This Landcare Note summarises information on the use of the registered pest animal poison 1080. It has been prepared to provide basic information on the use of 1080 in Victoria.

Pest animal problems in Victoria
Pest animals cause significant ecological and economic damage. Some pest animal species are vectors for endemic diseases or potential vectors for exotic diseases of humans, livestock and native fauna. These primary effects may influence public health, agricultural viability, catchment health and even entire eco-systems.

The Catchment and Land Protection (CaLP) Act 1994 declares wild rabbits, wild dogs (including dingoes and their hybrids), feral pigs, feral goats, foxes and hares as Established Pest Animals. Pest animals declared under the CaLP Act 1994 must be controlled on public and private land.

Why poison?
Poisoning is primarily used to reduce a pest animal population to immediately reduce their impact. Experience shows that poisoning alone will not provide complete control of any pest animal species. Poisoning is one part of an integrated management program.

What is integrated pest management?
Integrated pest management is the combination of several measures used to achieve long-term results where the overall aim is to minimise pest animal impact. The components of integrated pest management are:
- defining the impact of the pest
- understanding the purpose for control
- knowing the density, distribution and harbour requirements of the pest
- a planned control program that is goal-oriented and time dependent (e.g., Year 1 - remove all accessible warrens, Year 2 - remove all accessible harbour, etc.)
- stakeholder agreement and commitment to control options
- monitoring and evaluation established and implemented

What is the main poison used in integrated pest animal control?
The registered agricultural poison sodium monofluoroacetate or ‘Compound 1080’ is the main poison used. 1080 is an essential part of pest animal management in Victoria, particularly for rabbit and fox control. Pindone is also used for rabbit control, specifically where the use of 1080 is inappropriate (See Landcare Note LC0296 Rabbit control using Pindone poison).

What is 1080?
1080 is a registered agricultural poison and is classified as a restricted S7 poison.

Compound 1080 (sodium monofluoroacetate) is a white, powdery crystalline salt that is virtually tasteless, odourless to humans and highly soluble in water. There is no known effective antidote for 1080. The 1080 used in pest animal control is coloured for safety reasons.

Why use 1080?
1080 is an efficient, economic, environmentally safe, and species-selective poison. The poison 1080 has been used for more than 50 years to control rabbits, foxes, wild dogs and feral pigs.

Is 1080 safe for me to use?
1080 has had an excellent record since its introduction in the early 1950s. No human fatalities or near fatalities have been reported. 1080 used to poison bait material is substantially diluted. As with other hazardous material, 1080 bait material must be handled carefully and safety requirements must be observed. The label of the 1080 pest animal bait product provides specific direction for use and handling. Authorised users of 1080 pest animal bait products must comply with the product label, as well as the Directions for the Use of 1080 Pest Animal Bait Products in Victoria.

Is 1080 selective?
There are many poisons that will kill animals, but there is no poison available that will only kill declared pest animals. The action of 1080 is to interfere with energy...
production within cells. Hence, warm-blooded vertebrates with higher rates of energy production are more susceptible, whereas cold-blooded vertebrates are relatively tolerant to 1080.

1080 can be administered at specific dose rates - making it more target-specific and less hazardous to non-target animals and the environment, especially when compared to other poisons such as strychnine.

Bait materials are impregnated with selected concentrations of 1080, taking into consideration for the target species factors such as lethal dose rates, body weights, and the amount of bait material likely to be consumed. These factors will vary between species and between individuals within any species. By using techniques such as stipulating a specific bait type and size, the potential danger to non-target species is kept to a minimum.

Does 1080 harm the environment?
It has been shown that 1080 is not persistent in the environment. 1080 occurs naturally in a number of Australian plants (eg. *Gastrolobium sp*, *Oxylobium sp*). Studies of the soils in which these plants grow have shown no evidence of 1080 residues. The reason is that monofluoro-acetate salts are quite strongly absorbed onto root tissues and other cellulosic materials in the upper soil layers, so there is little movement through the soil. Once absorbed, a range of soil micro-organisms are capable of rapidly utilising 1080 as a food source, thereby breaking it down into harmless components. If soil is sterilised so that all bacteria are killed, this breakdown does not occur.

What are the risks to non-target species?
Where 1080 baits are used in accordance with the relevant product label and the *Directions for the Use of 1080 Pest Animal Bait Products in Victoria*, the chance of non-target poisoning is greatly minimised.

How does 1080 work?
The fluoroacetate in 1080 is converted to fluorocitrate, which blocks the process that provides energy to the cells, which is known as the Krebs cycle. Energy reserves within the cells are depleted, and cellular function is impaired. In carnivores like the wild dog, the end result is the collapse of both the central nervous system and the respiratory system, resulting in death.

What are the symptoms of 1080 poisoning?
The symptoms of 1080 poisoning are varied, but there is a tendency for herbivores to show cardiac effects and for carnivores to develop central nervous system disorders. In omnivores death tends to result from central nervous and cardiac system disorders.

Is it humane?
Available literature on the pharmacology and symptoms of 1080 poisoning indicates that:

a) Humans who have suffered sub-lethal doses of 1080 have not reported pain although they showed severe epileptiform convulsions, as well as cardiac effects.

b) Convulsions and squeals observed in some species occur when the animal is unconscious and are not a response to pain. Due to derangement of cells in the central nervous system, the reception of pain stimuli is decreased.

c) During the latent or lag period, normal behaviour such as feeding continues. This latent period is then followed by the rapid onset of symptoms and death.

What are the safeguards in the use of 1080?
In Victoria, there are a range of legislative, administrative and operational safeguards that have been developed to ensure that 1080 poison is used appropriately to meet the pest management, environmental and safety objectives of the community.

In Victoria it is a legal requirement that for a person to use 1080 pest animal bait products they must:

a) Hold a valid 1080 endorsed Agricultural Chemical User Permit (ACUP); or

b) Hold a valid Commercial Operator Licence (COL) with vermin destroyer endorsement or are the staff of that COL holder who have successfully completed a *Course in Minimising the Risks in the Use of 1080 Pest Animal Bait Products for Vertebrate Pest Control*; or

c) Hold a valid Licence to Use Pesticides (LTUP) authorising the use of pesticides formulated for the control of pest animals; and

that they must comply with:

1. The relevant product label; and

2. The *Directions for the Use of 1080 Pest Animal Bait Products in Victoria*; and

3. The relevant Material Safety Data Sheet(s).

When are 1080 pest animal bait products issued?
1080 pest animal bait products in Victoria will be available to *authorised* users from accredited retailers and licensed perishable bait manufacturers.

'Authorised' users are those persons who either:

a) Hold a valid 1080 endorsed Agricultural Chemical User Permit (ACUP); or

b) Hold a valid Commercial Operator Licence (COL) with vermin destroyer endorsement or are the staff of that COL holder who have
Minimising the Risks in the Use of 1080 Pest Animal Bait Products, or

Authorised users will need to demonstrate a genuine need to use 1080 pest animal bait products every time they wish to purchase 1080 bait, as evidenced by the completion of a 1080 Risk Assessment form and Bait User Declaration form.

The Bait User Declaration form must be presented (together with the user's valid ACUP with 1080 endorsement, valid COL with vermin destroyer endorsement, or valid LTUP with authorisation to use pesticides formulated for the control of pest animals) for co-signing by the accredited retailer or licensed perishable bait manufacturer at the point of sale.

Copies of the Bait User Declaration and 1080 Risk Assessment forms can be found at: www.dpi.vic.gov.au/1080

What types of 1080 pest animal bait products are there?

Australian Pesticides and Veterinary Medicines Authority (APVMA) registered products (shelf-stable baits eg dry oats and dried meat baits) are available from accredited retailers who have Agsafe Guardian 1080 accreditation under the Agsafe industry program. A list of Agsafe 1080 accredited retailers can be found at http://www.agsafe.com.au/Premises.php

Alternatively you can contact Agsafe on (02) 6230 4799

Perishable (‘fresh’) 1080 pest animal bait products can be purchased from authorised perishable bait manufacturers who have a licence issued by the Department of Human Services (DHS) enabling them to prepare and sell perishable (fresh) bait such as liver for fox control or carrots for rabbit control, using APVMA registered 1080 aqueous solution. A list of authorised perishable bait manufacturers can be found at http://www.health.vic.gov.au/dpu/1080_poison.htm

Alternatively you can contact DHS on 1300 364 545 or email: dpu@dhs.vic.gov.au

What is needed to legally purchase 1080 pest animal bait products in Victoria?

Only authorised persons can legally purchase 1080 pest animal bait products in Victoria. This includes people who:

a) Hold a valid 1080 endorsed Agricultural Chemical User Permit (ACUP), or

b) Hold a valid Commercial Operator Licence (COL) with vermin endorsement or are the staff of that COL who have undertaken a Course in

Successfully completed a Course in Minimising the Risks in the Use of 1080 Pest Animal Bait Products for Vertebrate Pest Control; or

c) Hold a valid Licence to Use Pesticides (LTUP) authorising the use of pesticides formulated for the control of pest animals.

(See Landcare Note LC0367: Frequently Asked Questions: 1080 baiting of pest animals).

Are non-target species affected by 1080 pest animal baits?

Research has been carried out on the toxicity of 1080 poison to both Australian native and introduced species. This research indicates that each species has its own level of tolerance to the poison. This is a major advantage and safeguard. One of the main reasons for using 1080 is that it can be targeted quite specifically at pest species. In general, foxes, rabbits, dogs and cats are most susceptible, other mammals less so, birds even less susceptible and amphibians and reptiles the least susceptible.

The susceptibility of various species to 1080 is detailed in Appendix 1.

Herbivorous animals

Herbivores tend to be more sensitive to 1080 than granivores, insectivores and omnivores.

Secondary poisoning of carnivorous mammals

An animal that eats a poisoned carcass is exposed to the risk of secondary poisoning. Studies have found that carnivorous species commonly at risk from secondary poisoning would have to eat significant quantities (up to 3 times their own body weight) of poisoned carcass at one sitting to achieve a lethal dose. The pattern for dogs and cats is different. Both species are highly susceptible to 1080 and may readily succumb to secondary poisoning.

Birds

Bird species in southern Victoria show little interest in carrot bait, which is the main bait type used in rabbit poisoning programs. In addition to the lack of interest shown by most birds to carrot bait, many species of birds are protected from 1080 poisoning by their habits (eg. honeyeaters, treetop dwellers, etc). Species that may be exposed are the ground feeders and carnivores. However, many of these species have a high tolerance for 1080. For example, a wedge-tailed eagle would have to eat 7.5 kg of poisoned rabbit at one sitting to be killed by 1080. This is 2.5 times the average eagle’s body weight. This makes their poisoning by secondary effects highly unlikely, if not impossible, using baits at the prescribed dosages. In addition, carnivorous birds also have a tendency to vomit after ingestion of 1080, thus further reducing risk.

Reptiles and amphibians

These groups are more tolerant to 1080 than most other species. The dose required to kill them makes it highly unlikely, if not impossible, that they would ingest enough bait to achieve a lethal dose.
Fish
Fish are highly unlikely to be affected. Fish have a high tolerance requiring about 300 times the average mammalian dose to kill them.

Reduction in non-target risk
The susceptibility of non-target species to 1080 toxicity is also limited by other aspects of the poisoning program, such as the bait material and bait placement, the concentration of 1080, the use of bait refuges, buried bait and the addition of dyes.

Chopped carrot bait has been shown to be much less attractive, especially to birds, than pellets. Poisoning of non-target mammal species is lessened when the bait trail is placed in open paddocks, rather than within the bush line. The addition of dyes on baits makes them much less attractive to birds.

Bait refuges are designed to allow rabbits to feed but keep out most native animals and birds. The buried bait technique that is used to bait foxes and wild dogs significantly reduces non-target risk.

Evidence indicates that the recommended poisoned techniques will lessen threats to non-target wildlife populations, although some individual animals may be at risk.

Environmental aspects of 1080
Does 1080 occur naturally?
The Compound 1080 poison is known to occur in more than 30 species of plants in Australia, including Acacia georginae (gige) and a number of Gastrolobium (eg. heart leaf poison bush) and Oxylobium (eg. box poison bush) species. Each of these plant species has caused poisoning in domestic livestock.

Does 1080 persist in baits?
Whilst 1080 pest animal baits may remain toxic for many weeks, 1080 is generally not persistent in baits in the longer term. Some 1080 is metabolised and excreted before the death of poisoned animals. The remainder is washed out of the carcass and uneaten baits at a variable rate, dependent largely on the frequency and amount of rain and bait size.

Will 1080 contaminate water supplies?
In practice about 40-50 mm of rainfall is necessary to leach out the 1080 in the bait. 1080 will always be diluted down many-fold by other water in a watercourse and the migration of 1080 into the watercourse is delayed by the adsorption effects of the pasture / soil system. All these factors make it inconceivable that contamination of water supplies by 1080 leaching could constitute a health hazard.

In addition, the Directions for the Use of 1080 Pest Animal Bait Products in Victoria, which all 1080 bait users in Victoria must comply with, specify that 1080 pest animal baits cannot be laid within 20 metres of permanent or flowing water bodies or a domestic drinking supply.

Are there any alternative poisons?
Pindone is an anti-coagulant poison that can be used in urban areas as an alternative to 1080 for rabbit control. Pindone has an effective antidote (Vitamin K1).
Pindone is ideally suited to be used in urban situations, semi urban areas and along the urban-rural fringe. Pindone is available as a commercially prepared bait, (oats and pindone) sold as Rabbait ® / ALDI BUNNYBAIT™ Pindone oat bait.

Acknowledgements

Further information
- Contact your local landcare or friends group for further assistance and advice.
- Call the DPI/DSE Customer Service Centre on 136 186.
- Contact your local DPI Pest Management Officer for advice on local programs.

References
Persistence in baits and carcasses

Persistence and degradation in soils

**Humaneness**


**Non-target poisoning**


**General environmental and non-target species aspects**

Allen, L. *Ecological Effects of 1080 and Other Poisons*. The Queensland Rural Lands Protection Board. PESTFACT A001/87A.


**Appendix 1 Follows**
### Appendix 1: Toxicity estimates for 1080

The relative susceptibility of various species to 1080 and the corresponding quantities of poisoned baits that would be lethal (based mainly on McIlroy 1984 and 1986). Species are ranked in decreasing order to overall susceptibility.

<table>
<thead>
<tr>
<th>Species</th>
<th>LD50 (mg/kg)</th>
<th>Body weight (kilograms)</th>
<th>Carrots (0.2 mg/kg 1080) (grams)</th>
<th>Oats (0.38 mg/kg 1080) (grams)</th>
<th>Fox bait 3.0 mg/bait 1080 (number)</th>
<th>Predator bait 4.5 mg/bait 1080 (number)</th>
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<tbody>
<tr>
<td>Rabbit</td>
<td>0.37</td>
<td>1.5</td>
<td>2.78</td>
<td>1.39</td>
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<td>*</td>
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<td>Fox</td>
<td>0.12</td>
<td>4.7</td>
<td>2.82</td>
<td>1.41</td>
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<td>*</td>
<td>0.56</td>
<td>0.37</td>
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<td>Brushtail possum</td>
<td>0.67</td>
<td>2.6</td>
<td>8.71</td>
<td>4.36</td>
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<td>Wild dog</td>
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<td>16.0</td>
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<td>*</td>
<td>0.59</td>
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<td>Swamp wallaby</td>
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<td>20.0</td>
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<td>Wedge-tailed eagle</td>
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<td>Pig</td>
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<td>286.0</td>
<td>143.0</td>
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<td>12.71</td>
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<td>520.0</td>
<td>1014.0</td>
<td>507.0</td>
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</tbody>
</table>

* less than * species unlikely to consume this type of bait

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