to adopt the best practicable option to remove or reduce any adverse effect on the environment; or
      - (iii) for any other purpose specified in the consent; or
    - (b) in the case of a coastal, water, or discharge permit, when a regional plan has been made operative which sets rules relating to maximum or minimum levels or flows or rates of use of water, or minimum standards of water quality or air quality, or ranges of temperature or pressure of geothermal water, and in the regional council's opinion it is appropriate to review the conditions of the permit in order to enable the levels, flows, rates, or standards set by the rule to be met; or
    - (ba) in the case of a coastal, water, or discharge permit, when relevant national environmental standards have been made; or
    - (c) if the information made available to the consent authority by the applicant for the consent for the purposes of the application contained inaccuracies which materially influenced the decision made on the application and the effects of the exercise of the consent are such that it is necessary to apply more appropriate conditions.
- (2) A consent authority must, in accordance with [section 129](#), serve notice on a consent holder of its intention to review the conditions of a resource consent if required by an order made under [section 339\(5\)\(b\)](#).
- (3) A regional council must notify the chief executive of the Ministry of Fisheries as soon as is reasonably practicable if it intends to review a condition of a coastal permit authorising an aquaculture activity to be undertaken in the coastal marine area and the condition has been specified under [section 186H\(1A\)](#) of the Fisheries Act 1996 as a condition that may not be changed or cancelled until the chief executive of the Ministry of Fisheries makes a further aquaculture decision.

## **Analysis of Waikato river water samples for selected endocrine disrupting chemicals and hormonal activity**

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October 2013

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Approved for release by:  
Peter Singleton      Date November 2013

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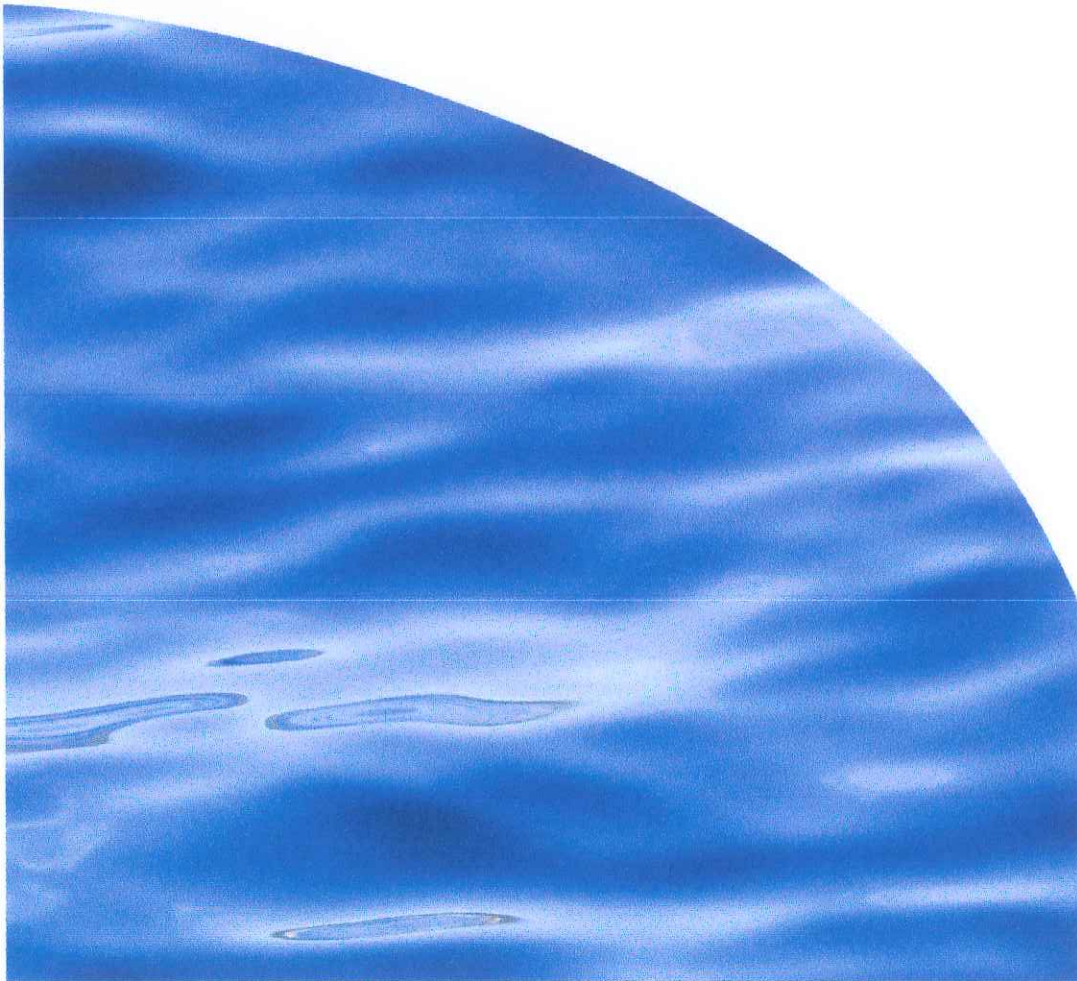
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REPORT NO. 2422

**ANALYSIS OF WAIKATO RIVER WATER SAMPLES  
FOR SELECTED ENDOCRINE DISRUPTING  
CHEMICALS AND HORMONAL ACTIVITY**



## ANALYSIS OF WAIKATO RIVER WATER SAMPLES FOR SELECTED ENDOCRINE DISRUPTING CHEMICALS AND HORMONAL ACTIVITY

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Prepared for Waikato Regional Council

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## 1. INTRODUCTION

Endocrine disrupting chemicals (EDCs) are a class of contaminants that are of significant concern due to their potential to disrupt endocrine functions in wildlife and human populations. Endocrine disrupting chemicals have been defined as "exogenous substances that cause adverse health effects in an intact organism, or its progeny, secondary to endocrine function" (European Commission 1996). Two significant sources of EDCs are from urban wastewater treatment plants (WWTPs) and dairy farming waste, which are released into the environment (Sarmah *et al.* 2006).

The Waikato Regional Council (WRC) contracted Cawthron Institute (Cawthron) to assess the endocrine disruption potential of eight water samples collected from the Waikato River between Taupo and Tuakau. Potential sources of EDCs to the Waikato River include wastewater discharge from a number of WWTPs along its length and the prevalence of intensive dairy farming in the region. The concentration of selected EDCs and the total endocrine activity was assessed using trace chemical analysis and bioassay methods.

## 2. METHODOLOGIES

### 2.1. Overview

The approach taken in this work combined the use of trace chemical analysis and biological assays, or bioassays, to measure both the concentration of selected EDCs and the total endocrine disrupting activity in concentrated sample extracts. Bioassays using reporter gene technologies are successfully used to estimate estrogenicity, anti-estrogenicity androgenicity and anti-androgenicity in environmental samples (Balaguer *et al.* 1999; Muller *et al.* 2008). Such bioassays are commonly used because they are easy to use, quick and relatively cheap, making them a good choice for large-scale hormonal activity screening (Leusch *et al.* 2010; Mnif *et al.* 2010; Tremblay *et al.* 2005; Tremblay *et al.* 2010).

While bioassays provide estimates of the total estrogenic or androgenic activity of a sample extract, they do not identify the specific compounds responsible. The biologically active chemicals can be identified by chemical analysis on a selection of common steroid hormones and other known endocrine-active chemicals. This approach has previously been used in New Zealand to assess the endocrine disruption potential of wastewater (Leusch *et al.* 2006) as well as dairy shed and dairy oxidation pond effluent (Sarmah *et al.* 2006; Gadd *et al.* 2010).



## 2.2. Sample collection and extraction

Water samples were collected from the Waikato River under low flow conditions on 6–7 March 2012 at the Taupo Gates, Ohaaki Bridge, Waipapa, Hamilton Narrows, Horotui Bridge, Huntly Tainui, Mercer Bridge, and Tuakau Bridge by WRC staff. A volume of 16 L was obtained for each sample by filling four replicate 4 L amber glass Winchester bottles. The samples were stored 4 °C overnight, prior to being transferred to Plant & Food Research Ruakura on 8 March 2012 by WRC staff. On arrival, the samples were acidified (pH = 2.5) and filtered through a glass microfiber filter (47 mm, Labservice) to remove particulate material.

### 2.2.1. Sample preparation for bioassay

Five litres of filtered sample was extracted using Oasis hydrophilic-lipophilic-balanced (HLB) 1 g 20 mL solid phase extraction (SPE) cartridges. The sample bottle was rinsed three times with MilliQ water and each rinse wash passed through the SPE cartridge. The SPE cartridges were dried under full vacuum and the EDCs eluted with a binary solvent mixture of dichloromethane / methanol (95:5). The SPE solvent extracts were purified by passing through a sequential florisil cartridge (IST, 2 g 12 mL) into a collection vial. The solvent extract was blow dried under a gentle stream of nitrogen gas, redissolved in 0.5 mL of dimethyl sulfoxide (DMSO) and transferred to 2 mL amber glass vials. With a sample volume of 5 L and final extract volume of 0.5 mL, the four samples were concentrated by a factor of 10,000 (relative enrichment factor).

### 2.2.2. Sample preparation for trace chemical analysis

Ten litres of acidified and filtered sample was spiked with a solution of carbon-13 labelled surrogate standards and extracted using Oasis HLB 1 g 20 mL SPE cartridges and purified as described above (Section 2.2.1). The solvent extract obtained from the florisil purification step was concentrated and exchanged into dichloromethane and further purified using gel permeation chromatography (GPC).

The GPC solvent extract was blow dried under a gentle stream of nitrogen gas. A mixture of isotopically labeled internal standards were added, before the steroid hormones and other polar chemical residues were derivatised to their respective trimethylsilyl ethers.

## 2.3. MELN and PALM bioassays

The MELN cell line measures estrogenic activity and the principles of the assay have been described by Balaguer *et al.* (1999). The PALM cells measure androgenic activity and have been described by Terouanne *et al.* (2000). Briefly, the MELN and PALM cells were plated and left to adhere in 96-well tissue culture plates (Nunc) at

concentrations of  $2.5 \times 10^5$  and  $1.5 \times 10^5$  cells/ml, respectively. The cells were incubated with serially diluted sample extracts for 24 h. The response was measured by addition of a medium containing the light-emitting biological pigment luciferin in the Microbeta Trilux luminometer (Wallac). The estrogenic and androgenic activities were determined by comparing the response of samples to that of the reference chemicals, *i.e.* 17 $\beta$ -estradiol for MELN and the synthetic androgen methyltrienolone (R1881) for the PALM cells.

For the antagonistic assays, cells were incubated with a fixed amount of the natural ligands, either 17 $\beta$ -estradiol or R1881 (0.1 nM), which produced a 50% response in luciferase activity that remained constant even in the presence of increasing amounts of environmental extracts. The synthetic anti-estrogen ICI 162 780 (Sigma) and the anti-androgen bicalutamide were reference compounds used to calibrate the bioassays.

## 2.4. Chemical analysis

The trimethylsilyl ethers of the target EDCs were analysed by high resolution gas chromatography-mass spectrometry (HRGC-MS) using an Agilent 6890N gas chromatograph (GC) coupled to an Agilent 5975A inert XL mass spectrometer (MS) and CTC autosampler. Target analytes and isotopically labeled analogues were detected using single ion monitoring of compound specific mass ions. Eight calibration standards (1–1000 ng/mL) were prepared and derivitised (described in Section 2.2.2). Calibration curves were prepared for quantitating the detected target analytes and surrogate recovery compounds by internal standard quantitation using Agilent Enhanced Chemstation data analysis software.

The total mass of target compounds in each sample extract was calculated, divided by the volume of sample extracted, and reported as a final concentration in ng/L, or parts per trillion (ppt).

The specific compounds analysed included:

- the estrogenic steroids 17 $\alpha$ - and 17 $\beta$ -estradiol, estrone, estriol, 17 $\alpha$ -ethynylestradiol, and mestranol
- the androgenic steroids testosterone, androstenedione, androstenediol, dihydrotestosterone, hydroxytestosterone, ketotestosterone, 19-nortestosterone
- industrial and domestic derived EDCs and antimicrobial chemicals including alkylphenols (nonyl- and octylphenols), bisphenol-A, parabens (methyl-, ethyl-, propyl-, butyl-, benzyl-), triclosan and methyl-triclosan, o-phenylphenol, and chloroxylenol.

#### 2.4.1. Method detection limits

The method detection limits (MDLs) for the target analytes ranged from 0.01 to 10.0 ng/L (refer to Table 3). The MDLs were estimated as the minimum mass of target compound required to produce a peak height exceeding a signal to noise ratio of three to one. Typical MDLs were equivalent to 0.01 ng/L, based on extracting a sample volume of 10 L. For alkylphenols, paraben preservatives and phenolic antimicrobial compounds with MDLs greater than 0.01 ng/L, the MDL was determined from the equivalent concentration of compound detected in the method blank sample.

The increased MDLs for the estrogenic steroid hormones 17 $\alpha$ -ethynylestradiol and mestranol, and androgenic and progestogenic steroids, reflect the decreased response of these compounds arising from the coelution of multiple steroid hormones within a common region of the chromatogram.

### 3. RESULTS

#### 3.1. Bioassay analyses

The results of the bioassay analyses are summarised in Table 1, but key findings were:

- There was very low levels of estrogenicity at the Taupo Gates and Ohaaki Bridge sites.
- None of the sites had detectable androgenic activities.
- Some sites showed estrogen and androgen antagonistic activities.

Table 1. Bioassay results for estrogenic and androgenic activities in the eight samples from the Waikato River catchment as determined by the MELN and PALM bioassays.

Site	Estrogenic activity		Androgenic activity	
	Agonist (17 $\beta$ -estradiol equivalent, ng/L)	Antagonist (ICI 182 780 equivalent, ng/L)	Agonist (R1881 equivalent, ng/L)	Antagonist (bicalutamide equivalent, $\mu$ g/L)
Taupo Gates	0.13	BDL (< 17.4)	BDL (< 7.1)	BDL (< 2.3)
Ohaaki Bridge	0.17	BDL (< 17.4)	BDL (< 7.1)	BDL (< 2.3)
Waipapa	BDL (< 0.072)	176.2	BDL (< 6.9)	10.1
Hamilton Narrows	BDL (< 0.068)	40.1	BDL (< 7.1)	10.8
Horotui Bridge	BDL (< 0.072)	16.1	BDL (< 6.9)	BDL (< 1.5)
Huntly Tainui	BDL (< 0.072)	30.2	BDL (< 6.9)	4.6
Mercer Bridge	BDL (< 0.068)	31.5	BDL (< 7.1)	15.4
Tuakau Bridge	BDL (< 0.072)	28.5	BDL (< 6.9)	2.4

BDL = Below Detection Limit.



### 3.2. Chemical analyses

#### 3.2.1. Recovery of surrogate standard compounds

The mean recovery of individual carbon-13 labeled surrogate standards spiked into each sample prior to extraction, and the overall mean recovery of all surrogate compounds is displayed in Table 2. The surrogate standard compounds were spiked into 10 L of prefiltered sample at an equivalent concentration of 10 ng/L (ppt). This represents a low level rate of spiking for quality assurance (QA) determinations.

Table 2. Recovery of surrogate standards spiked into individual samples (n=8).

Recovery compound	Calculated mean percentage recovery
<sup>13</sup> C-methylparaben	72.2
<sup>13</sup> C-ortho-phenylphenol	77.4
<sup>13</sup> C-butylparaben	79.2
<sup>13</sup> C-methyltriclosan	72.4
<sup>13</sup> C-triclosan	98.7
<sup>13</sup> C-bisphenol-A	95.0
<sup>13</sup> C-estrone	83.8
<sup>13</sup> C-17 $\beta$ -estradiol	72.5
<sup>13</sup> C-17 $\beta$ -ethynylestradiol	91.0
<b>Mean recovery</b>	<b>82.5</b>

The level of surrogate standard recovery (> 70% for all <sup>13</sup>C-labelled surrogates) meets the acceptance requirements of quality assurance criteria. The level of surrogate compound recovery obtained from the samples spiked at the low concentration of 10 ppt validated the performance of the analytical methodology.

#### 3.2.2. Residues of endocrine disrupting chemicals

The results of the chemical analyses are summarised in Table 3. The only industrial alkylphenol detected in the Waikato River samples was technical nonylphenol (t-NP). Technical nonylphenol was not detected in Waikato River samples upstream from the Narrows Bridge. Traces of t-NP were detected at Narrows Bridge and increased to a maximum concentration of 33.9 ng/L at Horotiu Bridge, downstream from Hamilton City. These traces decreased to a concentration of 10.9 ng/L at the Huntley Tainui Bridge and to trace level concentrations further downstream.

Paraben preservatives and phenolic antimicrobial chemicals were not detected in the Waikato River samples obtained upstream from the Narrows Bridge sample site, which is located downstream from the township of Cambridge and upstream of the city of Hamilton.

Low concentrations of methyl-, propyl- and butyl-paraben, chloroxylenol, and methyl-triclosan were detected in waters sampled at the Narrows Bridge and at various sampling sites further downstream. Residues of methyl-paraben, propyl-paraben, chloroxylenol, and methyl-triclosan persisted in the Waikato River as far downstream as the Tuakau Bridge sampling site. Higher concentrations of these chemicals were most often measured in water sampled at Horotiu Bridge, downstream from the city of Hamilton, with the highest concentrations obtained at the Mercer Bridge site.

All of the Waikato River samples contained low concentrations of bisphenol-A with the highest concentration (4.26 ng/L) measured in water sampled downstream from the city of Hamilton at the Horotiu Bridge sample site.

No steroid hormone residues were detected in any of the analysed river water samples.

Table 3. Concentration of endocrine disrupting chemicals measured in Waikato River samples (ng/L or ppt). The results have been corrected for any contributions of individual compounds measured in the QA / QC blank sample.

Compound	Taupo Gates	Ohaaki Bridge	Waipapa	Hamilton Narrows	Horotiu Bridge	Huntley Tainui Bridge	Mercer Bridge	Tuakau Bridge	MDL <sup>a</sup>
<b>Alkylphenols</b>									
4-t-Amylphenol	N.D <sup>b</sup>	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
4-n-Amylphenol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
4-t-octylphenol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
4-t-heptphenol	N.D	0.47	N.D	N.D	0.38	N.D	N.D	N.D	0.01
4-n-octylphenol	N.D	0.11	N.D	N.D	N.D	N.D	N.D	N.D	0.01
4-n-nonylphenol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
Technical nonylphenol equivalents <sup>c</sup>	ND	ND	ND	T <sup>d</sup>	33.88	10.87	T	T	10.00
<b>Paraben preservatives</b>									
Methylparaben	N.D	N.D	N.D	0.20	0.29	0.28	0.46	0.17	1.00
Ethylparaben	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
Propylparaben	N.D	N.D	N.D	0.12	0.21	0.12	0.26	0.12	0.01
Butylparaben	N.D	N.D	N.D	0.56	0.49	N.D	N.D	N.D	1.00
Benzylparaben	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
<b>Phenolic antimicrobials</b>									
Chloroxylonol	N.D	N.D	N.D	0.12	0.21	0.14	0.16	0.08	1.00
o-phenylphenol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
Methyl-triclosan	N.D	N.D	N.D	0.20	0.29	0.28	0.46	0.17	0.01
Triclosan	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	1.00
<b>Other</b>									
Bisphenol A	0.83	1.02	2.76	0.96	4.26	0.90	1.92	0.87	0.05

7

Table 3. continued. Concentration of endocrine disrupting chemicals measured in Waikato River samples (ng/L or ppt). ). The results have been corrected for any contributions of individual compounds measured in the QA / QC blank sample.

Compound	Taupo Gates	Ohaaki Bridge	Waipapa	Hamilton Narrows	Horotiu Bridge	Huntley Tainui Bridge	Mercer Bridge	Tuakau Bridge	MDL <sup>a</sup>
<b>Estrogenic steroid hormones</b>									
17L-estradiol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
17-L-estradiol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
Estrone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
Estriol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.01
17L-ethynylestradiol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
Mestranol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
<b>Androgenic steroid hormones</b>									
Testosterone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
Androstenedione	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	1.00
Adrostenediol	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
Dihydrotestosterone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
Hydroxytestosterone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
11-Ketotestosterone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
19-Nortestosterone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
<b>Progestogenic steroid hormones</b>									
Progesterone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	1.00
Hydroxyprogesterone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	1.00
Medroxyprogesterone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
19-Norethindrone	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05
Levonorgestral	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	0.05

<sup>a</sup> Method detection limit in ng/L, determined for 10 litres of extracted aqueous sample. <sup>b</sup> Not detected. <sup>c</sup> Measured as the sum of the principal nine components of a mixture of branched alkyl chain nonylphenol isomers. <sup>d</sup> Trace level detected but below the limit of quantitation



#### 4. DISCUSSION

Technical nonylphenol (t-NP) is used as an industrial product and is ethoxylated to produce corresponding technical mixtures of nonylphenol ethoxylate (t-NPE) surfactants. Technical nonylphenol and t-NPE are comprised of a series of highly branched complex isomers. Both t-NP and t-NPE are widely used in the processing of wood and metal, and as emulsifiers and detergents. Nonylphenol ethoxylate entering wastewater treatment plants (WWTPs) is aerobically degraded to produce t-NP. A number of isomers of t-NP have estrogenic activity, including the single isomeric compound 4-nonylphenol (Leusch *et al.* 2006). The only alkylphenol detected in the waters of the Waikato River was t-NP, the most widely used alkylphenol in domestic and industrial products. The dominance of t-NP in the Waikato River water samples downstream from Hamilton is consistent with their widespread use in this large urban centre and their release into the Waikato River from the Hamilton City Council Pukete WWTP and stormwater drainage system.

Concentrations of t-NP measured in Waikato River water at the Horotiu and Huntley Tainui bridge sample sites were 33.88 and 10.87 ng/L, respectively. These concentrations are below the 0.20 µg/L (200ng/L) concentration of t-NP considered to represent the average background concentration within the continental waters of Europe (WHO IPCS 2004). More significantly, these concentrations are an order of magnitude lower than the European Union predicted-no-effect concentration (PNEC) of 0.33 µg/L, or 330 ng/L for t-NP.

The detection of methyl-, propyl- and butyl-paraben, chloroxylenol, and methyl-triclosan in Waikato River water is not surprising given the predominance of these chemicals in a wide range of personal care products. Methyl-, propyl- and butyl-parabens are specifically designed to extend the lifetime of formulated products by inhibiting microbial activity. Chloroxylenol is an antibacterial chemical used in many antiseptic and disinfectant products. Methyl-triclosan is a bacterial metabolite of the parent chemical triclosan, which is a common ingredient in liquid soaps and toothpastes. A recent report on emerging organic contaminants in the influent and effluent of WWTPs in New Zealand demonstrated that methyl-, propyl- and butyl-paraben, chloroxylenol, and triclosan are not totally removed by wastewater treatment and are released into receiving waterways in New Zealand (Northcott *et al.* 2013).

During wastewater treatment, triclosan can be transformed by bacterial activity to methyl-triclosan. This chemical is more hydrophobic than triclosan and readily adsorbs to particulate material and tends to accumulate in the sewage sludge. Therefore, it is not surprising that methyl-triclosan has not been detected in treated effluent discharged from WWTPs in New Zealand (Northcott *et al.* 2013). The detection of low concentrations of methyl-triclosan in Waikato River water downstream of the township of Cambridge can be attributed to the release of triclosan followed by *in situ* microbial degradation by bacteria within the river.

The concentrations of methyl-, propyl- and butyl-paraben, chloroxylenol, and methyl-triclosan measured in the Waikato River samples are relatively low. Predicted-no-effect concentrations for these chemicals are not readily available, but a useful comparison is triclosan; a chemical demonstrated to bioaccumulate in aquatic organisms and exhibit endocrine disrupting activity. The PNEC for triclosan in fresh water, proposed by the European Commission Water Framework Directive Annex VIII (WFD-UKTAG, 2009), is 0.1 µg/L. This is two-orders of magnitude higher than the concentration of methyl-, propyl- and butyl-paraben, chloroxylenol, and methyl-triclosan detected in the Waikato River water samples.

The only EDC detected in all samples of the Waikato River was bisphenol-A (BPA). Bisphenol-A is an industrial chemical used in the production of polycarbonate plastics that are incorporated into a wide variety of consumer goods including water bottles, sports equipment, the lining of water pipes, the inner coatings of food and beverage cans, and thermal paper used to print sales receipts from cashier machines. The US EPA estimate approximately 0.5 million kg of BPA is released into the environment per annum, principally through the degradation of plastic products that are themselves ubiquitously distributed in the environment and concentrated in urban environments. Urban stormwater discharges are a major source of BPA into waterways.

Bisphenol-A is considered a ubiquitous pollutant and is atmospherically transported and distributed around the world. It is found in all of the world's oceans and in the snow and ice of the Arctic and Antarctica. The detection of BPA in the upper waters of the Waikato River reflect what can be considered background concentrations within Lake Taupo.

Bisphenol-A was detected in the Waikato River at a maximum concentration of 4.26 ng/L at the Horotiu Bridge sample site downstream of Hamilton City. This is three-orders of magnitude less than the PNEC values of 1.5 and 1.6 µg/L for BPA, respectively, set by the European Union (EU, 2008) and Japan (AIST 2007), and two-orders of magnitude lower than the PNEC of 0.175 µg/L for Canada (Canada 2008). More significantly, the concentration of 4.26 ng/L BPA in the Waikato River sampled at Horotiu Bridge is an order of magnitude lower than the most up-to-date PNEC of 0.06 µg/L, obtained by a weight of evidence approach from 61 studies assessing the effects of BPA upon aquatic organisms (Wright-Walters *et al.* 2011).

Estrogenic activity was found only in the Taupo Gates and Ohaaki Bridge samples at levels close to the detection limit of the bioassay and an order of magnitude below the PNEC of 2 ng/L estimated for 17β-estradiol (Table 1; Caldwell *et al.* 2012). It is interesting to note that the same sites showed no antagonistic activity while all the other sites showed opposite trends with no estrogenicity but low levels of antagonistic activity. The presence of agonistic and antagonistic activities in WWTP effluent has been previously reported (Conroy *et al.* 2007). It has been proposed that the loss of estrogenic and androgenic activities in treated effluents is not caused solely by the

degradation of agonistic compounds but also by the presence and production of antagonist compounds (Conroy *et al.* 2007). This may explain the presence of estrogenic activity at the more pristine sites of Taupo Gates and Ohaaki Bridge where the presence of antagonistic chemicals is less likely and estrogenicity may be from agricultural activities (Gadd *et al.* 2010). In comparison, androgenic activity was not detected in any of the Waikato River water samples (Table 1). While low levels of anti-estrogenic and androgenic activity was detected in some samples, it is not possible to provide a risk assessment at this stage as the mechanisms are still poorly understood.

Despite the degree of sample concentration (10 L water samples were concentrated 20,000x for bioassays and 30,000x for chemical analysis) prior to analysis and the low method detection limits that were achieved, steroid hormones and a number of other target analytes were not detected in Waikato River samples. This reflects the high flow rate and corresponding level of dilution achieved within the Waikato River. The various point sources of steroid hormones into the Waikato River catchment, treated effluents from WWTPs in particular, are massively diluted even under the low flow rate conditions during which the field sampling was undertaken.

However, previous investigations have demonstrated the Waikato River receives inputs of steroid hormones from diffuse agricultural sources and WWTP effluent point sources (Sarmah *et al.* 2006). The absolute mass of steroid hormone residues entering the greater Waikato catchment each day from these sources will be significant. Aquatic organisms within localised areas, particularly those adjacent to discharges of WWTPs effluent, could potentially be impacted by residues of steroid hormones and other EDCs that are continually released into the Waikato River.

Further assessment and characterisation of EDCs at localised sites considered likely to be impacted by EDCs is required to conclusively determine whether or not the presence of these biologically active chemicals has the potential to negatively impact river biota. As previously mentioned, the identifiable inputs of EDCs to the Waikato River are massively diluted and this affects the detection of these biologically potent chemicals. Future investigations of EDCs and other organic contaminants within the Waikato River would benefit from the deployment of integrative passive sampling devices that accumulate very low concentrations of contaminants over a period of weeks. Calibration of these devices allows the time-weighted average waterborne concentration of contaminants to be calculated. Devices such as the Polar Organic Contaminant Integrative Sampler (POCIS) are routinely used by the US EPA, US Geological Survey, and European Commission funded NORMAN Network to assess the concentration of EDCs and other organic contaminants in waterways. To assess whether biota is affected by EDCs, it may be advisable to conduct a biomarker-based survey. For instance, the induction of egg-yolk precursor vitellogenin in male fish is a marker of exposure to estrogenic compounds (Jones *et al.* 2000).



## 5. CONCLUSIONS

Overall, the results obtained from this assessment of EDCs in the Waikato River demonstrate that when specific contaminants are present, it is at relatively low concentrations. The concentrations of chemical residues measured in the Waikato River are one to three-orders of magnitude below their respective predicted-no-effect concentration (PNEC). The bioassay responses were similarly low, suggesting the current concentration of these chemicals in Waikato River water pose negligible risks to aquatic biota.

However, it is important to acknowledge the samples analysed in this study were obtained from a one-off sampling and the results must therefore be interpreted with caution. The absence of many of the target EDCs in the analysed river water samples does not necessarily mean these chemicals are not present in the Waikato River; nor does it mean these chemicals present no risk to biota.

Endocrine disrupting chemicals can elicit effects at very low concentrations and their potency can be additive when they are present as mixtures. The PNECs for EDCs continue to decrease as our understanding of the risks these chemicals pose to wildlife and humans are better defined. This is illustrated by the range of PNEC values for bisphenol-A referred to in this report. The latest proposed bisphenol-A PNEC of 0.060 µg/L, determined by numerous scientific studies, is two-orders of magnitude lower than the existing PNEC values adopted by the EU and Japan. Current PNEC values are determined from single chemical exposures and do not take account of the potential cumulative effects of mixtures of contaminants upon biological receptors.

It is likely the PNEC for EDCs will continue to reduce as risk assessments become more refined and robust. Future assessments of EDCs within the Waikato River will need to acknowledge these modified PNECs and adopt sampling strategies that accommodate the significant level of dilution that occurs within the Waikato River.

## 6. ACKNOWLEDGEMENTS

The authors wish to thank Waikato Regional Council staff for collecting the river samples, Katherine Trought and Dr Feng Shi for conducting the bioassays. We also thank Fred Leusch for assistance analysing the bioassay results and Cherie Johansson for editorial comments. The MELN and PALM cell lines were kindly provided by Dr P. Balaguer, IRCM, Montpellier, France.

# Report to Environmental Performance Committee November 2014 – Decision Required

**File No:** 03 04 30  
**Date** 18 November 2014  
**To:** Chief Executive Officer  
**From:** Director – Resource Use  
**Subject:** Goodnature Traps – New Self Re-setting Traps  
**Section:** B (For recommendation to Council)

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## 1 Purpose

To present a paper provided by Councillor Clyde Graf and Councillor Kathy White with regard to Goodnature traps.

The attached paper contains information supplied by the two Councillors and does not contain input from staff.

## Recommendations:

Cr Graf and Cr White's recommendations are contained on Page 82.

## 2 Background

The attached paper provides an update on a new Goodnature self-resetting trap that humanely kills rats, stoats and possums without use of toxins.

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Chris McLay  
**Director**  
**Resource Use**

17 November 2014

## **Report to Environmental Performance Committee Nov 2014 – To be received**

From – Clyde Graf and Kathy White

To – Council

Subject            Good Nature traps – new self re-setting traps

Purpose

To update councillors with information about a new self-resetting trap that could revolutionise pest control

### **Background**

Quoted from the GoodNature website:

Goodnature is committed to providing pragmatic solutions to one of our most serious environmental problems - biodiversity decline - through the design and manufacture of automatic traps that humanely kill pest animals and then reset themselves.

The traps are humane and toxin free and have been designed to save you the time and effort. Operating them is a breeze - you don't even have to get your hands dirty. Goodnature traps are powered by compressed CO2 gas. The gas source is a small, recyclable canister that will power and reset the trap multiple times before needing to be replaced.

They work by striking the skull of the pest animal with a steel-cored, glass reinforced polymer Piston, killing it instantly. This piston is driven by a measured volume of compressed CO2 when the animal triggers the trap. Once the animal has been struck, the Piston returns, dropping the animal to the ground. The smart trap resets immediately. Goodnature traps employ 2 distinct trigger systems, the Classic and the Leaf360 depending on the target species. The Classic Trigger is activated when a possum bites it and pulls. This triggers the firing sequence that drives the Piston into the possum's skull. The Rat and Stoat trap employs the very sensitive Leaf360 Trigger. As the animal brushes the leaf aside to investigate a lure, the trap is set into action. The traps use the Goodnature range of lures for extended effectiveness in the field or traditional lures applied by the user.

Staff provide an update on how these traps are being trialled in the Waikato region. A video shows the trap in action. See the Appendix for the Listener article review.

<http://www.goodnature.co.nz>  
<http://www.scoop.co.nz/stories/BU1402/S00802/unprecedented-0-pest-survival-rate-in-doc-rat-control-trial.htm>



**Recommendation**

That the verbal and visual report 'Goodnature Traps – new self re-setting traps' be received for information.

That subject to a successful trial, a business case be prepared that looks at the possibility of using these self re-setting traps in a number of areas where communities have actively requested an alternative to toxins in pest control programmes.

APPENDIX: "Listener" 4 October 2014 article "Weapons of mass destruction"

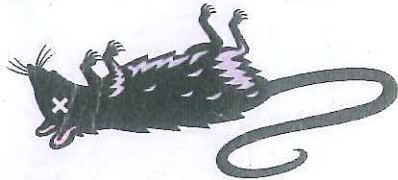


## SCIENCE

by Rebecca Priestley

# Weapons of mass destruction

A Kiwi trap manufacturer's automated design has upped the ante in the war against rats and possums.



**B**ands of hardy volunteers hike into the wild parts of New Zealand every weekend, checking traps for pests and servicing and replenishing the bait of those that need it. Their work is helping to control the introduced rodents, mustelids and possums that are ravaging our wilderness, killing forests, birds and other native fauna.

Goodnature, a Wellington-based trap manufacturer, wants to make better use of that volunteer time. The day I visit its Kilbirnie factory, three of the 12 staff are assembling the weekly order of about 600 traps. In the small research and development room, an experiment is set up to test the force needed to extrude bait into an automatic bait dispenser. Another room contains a neat row of muddy boots below a line of hanging backpacks and parkas; Flight of the Conchords is on the stereo and a series of taxidermied mounts – a stoat, a weasel, a ferret, a rat – peer down from a shelf. Another board features a row of tiny skulls.

They're not for decoration, says Robbie van Dam, who leads Goodnature's design department. The skulls "drive the way we develop our product. Having an understanding of physiology is really important. These little skulls really inform how we kill an animal humanely."

Goodnature's traps lure pest animals using a nut-based bait. When an animal puts its head into the trap, it activates a trigger that sends a steel-cored, glass-reinforced polymer piston into the



**The rat and stoat trap "is just as happy in the backyard or the attic as it is on rugged terrain".**

skull, killing the animal instantly and releasing it onto the ground. The traps can kill up to 24 animals without being serviced. And apart from a few tiny components, they're New Zealand made.

The three founders of the business – van Dam, Craig Bond and Stu Barr – graduated with qualifications in product design in 2003, part of the first batch of graduates from Victoria University's School of Design. They began working together after van Dam became part of a Department

of Conservation (DoC) team given the job of designing a humane trap for stoat control. The new trap was approved and went into production, but a member of the DoC team commented to van Dam that although it was a great design, "it would be even better if you didn't have to check it all the time".

So, says van Dam: "Craig and I sat down and kind of worked out 100 ways to kill a rat."

With a \$20,000 Innovation Fund grant from DoC, Goodnature designed a trap powered by a small canister of compressed CO<sub>2</sub>. Traditional traps can kill one animal before they need to be reset and re-baited, so this automatically resetting version was economically appealing. Goodnature got a further grant of \$250,000 to commercialise the rat and stoat traps.

*Self-  
resetting  
traps.*





Predation risk  
(from left): the kaka,  
stitchbird and bellbird.  
Below, the rat and stoat  
trap that can kill up to 24  
times without servicing.



"We completed that contract and at the end of that they said, 'Great, can you make one for possums too?'"

That was nine years ago. Goodnature now has 15,000 rat and stoat traps in operation around New Zealand and 5000 possum traps, variously bought by DoC, community groups and individuals.

The technology is "immediately transferable anywhere in the world", says van Dam, which is significant – although New Zealand has internationally recognised expertise in island-pest eradication, many of the poisons used here are banned or restricted in other parts of the world. Goodnature now exports to 15 territories, including Hawaii, Australia and the Galapagos Islands. One of its traps has just passed humane standards for trapping

North American mink in Sweden and there are plans to get it approved for control of mink and grey squirrels in the UK, and mongoose, bandicoots and rats in a number of Pacific and Asian countries. Its success is partly due to a fresh way of thinking about an old problem, "applying a design logic to a method of control", says van Dam.

In April, DoC reported that Goodnature's traps had eliminated the predator-rat populations in large-scale trials in northern Te Urewera and the Boundary Stream Mainland Island. DoC is now using the traps on Native Island, next to Stewart Island. Since volunteers laid 180 traps on the 65ha island last November, the pest population has dropped to 6% of pre-trap levels. The aim is to eliminate

the pest population and maintain a series of traps that can kill any new pests that swim to the islands.

Every year, New Zealand spends hundreds of millions of dollars on pest control, on a range of methods including baited traps and drops of poison such as 1080 and brodifacoum. But most of this pest control is cyclical – the bait works once, then traps have to be re-baited, or poison drops rescheduled – and the use of toxins is controversial. Goodnature's traps can kill up to 24 times without servicing and are expected to last up to 15 years in the field.

But for many community groups, trap checking can be a social occasion and an excuse for a walk in the bush. Fine, says van Dam, but "instead of re-baiting the same traps 24 times a year, why not set automatic traps in 24 times the area?"

If we're working towards a predator-free New Zealand, these humane, nontoxic and cost-effective traps will be a vital tool in the campaign. ■

### Home-kill hints

According to Goodnature's marketing, its rat and stoat trap "is just as happy in the backyard or the attic as it is on rugged terrain". And thanks to the award-winning design, it's easy to use. At \$169, it's not for everyone. But if you can afford the initial price, the only additional costs you'll encounter over the next 15 years are the occasional \$9.50 lure bottle and \$7.50 canister of CO<sub>2</sub>.

#### Here's how it works:

- Put the supplied detector cards in likely spots around your garden or attic.
- Check the detectors for scratch marks to see where pests are roaming.
- Install the trap in the appropriate position – a simple matter of screwing it onto a tree or part of your house.
- Behold the dead rat (or stoat, or possum). When the bait runs out (after about a year) or the CO<sub>2</sub> canister is empty (after 24 kills), you'll need to restock.

[goodnature.co.nz](http://goodnature.co.nz)